

# **Education Reform and Development**

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## Education Reform and Development

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# Translation Dynamics: From Duality to Integration

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**Abstract:** The field of translation unfolds as a complex narrative, weaving together triumphs and tribulations, often overshadowed by instances of rejection. Translation, as an act, has undergone significant evolution, transcending mere language transfer. Modern perspectives emphasize the imperative integration of the source language author, text, translator, and recipient of the target language text, seamlessly interwoven. This integration hinges on the translator's utilization of various competencies and methodologies to acquire, retain, and effectively apply information. To navigate the intricacies of translation, scholars have devised numerous strategies and procedures to dissect the points at which translation shifts occur. Despite the diversity of approaches and the resulting terminological confusion, the field remains dynamic and ever-evolving. The quest for a universal theory of translation persists, marking an ongoing journey in this complex and multifaceted realm.

**Keywords:** Translation; Translation methods; Translation procedures

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## 1. Introduction

The narrative of translation unfolds as a complex tapestry woven with alternating episodes of triumph and sorrow, punctuated by moments of repudiation. While some translators have been generously rewarded, others paid the ultimate price for translations they might never have considered twice.

In 1546, Étienne Dolet reportedly inserted three words into his translation of one of Plato's dialogues: "And when you have died, death will also not be able to do anything, since you will be *nothing at all*"<sup>[1]</sup>. The theological faculty of Sorbonne interpreted these three words as a blasphemous renunciation of soul immortality and sentenced him to death by burning at the stake. Nevertheless, such extreme consequences are exceptions rather than the rule. In the grander scheme of things, disregard tends to prevail.

## 2. Translation: Duality Dialectics

When it comes to translation, Maurice Blanchot asserted, "One either says of it that it does not read like a translation, or one marvels at just how identical it is with its original, how it is truly one and the same work; in

both cases, something essential gets lost”<sup>[2]</sup>. Such statements, among others, allude to the duality of *free* and *literal* translation, a topic that continues to ignite heated debates in academic circles.

More recently, the discourse on *free* and *literal* translation has expanded beyond the boundaries of the text. Wolfram Wilss suggested that the longstanding issue of source language or target language-related translation has disappeared, giving way to a fresh perspective on the objective of translation, namely the achievement of a functional integration of the source language author, the source language text, the translator, and the target text recipient<sup>[3]</sup>. According to Riitta Jääskeläinen, the responsibility lies with the translator to make wise decisions regarding the most effective ways to deliver the message as faithfully as intended by the original text’s author<sup>[4]</sup>. In pursuit of this objective, the translator employs a sequence of skills and a defined set of processes that facilitate the acquisition, retention, and/or application of information. The chosen approach can thus be defined as a conscious arrangement for solving specific translation problems within a tangible task or as a potentially conscious scheme for handling difficulties encountered when translating a text or any segment thereof.

Translators may encounter challenges during the translation process, either due to a particularly intricate unit or a deficit in knowledge or skill. It stands to reason that the categories used to analyze translations make room for the study of how translation works. These categories are allied to text, context, and process, all of which fit into what Jääskeläinen termed *product-related strategies*, denoting the choice of a source text and the adoption of a translation approach, and *process-related strategies*, referring to the steps taken to achieve the goals established by the translating situation<sup>[4]</sup>.

Considering the intricate nature of translation, attempts at a general theory applicable to every possible translation situation have been of little avail. Various concepts have gained currency, with the same category expressed by different names, and dissimilar classifications overlapping to varying extents. In a nutshell, terminological confusion has given rise to a “theoretical Babel.” Many scholars have devised their own classifications, which, whether expressly or not, overlap with others due to addressing the same reality from different perspectives. The following discussion sheds light on prominent approaches that tackled the issue of meaning change, specifically in terms of manipulation, in translation.

### **3. Towards integration**

Jean-Paul Vinay and Jean Darbelnet are commonly believed to be the first to have introduced the concept of translation procedures, the aggregate of instruments engaged when commuting between two different languages. They pledged to “follow the way our mind works consciously and subconsciously when it moves from one language to another and record its progress” (page 10)<sup>[5]</sup>. Along the way, they aimed to examine the principles of translation through concrete examples, intending to develop practical methods for translation. However, they fell short of their own expectations, confining themselves to a purely contrastive level where decontextualized units of translation are analyzed, while other equally significant factors are ignored.

According to Vinay and Darbelnet, virtually any text elicits an impressive array of possible renderings, contingent on how translators evaluate their proposed solutions. The two scholars developed a comprehensive classification of translation procedures, emphasizing a systematic exploration of both the text and its suggested translation, rather than casually referring to challenges as “treason”<sup>[5]</sup>. They outlined two types of translation procedures: direct translation procedures and oblique translation procedures.

#### **3.1. Direct translation procedures**

These procedures are invoked when translators encounter gaps in the target language that need filling to achieve

the same stylistic effect without disrupting the syntactic order of the original text <sup>[5]</sup>. There are three direct translation procedures, namely:

- (1) Borrowing: Regarded as “the simplest of all translation methods” (page 31) <sup>[5]</sup>, it involves transferring a word or phrase directly to the target language, usually with the intent to bridge a conceptual gap or preserve the flavor of the source culture.
- (2) Calque: Described as “a special kind of borrowing” (page 32) <sup>[5]</sup>, it entails a language adopting an expression form and literally rendering each of its components. This process gives rise to either a lexical calque, which observes the syntactic structure of the target language while introducing a new mode of expression, or a structural calque, which inaugurates the use of new construction in the target language.
- (3) Literal translation: Also known as word-for-word translation, this is most common when translating between sister languages. It denotes the direct rendering of “a source text into a grammatically and idiomatically appropriate target text” (page 33) <sup>[5]</sup>.

### 3.2. Oblique translation procedures

Concerning oblique translation procedures, Vinay and Darbelnet posited that occasional structural or metalinguistic discrepancies might hinder the rendering of certain stylistic effects into the target language without disrupting the syntactic or lexical construction. In such cases, more complex methods could afford translators strict control over the reliability of their work. These oblique translation procedures, numbering four, include, but are not limited to:

- (1) Transposition: Operates at the grammatical level and involves the replacement of a word class while consistently maintaining the same message as the source text (page 36) <sup>[5]</sup>. This procedure may be either obligatory or optional, depending on the situation.
- (2) Modulation: Defined by Gérard Hardin and Cynthia Picot as “a change in point of view that allows the expression of the same phenomenon in a different way” <sup>[6]</sup>. It is contingent on syntactic and metalinguistic considerations (page 246) <sup>[5]</sup>. Like transposition, modulation may be either obligatory or optional, but unlike transposition, the difference between the two poles is a matter of degree (page 37) <sup>[5]</sup>.
- (3) Equivalence: Invokes cases in which languages depict the same situation in thoroughly distinct structural and stylistic methods (page 38) <sup>[5]</sup>. This procedure is often repeated in translating proverbs and idioms on account of their very culture-specific nature.
- (4) Adaptation: Aptly named “the extreme limit of translation” (page 39) <sup>[5]</sup>, it is often employed when the target culture is unfamiliar with the situation referred to by the source language message. In such cases, the source text undergoes formal and substantial changes to create an equivalent situation while adhering to the rules of the target language and culture.

The following seven translation procedures may be supplemented with other procedures:

- (1) Compensation: Occurs when a nuance defies symmetrical transfer; that is, being placed at the same point as in the original text and is therefore moved to another point in the target phrase or sentence to maintain the overall tone (page 341) <sup>[5]</sup>.
- (2) Concentration versus dissolution: Concentration happens when an expression from the source text is translated into a shorter number of words in the target text. Conversely, dissolution takes place when an expression from the source text is rendered in more words than in the original text <sup>[5]</sup>.
- (3) Amplification versus economy: Amplification occurs when the target language deploys more signifiers to bridge syntactic or lexical gaps and convey the same meaning, whereas economy is the

opposite and is typically a matter of structure (page 339) <sup>[5]</sup>.

- (4) Reinforcement versus condensation: These are variations of amplification and economy. They are used when some grammatical elements from the source language require reinforcement or condensation in the target language (page 339) <sup>[5]</sup>.
- (5) Explicitation versus implicitation: Explicitation is a stylistic translation method consisting of bringing out what lies in darkness in the source text, aiming to elucidate it based on the context or situation. Implicitation, however, applies in reverse (page 342) <sup>[5]</sup>.
- (6) Generalization versus particularization: Generalization involves translating a specific term into a more global equivalent, whereas particularization stands on the other extreme (page 343) <sup>[5]</sup>.
- (7) Inversion: Denotes the alteration of the word order or phrase structure in a sentence or paragraph so that it reads naturally in the target language (page 225) <sup>[5]</sup>.

Despite its deficiencies, Vinay and Darbelnet's approach exerted considerable influence on scholars such as Peter Newmark, who adopted the same concept as a methodological basis for his studies. However, he distinguished between translation methods, referring to the strategies applied to the entirety of the text, and translation procedures, denoting those applied to specific elements within the text <sup>[7]</sup>. Eventually, Eugene A. Nida introduced the concept of techniques of adjustment, meaning all the operations involved in the "production of correct equivalents" <sup>[8]</sup>.

According to the perspective of Eugene Nida and Charles Taber, valiant efforts had been expended on making translations preserve the form and content of the source language, but they were all doomed to abject failure <sup>[9]</sup>. In these circumstances, structural adjustments become a necessity. According to Nida, translators should decide on the closest natural equivalent. When the corresponding forms in the source and receptor languages are compared afterward, it would be noticed that they conveniently fit into modifications described as additions, subtractions, and alterations <sup>[8]</sup>:

- (1) Additions: Several types of additions may be involved in the process of translating. The most common and important of which are "filling out elliptical expressions; obligatory specification; additions required because of grammatical restructuring; amplification from implicit to explicit status ... and categories of the receptor language which do not exist in the source language" (page 227) <sup>[8]</sup>.
- (2) Subtractions: Nida asserted that subtractions, though fewer in number and variety than additions, are of paramount importance in the process of adjustment. They encompass, among other things, "repetitions; specification of reference; conjunctions ... and formulae" (page 231) <sup>[8]</sup>.
- (3) Alterations: Nida believed that "the entire text must be subjected to a series of changes ... some of them relatively radical" (page 233) <sup>[8]</sup>. Alterations can be tackled under the following headings: categories, word classes, order, clause and sentence structures, semantic problems involving single words, and semantic problems involving exocentric expressions <sup>[8]</sup>.

## 4. Conclusion

The realm of translation unfolds as a multifaceted journey marked by both triumphs and setbacks, often carrying profound consequences. From its origins as a simple transference of linguistic symbols, translation has surpassed traditional boundaries. Contemporary paradigms emphasize the crucial need for a seamless fusion of the source language author, the source text, the translator, and the recipient of the target language text. This integration is facilitated by a series of competencies and methods employed by translators to acquire, store, and wield information effectively.

In grappling with the intricacies of translation, scholars have devised various strategies and procedures, all converging toward uncovering where shifts in translation occur. Despite the diverse approaches and the ensuing conceptual perplexity they may evoke, the field remains dynamic and ever-evolving. The challenges of formulating a general theory applicable to all translation situations persist. The evolving discourse on translation increasingly reveals that it is not merely a linguistic endeavor but a complex interplay of cultural, social, and cognitive factors. Therefore, it falls upon translators to adapt and judiciously apply their skills, making informed decisions to ensure that the essence of the original text is conveyed as faithfully as possible.

## Disclosure statement

The author declares no conflict of interest.

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# The Application and Development of Shaanxi's Local Traditional Culture in University Art Education

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**Abstract:** Shaanxi, recognized as one of the significant cradles of Chinese civilization, boasts a profound cultural heritage and an abundance of intangible cultural assets. Within the realm of university art education, Shaanxi's local traditional culture has been thoroughly excavated and effectively applied. This not only fosters the preservation and development of traditional culture but also infuses new vitality into university art education. This paper delves into the various ways in which Shaanxi's local traditional culture is applied in university art education, encompassing aspects such as curriculum design, teaching methods, and event organization. Additionally, it references successful cases and explores their developmental value.

**Keywords:** Traditional culture; University art education; Innovation; Integration

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## 1. Introduction

From the current state of art education development in China, it is evident that a considerable portion of China's art education draws inspiration from foreign educational models. There is insufficient emphasis on the unique characteristics of China's national art, leading to a neglect of ethnic art cultivation. The education sector lacks appreciation and recognition of the value of local traditional culture, resulting in a disconnect between education and the protection and inheritance of cultural heritage. Traditional culture-related disciplines are relatively scarce in universities, and education fails to cultivate the social talents necessary for cultural heritage preservation. Therefore, the current state of protection and inheritance of local traditional culture in universities is not optimistic.

As a crucial component of artistic education, fine arts bear an inescapable responsibility to carry on the mission of heritage and innovation. University students represent the future mainstays who will control important aspects such as the economy, culture, and education in society. They constitute the backbone of future societal development. Cultivating in them a correct attitude and deep affection towards local traditional culture is vital to ensuring the right direction of China's future cultural policies. It is a long-term strategy for

establishing a national concept of cultural protection and an intrinsic mechanism and important pathway for the sustainable development of China's local traditional culture.

In recent years, with the continuous improvement of living standards, seeking cultural traditions and protecting cultural heritage have become a conscious pursuit of people. There is an increasing realization of the significant value that local traditional culture holds and a growing awareness of the importance and urgency of its inheritance and protection.

## **2. The inheritance and integration of Shaanxi's local traditional culture in university art education**

In university art education, the emphasis on cultivating professional talents is evident, extending from the configuration of majors to the objectives of professional training, all of which are actualized through teaching. A crucial question arises: How to elevate students' cultural literacy and artistic proficiency, acquainting them deeply with Shaanxi's local traditional culture? Furthermore, how to empower them to seamlessly merge traditional culture with modern art, resulting in the creation of artworks imbued with regional characteristics? This approach aims to cultivate art talents possessing both an innovative spirit and distinctive regional features. To effectively integrate Shaanxi's local culture into university art education, exploration can be undertaken in the following aspects.

### **2.1. Curriculum design**

University art education courses have successfully woven cultural elements distinctive to Shaanxi, including the Terracotta Army of Qin Shi Huang, Han and Tang dynasty murals, paper-cutting, and shadow puppetry. These elements are seamlessly integrated into art teaching, offering students the opportunity to appreciate the unique charm of Shaanxi's local culture while honing their professional skills. By adjusting the proportion and methodology of incorporating local culture courses, this approach not only aids in preserving and promoting the outstanding traditional culture of the Chinese nation but also enriches the essence of art education. This, in turn, enhances students' aesthetic literacy and cultural confidence.

#### **2.1.1. Establish Shaanxi local culture thematic courses, integrating elements of Shaanxi's local culture**

In university art education, it is crucial to establish a comprehensive curriculum system for Shaanxi's local traditional culture. This involves creating specialized courses in Shaanxi folk art, Shaanxi ancient architectural art, and Shaanxi traditional painting. Additionally, integrating Shaanxi's local cultural elements into foundational courses such as painting, design, and sculpture is essential. Through a systematic course structure, students can gain a comprehensive understanding of the characteristics, history, and development of Shaanxi culture. They can be systematically introduced to the unique cultural aspects of Shaanxi, including its history, geography, folklore, architecture, and art. By studying Shaanxi's local art schools, notable figures, and classic works, students can deepen their understanding of Shaanxi culture, fostering their interest and passion for local culture. For instance, courses such as "Shaanxi Folk Art," "Shaanxi Ancient Architectural Art," and "Shaanxi Traditional Painting" can be offered to allow students to systematically study Shaanxi's local art knowledge. In the art course teaching process, teachers can incorporate representative elements of Shaanxi's local culture into their teaching practices. For example, in painting courses, students can create works inspired by Shaanxi's natural landscapes, folk customs, and historical relics; in design courses, students can utilize Shaanxi's traditional patterns, colors, and materials in their creative designs. This approach enables students to

experience the unique charm of Shaanxi culture in a practical setting, thereby enhancing their artistic creativity and capabilities.

### **2.1.2. Conduct field investigations of Shaanxi's local culture and invite Shaanxi local artists to give lectures**

Organizing field investigations into Shaanxi's local culture is an important way for students to gain an in-depth understanding of Shaanxi culture. Universities can arrange for students to visit various places in Shaanxi, such as museums, cultural sites, and traditional craft workshops, allowing them to personally experience the charm of Shaanxi culture. During these field trips, teachers can conduct on-site teaching according to the actual situation, guiding students to analyze and interpret cultural phenomena from an artistic perspective, thus enhancing their aesthetic appreciation and cultural literacy. Inviting local Shaanxi artists and cultural inheritors into university classrooms to teach students or hold lectures is an effective way to bridge the gap between students and Shaanxi culture. Through the direct instruction of local artists, students can gain a more vivid understanding of the traditional techniques and creative methods of Shaanxi art, inspiring their creative ideas. Additionally, the presence of these artists can enrich the faculty resources of university art education and improve the quality of teaching.

### **2.1.3. Organize Shaanxi local culture art exhibitions and strengthen research on Shaanxi's local culture**

Universities can organize art exhibitions showcasing Shaanxi's local culture to display the charm and achievements of Shaanxi's art. Through these exhibitions, students can appreciate the masterpieces of Shaanxi's local art, understand the development of Shaanxi's art, and strengthen their identification with local culture. Additionally, these exhibitions can attract visitors from both inside and outside the university, enhancing the influence of Shaanxi's local culture. University art education should strengthen research on Shaanxi's local culture, exploring the academic and educational value of Shaanxi's art resources. Teachers can guide students to conduct research on topics related to Shaanxi's local art and encourage them to explore the connotations and extensions of Shaanxi culture from different perspectives, thereby improving students' academic literacy and innovative abilities.

## **2.2. Teaching methods**

In university art education, the selection and application of teaching methods are crucial to students' learning outcomes. When applying Shaanxi's local culture to art education, it's necessary to innovate teaching methods to stimulate students' interest in learning and to enhance their aesthetic literacy and cultural awareness.

### **2.2.1. Contextual teaching method**

Contextual teaching method refers to a teaching approach in which teachers intentionally introduce or create vivid and concrete scenarios with certain emotional elements and a focus on imagery during the teaching process. This is done to evoke students' cognitive and emotional experiences, helping them understand the curriculum and develop their psychological functions. In the teaching of Shaanxi's local culture, teachers can use multimedia technology to showcase Shaanxi's natural scenery, historical landmarks, folk activities, and more, allowing students to immerse themselves in the cultural context of Shaanxi. This approach can stimulate their interest in learning and inspire their creative ideas.

### **2.2.2. Case study teaching method**

The case study teaching method is an instructional approach that uses real-life cases as materials, allowing students to analyze, discuss, and solve problems within specific contexts. In the teaching of Shaanxi's local culture, teachers can select representative Shaanxi artworks, artists, historical events, and other relevant cases. This enables students to gain an in-depth understanding of the characteristics and development context of Shaanxi culture through in-depth case analysis. This teaching method helps enhance students' critical thinking skills and problem-solving abilities.

### **2.2.3. Experiential teaching method**

For art, sketching is the source of artistic creation, and artistic fieldwork is an essential practical component of art education. Teachers and students venture into the field to sketch landscapes, observe the surrounding environment, quickly capture object characteristics, conduct thematic research activities, appreciate the natural charm, comprehend genuine emotions, find materials, ignite creative inspiration, exchange creative experiences and insights, and create artistic images that touch the soul. University teachers and students move from the classroom to society, combining theory with practice. They engage in rural development, examine local cultural resources, and address real-world issues. They express their emotions through creation, design, papers, and other forms, providing valuable recommendations for local cultural development and cultural tourism industry construction. They may also create innovative products to support rural development and actively participate in local cultural and economic development. In the teaching of Shaanxi's local culture, experiential teaching can be manifested in two aspects: field teaching, where teachers can organize students to visit museums, cultural sites, and traditional craft workshops, and conduct on-site investigations and experiences in various places in Shaanxi. This allows students to personally experience the charm of Shaanxi culture and deepen their understanding of Shaanxi's local culture through practical experience. The second aspect is creative practice, where teachers can guide students to create art such as painting, design, and sculpture with Shaanxi culture as the theme. This helps students improve their artistic literacy through practical experience.

### **2.2.4. Interdisciplinary teaching method**

Interdisciplinary teaching refers to the integration of knowledge from different disciplines, guiding students to analyze and solve problems from multiple perspectives and fields. In the teaching of Shaanxi's local culture, teachers can collaborate with teachers from other disciplines such as history, folklore, and philosophy. They can introduce Shaanxi culture-related knowledge into art courses, enabling students to gain an in-depth understanding of Shaanxi culture from different perspectives and enhancing their comprehensive qualities.

## **2.3. Event hosting**

In university art education, organizing various exhibitions, lectures, and activities, and inviting local artists and cultural scholars to teach, allows students to directly connect with the essence of Shaanxi's local culture and ignite their love for and innovative awareness of local culture. In university art education, organizing various activities is an essential means to enhance students' interest in learning, develop their practical abilities, and strengthen their teamwork spirit.

### **2.3.1. Hosting Shaanxi local culture art exhibitions, cultural lectures, and seminars**

Universities can host Shaanxi local culture art exhibitions to showcase the charm and achievements of Shaanxi's art. Through these exhibitions, students can appreciate the masterpieces of Shaanxi's local art, understand the development context of Shaanxi's art, and strengthen their identification with local culture. Furthermore,

the exhibitions can attract both university and external visitors, enhancing the influence of Shaanxi's local culture. Universities can also organize seminars, lectures, and other activities, inviting experts and scholars. These events provide students with a deeper understanding of Shaanxi culture's history, characteristics, and artistic value, expanding their academic horizons. Additionally, these events promote academic exchange and intellectual collision, inspiring students' innovative ideas.

### **2.3.2. Hosting Shaanxi local culture-themed creative competitions and research exhibitions**

Universities should strengthen academic research on Shaanxi's local traditional culture, exploring its academic and educational value. Teachers can guide students to research Shaanxi's local art topics, encouraging them to explore the depth and breadth of Shaanxi culture from various perspectives, thus enhancing students' academic literacy and innovation capabilities. Universities can organize Shaanxi's local culture-themed creative competitions, encouraging students to apply their knowledge to artistic creation and express their understanding and love for Shaanxi culture. The competition can include multiple categories such as painting, design, and sculpture, allowing students to express their interpretation and affection for Shaanxi culture through their creations. Moreover, inviting experts to form judging panels to evaluate and provide feedback on the entries can boost students' motivation and improve the quality of their artwork. Encouraging students to conduct research on Shaanxi's local culture and hosting research results exhibitions is essential. Students can present their research findings and cultural insights through various formats like papers, reports, exhibitions, etc. This approach enhances students' research capabilities while promoting cultural exchange and academic collaboration on and off campus.

### **2.3.3. Establishing Shaanxi local culture practice bases**

University art education is not confined to a single mode but is an applied and diversified development of quality education. It serves as an important and effective way to enhance students' comprehensive qualities and practical abilities. Apart from classroom teaching, various extracurricular activities in art become the second classroom for students' all-around development. To cultivate students' teamwork spirit, aesthetic literacy, and humanistic qualities, universities should establish a good learning platform, offering students various places for extracurricular learning, communication, and research, such as campus libraries, sports facilities, museums, and practical experience halls. By fully utilizing the beautiful environment and advanced facilities provided by modern university construction and the comprehensive, open features of digital construction, students can engage in art-specific education. They can visit places, engage in practical activities, and have firsthand experiences of the unique services offered by various halls. This encourages students to efficiently utilize university resources to enhance their knowledge and skills. Universities can also collaborate with local museums, cultural sites, traditional craft workshops, and more to establish Shaanxi's local cultural practice bases. Through these practice bases, students have the opportunity to interact with the practical aspects of Shaanxi's local culture and gain in-depth insights into and experiences of the traditional techniques and creative methods of Shaanxi art. Additionally, the practice bases can provide students with internship and training opportunities, enhancing their practical skills and competitiveness in the job market.

## **3. Expansion and innovation of Shaanxi local traditional culture in higher education in fine arts**

Outstanding traditional culture represents the tireless efforts and struggles of generations and is the crystallization of wisdom and wealth of civilization. With the development of industrialization and the market

economy, some time-consuming and complex handicrafts, such as embroidery, batik, and shadow puppetry, face various practical problems. The learning time and the number of people involved in the traditional art inheritance are not as abundant as before <sup>[1]</sup>. Given this situation, higher education in fine arts should take it as its mission to protect local culture and folk art with distinctive features, strengthen cooperation with local governments, undertake teaching and research work related to ethnic and local cultures, enhance teaching reform and innovation in the inheritance and development of traditional culture, and construct new ideas and models for the development of cultural and creative industries. This should be done while actively carrying out targeted training and exchange activities for professional talents, seeking new ways and paths for cultural and artistic industry development in practice and practical training, providing suggestions for local development, and pooling wisdom and efforts.

In terms of talent cultivation, higher education in fine arts should make a rational analysis of traditional culture, guide college students to attach importance to traditional culture in their thoughts, defend traditional culture in their actions, and develop traditional culture through innovation. By organizing academic exchanges and forums, and sharing outstanding achievements and successful experiences, traditional culture should adapt to the trends of modern society, enter the public's field of vision, improve college students' cultural and artistic accomplishment, encourage young students to innovate and start businesses related to rural culture, use resource advantages and new technological platforms to rejuvenate local outstanding traditional culture and expand its dissemination. This will gain recognition from more people in society, and use the advantages of modern industry to drive intangible cultural heritage and handicrafts towards market-oriented development. Colleges and universities should strengthen the construction of professional cooperation and cultivate a young group of talents in art inheritance, forming a talent echelon. In recent years, the integration and development of Shaanxi's local traditional culture and higher education in fine arts have achieved many results <sup>[2]</sup>. Here are some successful cases:

- (1) Xi'an Academy of Fine Arts: Xi'an Academy of Fine Arts actively incorporates Shaanxi local culture into art education, using folk art such as Shaanxi paper-cutting, shadow puppetry, and clay sculpture as teaching materials. This approach guides students to deepen their understanding and learning of Shaanxi's traditional culture. The institution has also established the "Shaanxi Folk Art Research Center," dedicated to the inheritance and innovation of Shaanxi's local culture.
- (2) Shaanxi Normal University: Shaanxi Normal University emphasizes the inheritance and promotion of Shaanxi traditional culture in art education. For example, it includes Shaanxi calligraphy, painting, and seal cutting as part of its curriculum, cultivating students' awareness and love for Shaanxi's traditional culture. The university has also organized the "Shaanxi Traditional Culture Art Exhibition," showcasing students' artistic creations.
- (3) Xi'an University of Technology: Xi'an University of Technology integrates elements of Shaanxi local culture into its art education, with projects such as "Incorporating Shaanxi Folk Art into Art Education." The university collaborates with local folk art groups to organize students' participation in practical activities and creative work related to folk art, enhancing students' practical skills and innovative consciousness.
- (4) Shaanxi University of Science and Technology: Shaanxi University of Science and Technology focuses on incorporating Shaanxi traditional culture into art education, using forms of art such as Shaanxi clay sculpture, wood carving, and embroidery as teaching materials, enhancing students' artistic accomplishment and their identification with traditional culture. The university has also established the "Shaanxi Folk Art Workshop," encouraging students to engage in innovative artistic creation.

- (5) Xi'an University of Architecture and Technology: Xi'an University of Architecture and Technology incorporates elements of Shaanxi traditional culture into its art education, using art forms such as Shaanxi ancient architecture, gardens, and stone carving as teaching content. This helps students gain a deeper understanding and appreciation of Shaanxi's traditional culture. The university has also organized the "Shaanxi Traditional Culture Art Exhibition," showcasing students' artistic creations.

These successful cases demonstrate that the integration of Shaanxi's local traditional culture into higher education in fine arts is an important way to promote Shaanxi culture. By incorporating Shaanxi's local traditional culture into higher education in fine arts, colleges and universities can enrich their teaching resources, improve students' artistic accomplishment and innovation ability, and promote the inheritance and development of Shaanxi's traditional culture.

## 4. Conclusion

Higher education in fine arts plays a significant role in the expansion and innovation of traditional local culture in Shaanxi. Integrating Shaanxi's local culture into fine arts education enriches teaching resources, cultivates students' artistic literacy and innovative abilities, and promotes the inheritance and development of Shaanxi's traditional culture. To achieve this goal, universities can take various measures, including organizing exhibitions, lectures, seminars, conducting art creation competitions, and showcasing research achievements. Establishing practical bases and enhancing interdisciplinary cooperation are also essential. These initiatives will help higher education in fine arts better inherit and promote Shaanxi's local traditional culture, nurture artistic talents with regional cultural characteristics, and contribute to the development of local culture.

## Disclosure statement

The author declares no conflict of interest.

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# Safety Management in Chinese University Biochemical Laboratories: A Strategic Approach

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**Abstract:** This article examines safety management in Chinese university biochemical laboratories, emphasizing the need for improved safety awareness and standardized practices. The study analyzes challenges such as inadequate safety consciousness among researchers, risks associated with chemical reagents, and equipment-related hazards. Comparative insights are drawn from international safety management systems, particularly those in Australian universities. The research proposes solutions including the establishment of a laboratory admission system, strict management of chemical reagents, and the standardization of experimental instrument usage. The findings underscore the importance of rigorous safety protocols and preventive measures to mitigate accidents in university biochemical laboratories.

**Keywords:** Biochemical laboratory safety; University research laboratories; Hazard management

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## 1. Introduction

University biochemical laboratories are crucial sites for conducting biochemical experimental teaching and research projects, serving as essential bases for talent cultivation. These laboratories house a large number of instruments and equipment and extensively use various hazardous chemicals, narcotic drugs, bacteria, and other biological materials. The experimental operations often involve high temperatures, high pressures, and high-speed centrifugation, all of which can lead to complex and varied safety risks, making the safety management of biochemical laboratories more intricate<sup>[1]</sup>.

Laboratory safety management is not only a prerequisite and guarantee for the normal conduct of teaching, research, and service work in universities but also constitutes an important aspect of university campus construction. In recent years, with the continuous expansion of university laboratories, the variety of experimental instruments, equipment, and consumables has also increased, underscoring the significance of laboratory safety management.

In May 2019, the Ministry of Education of China issued the “Opinions on Strengthening Laboratory Safety Work in Universities,” which emphasized the need for the education system to establish a concept of safe development. It is crucial to learn from past safety accidents and significantly enhance the safety management

capabilities and standards of university laboratories, ensuring the safety and stability of the campus and the life safety of teachers and students. Therefore, universities should strengthen the safety management of scientific research laboratories, and institutionalize, concretize, and normalize safety work to ensure the personal safety of teachers and students and the property safety of the institute <sup>[2]</sup>.

## **2. Issues in Chinese biochemistry laboratories**

### **2.1. Weak safety awareness among research personnel**

With the expansion of universities and the increasing number of undergraduates and postgraduates utilizing research laboratories, there has been a rise in personnel turnover, leading to increased safety pressures in these laboratories. Currently, most universities emphasize teaching and research performance indicators, neglecting laboratory safety assessment indicators. This situation has fostered a mindset among university teachers that prioritizes research activities while overlooking safety management.

Simultaneously, some universities lack necessary laboratory safety education and emergency response training for teachers and students. Many researchers have a scant understanding of basic safety knowledge and exhibit weak safety awareness. For instance, some students lack proper protective awareness and the ability to handle emergencies. They conduct chemical experiments without wearing lab coats or safety goggles, are unaware of the location of fire extinguishers and other firefighting equipment nearby, and do not know how to use them.

Furthermore, some researchers with indifferent safety consciousness handle toxic volatile reagents (like acetic acid, chloroform, and methanol) outside fume hoods, touch nucleic acid dyes without protective gloves during DNA gel electrophoresis, dispose of volatile or toxic waste liquids directly in sinks, and carelessly throw biological solid waste into regular trash bins.

### **2.2. Safety hazards associated with chemical reagents used in experiments**

In biochemical teaching experiments, reagents that are flammable, explosive, corrosive, volatile, toxic, or teratogenic are frequently employed. For instance, during the extraction and identification of nucleic acids from animal tissues, the use of strong acids like trichloroacetic acid for protein precipitation and concentrated sulfuric acid for nucleic acid identification can pose burn risks due to improper handling by students. Chloroform, utilized for RNA extraction from tissues and cells, exhibits strong volatility and significant hepatotoxicity. Barbiturates, used in serum protein acetate cellulose membrane electrophoresis, have central inhibitory effects and are harmful to the human body. Ethidium bromide, employed in agarose gel electrophoresis for plasmid DNA identification, is a highly sensitive fluorescent dye and is generally considered a strong mutagen that can insert into DNA molecules, causing base mismatches. Acrylamide and bis-acrylamide, used in polyacrylamide gel electrophoresis for protein separation, are neurotoxic and can be absorbed through the skin and respiratory tract. If students do not pay attention to personal protection during experiments, they may easily jeopardize their health. Improper storage of flammable and volatile reagents can lead to serious accidents such as fires or explosions. Additionally, the careless disposal of these harmful waste liquids can cause severe environmental damage.

Beyond teaching experiments, the hazardous chemicals used in research laboratories involve a broader and more complex range of flammable, explosive, volatile, toxic, and teratogenic substances compared to those used in teaching laboratories. The variety of instruments and equipment is wider, with more dangerous devices and large-scale instruments being used more frequently and for longer periods. Some imported equipment is also highly expensive. Biological materials are more complex, encompassing various bacteria, viruses, clinical

pathological specimens, transgenic animals, various pathological animal models, and constructed plasmids. All these factors amplify the safety hazards and management difficulties in laboratories <sup>[3]</sup>.

### **2.3. Safety hazards of experimental instruments and equipment**

Biochemical laboratories are equipped with a variety of instruments, including autoclaves, laminar flow hoods, high-speed centrifuges, constant temperature water baths, electrophoresis apparatus, electric stoves, gas cylinders, and micropipettes. These instruments and equipment come with strict operating procedures, and failure to adhere to these can easily result in equipment damage and serious safety incidents.

For instance, students using centrifuges may, in an attempt to save time, neglect precise sample balancing, relying instead on visual inspection of the scale lines or improperly positioning samples. This can cause the rotor to tilt and, in severe cases, detach, leading to potential injury. When using an electrophoresis apparatus, removing the gel without disconnecting the power can pose the risk of electric shock. Operating a laminar flow hood without first turning off the UV sterilization lamp may result in prolonged exposure to UV light, causing retinal detachment and skin burns. Additionally, the simultaneous use of multiple high-power electrical appliances in teaching laboratories with aging electrical circuits can lead to overloading and electrical risks in the laboratory.

### **2.4. Irrational internal division of laboratory spaces**

Many university laboratories in China are overcrowded, with numerous people and limited space. Instruments, equipment, and consumables fill these laboratories, most of which lack a separate preparation room. Laboratory coats are often hung in the study area or inside the laboratory itself, and there is no clear division of areas for washing. Activities such as washing hands, general laboratory equipment cleaning, and the cleaning of contaminated laboratory equipment often take place at the same sink. In some cases, study areas are located within the laboratory, increasing safety risks <sup>[4]</sup>.

## **3. Suggestions for Chinese biochemical laboratories**

### **3.1. Enhance safety awareness among research personnel and establish a laboratory admission system**

Using Western Sydney University in Australia as a benchmark, the university employs a robust Work Health and Safety Management System. It has established a dedicated Work Health and Safety Unit (WHSU), staffed by a professional team responsible for managing work health and safety, emergency management, and workers' compensation. This department, guided by the New South Wales Work Health and Safety Act and the specific needs of the university's research and teaching, has developed tailored policies, regulations, and systems.

Furthermore, the university has instituted a Health and Safety Committee, comprised of representatives from the entire university staff. This committee is responsible for discussing and summarizing safety incidents, assisting WHSU in enhancing existing policies, regulations, and systems, and providing consultation on health and safety for teachers and students <sup>[5]</sup>.

For individuals entering the laboratory, whether they are teachers, students, or researchers, mandatory laboratory induction training is required. This training consists of two components: self-study of laboratory safety training materials and on-site training conducted by laboratory managers. During a scheduled appointment, the laboratory manager guides applicants through a comprehensive laboratory tour, explaining relevant safety knowledge. This includes basic laboratory rules and regulations, the location and use of emergency facilities, experimental safety protection facilities, precautions for using various instruments and

equipment, chemical storage standards, waste disposal procedures, and precautions for entering the laboratory outside of regular working hours.

Following the training, the applicant acknowledges their commitment to safety by signing a safety agreement. Subsequently, the laboratory manager grants access permissions to the corresponding rooms. For large and complex equipment, specialized experimental technicians provide operational training, and usage is permitted only after the successful completion of this training. Before commencing experiments, a laboratory risk assessment form must be submitted. This form details the experimental plan, required equipment and consumables, potential risks involved, specific incidents that might occur for each type of risk, and prevention and control methods. For experiments involving hazardous chemicals, the laboratory risk assessment form should specify the chemical names (e.g., alcohol) and their characteristics (flammable), storage and usage precautions, potential dangers, and response measures<sup>[6]</sup>.

### **3.2. Strengthen the management of chemical reagents and replace dangerous reagents where possible**

At the conclusion of each semester, the quantity of reagents, such as hydrochloric acid and chloroform, needed for the next semester is determined based on the inventory of hazardous chemicals and the number of scheduled experimental courses and classes. A written application is then submitted to the university's Laboratory and Asset Management Department and registered with the city's public security bureau. Following approval by university and college leaders, these reagents are purchased through the Laboratory and Asset Management Department and received and registered by two individuals.

To ensure the correct and safe storage of hazardous chemicals, the college invites professional organizations to conduct training on the storage of hazardous chemicals. Additionally, assessments for laboratory management personnel on the knowledge of the use and storage of hazardous chemicals are organized. Laboratories store hazardous chemicals separately from regular reagents, with solid and liquid hazardous chemicals, flammable, explosive, and volatile reagents stored individually. Regular ventilation of hazardous chemical cabinets is necessary to prevent dangerous concentrations of reagents.

When using hazardous chemicals, double registration is required, noting the usage time, quantity, and inventory to facilitate tracking of reagent usage. To actively promote reform in experimental teaching, experiments that involve significant risk and use a large number of hazardous chemicals are modified to find substitutes. This helps in reducing the risk to students. For example, nucleic acid extraction experiments now utilize reagent kits, leading to a significant reduction in the use of hazardous chemicals. Borate buffer solution replaces the anesthetic barbiturates in acetate cellulose membrane electrophoresis of serum proteins, and non-toxic or low-toxic nucleic acid dyes replace the carcinogenic ethidium bromide in agarose gel electrophoresis for DNA identification.

### **3.3. Standardization in the use of experimental instruments**

Prior to the commencement of laboratory classes, technical staff should diligently inspect and adjust equipment such as centrifuges, electrophoresis apparatus, constant temperature water baths, and electrophoresis tanks. If any issues are identified, they should be promptly rectified by replacing faulty instruments, and ensuring that students do not utilize malfunctioning equipment.

It is essential to standardize student experimental procedures, which includes practices such as refraining from storing flammable and volatile reagents in refrigerators and ovens, ensuring proper sample balancing in centrifuges, and monitoring water levels in constant temperature water baths, and disconnecting power before removing gels from electrophoresis tanks. Additionally, installing cameras at the front and back of teaching

laboratories can aid in promptly identifying and correcting improper instrument usage, thereby ensuring the safe operation of equipment.

For more complex instruments, it is advisable to create pre-recorded standard operating procedure videos in advance. These videos can cover a range of equipment, such as low-speed and high-speed centrifuges, adjustable micropipettes, UV spectrophotometers, PCR machines, nucleic acid and protein detectors, gel imaging systems, and others. Students can access these instructional videos online before class, facilitating standardized equipment usage and effectively reducing the likelihood of equipment damage and accidents.

### **3.4. Rational division of laboratory areas and standardization of experimental procedures**

Animal laboratories, utilized for scientific research involving experimental animals, differ from general laboratories. Standardized animal laboratory structures must adhere to the regulations of various departments and meet the functional requirements of animal experiments. The basic structure of an animal laboratory should include a changing room, air shower room, clean corridor, preparation room, operation room, dirty corridor, and washing and disinfection room. This setup aims to prevent potential hazards within the laboratory area from causing harm to personnel and effectively reduce pollution risks to the surrounding environment <sup>[7]</sup>.

For example, in an animal laboratory, research personnel enter the facility by swiping their card at the entrance. They proceed to the first changing room to hang their coats in a designated area and disinfect their hands with alcohol. Then, they move to the second changing room to don isolation suits, masks, goggles, and gloves before passing through the air shower in the air shower room. Upon entering the animal room, they change into slippers at a designated spot, retrieve necessary items and disinfectant in the inner preparation room, and conduct experiments in the animal operation room.

After completing the experiment, personnel must wipe down the experimental operation table, sweep the floor, mop, and spray disinfectant before leaving the operation room. They exit the barrier facility through the contaminated buffer zone, removing and placing isolation suits, goggles, gloves, masks, and hair caps in designated spots. Finally, they return to the signature room to retrieve personal items and record their activities, placing slippers in a designated area.

## **4. Conclusion**

The study conclusively highlights the critical need for enhanced safety management in Chinese university biochemical laboratories. It identifies key challenges such as the lack of safety awareness among researchers, the inherent risks of chemical reagents, and the potential hazards posed by laboratory equipment. By examining successful international models, notably from Australian universities, this research offers a pathway toward implementing more effective safety protocols in Chinese institutions.

The proposed solutions, including the establishment of a laboratory admission system, rigorous management of chemical reagents, and standardization of experimental equipment usage, are not only practical but also pivotal in mitigating risks. These strategies aim to cultivate a culture of safety, ensuring that both students and faculty are well-versed in the best practices of laboratory safety.

This research underscores the importance of an ongoing commitment to safety, suggesting that continuous evaluation and adaptation of safety measures are essential in the ever-evolving landscape of scientific research. The study's insights and recommendations serve as a valuable guide for universities seeking to bolster their laboratory safety protocols, ultimately contributing to a safer, more productive academic research environment.

## Disclosure statement

The author declares no conflict of interest.

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# Preschool Teacher Development in China: Insights from Japan and South Korea's Responses to Population Aging

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**Abstract:** With the declining birth rate and the exacerbation of aging in China, the construction of preschool education teacher programs faces unprecedented challenges. To address these challenges, it is imperative to draw insights from the successful experiences and lessons of Japan and South Korea. Both countries have adopted different strategies in response to their population crises, particularly in the realm of preschool education teacher development. By conducting a comparative analysis of these strategies, the commonalities and differences can be identified. An urgent task is to improve the provision of nursery services for children under three years old, enhance incentives for childbirth, and establish an early warning mechanism for population trends to optimize the allocation of educational resources. Additionally, efforts should focus on enhancing the quality of teachers and expanding employment opportunities to mitigate the impact of the population crisis on the high-quality and balanced development of preschool education teachers.

**Keywords:** Population forecast; Demand for educational resources; Experience and lessons

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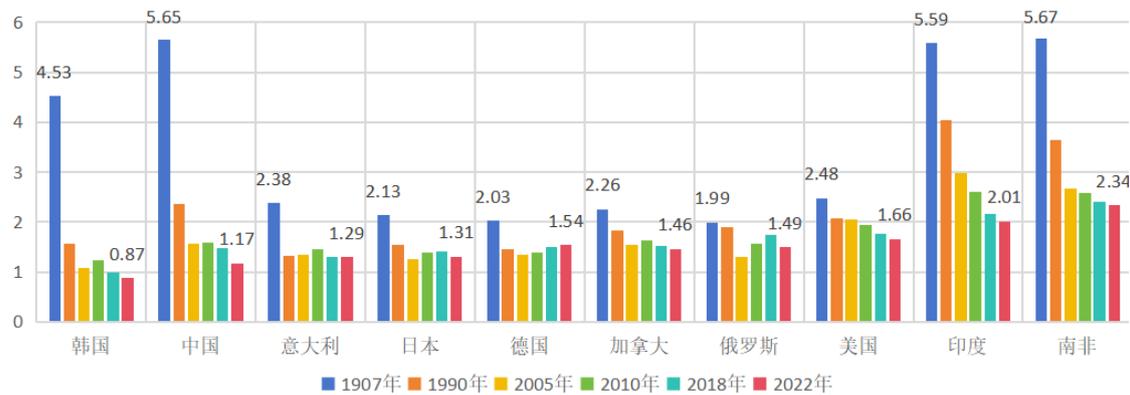
## 1. Introduction

The aging population and the persistent decline in birth rates present a challenging scenario for China's population dynamics. The dwindling fertility rate poses a serious threat to the development of the national education ecosystem, with far-reaching implications for the education system as a whole. Particularly in the realm of preschool education, adapting to the shifting population demographics has emerged as a pressing concern. Against this backdrop, the experiences and insights gleaned from Japan and South Korea in the realm of preschool education teacher training hold significant relevance.

In 2023, South Korea recorded its lowest-ever birth rate, with only 235,000 births, marking a decline of over 120,000 births. According to the "Population Trends in May 2023" report by the Korea Census Bureau, released on July 26, 2023, there were 18,988 newborns in South Korea in May alone, reflecting a year-on-year decrease of 5.3% <sup>[1]</sup>. Similarly, Japanese newspaper Asahi Shimbun reported on January 3, 2023, that Japan also witnessed the lowest-ever record of 722,000 newborns. China's birth population in 2023 also hit a historic

lowest of 9.02 million, with a fertility rate even lower than that of Japan. This grim reality underscores the bleak outlook of population development in these three East Asian nations.

The fertility rate serves as a crucial indicator of a country's demographic health. According to the United Nations' World Population Prospects 2022 report, the top 10 countries with the lowest fertility rates include South Korea (0.874‰), Singapore (1.035‰), Andorra (1.135‰), San Marino (1.138‰), China (1.175‰), Malta (1.25‰), Ukraine (1.27‰), Spain (1.29‰), Italy (1.29‰), and Japan (1.31‰), as depicted in **Figure 1** (data sourced from the United Nations' World Population Prospects statistical data).



**Figure 1.** 1907–2022 statistical changes in the total fertility rate of major countries in the world. Left to right: South Korea, China, Italy, Japan, Germany, Canada, Russia, U.S.A., India, South Africa.

**Figure 1** illustrates the substantial decline in fertility rates across the three East Asian countries over the past century, positioning them among the global leaders in this demographic trend. Looking ahead, South Korea's population is projected to experience exponential decline, closely followed by China, further accentuating the urgency of addressing population-related challenges.

## 2. The current configuration of preschool teachers

### 2.1. The development of preschool education

#### 2.1.1. South Korea

The Ronam Kindergarten, founded by Mr. Shizong Zheng in 1909 in North Hamgyong, stands as the earliest kindergarten in South Korea. Following this, the first public kindergarten, Cheongju Kindergarten, was established in 1947. Subsequently, South Korea implemented policies such as the “Kindergarten Education Curriculum” in 1969 to foster the growth of preschool education. This marked the onset of rapid advancement in South Korean preschool education.

From the 1970s onward, the predominant presence in South Korean preschool education gradually shifted from private to public entities. By the early 21st century, South Korean preschool education has achieved a degree of standardization. In 2004, South Korea enacted the “Early Childhood Education Law,” providing a legal framework for preschool education. The law underwent revisions in 2012 to stipulate that the state and local governments would bear the full or partial costs of preschool education for children belonging to specified categories as per the “National Basic Life Security Law” and presidential decrees <sup>[2]</sup>.

In 2018, the Ministry of Education in South Korea introduced the “Basic Plan for the Development of Early Childhood Education (2018–2020),” aimed at broadening early childhood education opportunities, balancing and expanding public education across all regions, continually easing parental financial burdens, fortifying support and management systems for private kindergartens, and fostering new avenues for development <sup>[3]</sup>.

### 2.1.2. Japan

In 1872, the Meiji government enacted Japan's first modern educational ordinance, known as "The School System Ordinance." Subsequently, in 1876, Japan established its inaugural kindergarten, the Tokyo Women's Normal School Kindergarten, marking the inception of public preschool education in the country. By 1890, Japan had established its first crèche, followed by the promulgation of the initial official ordinance on early childhood education in 1899, titled "Regulations on Kindergarten Care and Equipment." At that time, Japan boasted 229 kindergartens with over 20,000 enrolled children <sup>[4]</sup>.

In 1926, Japan introduced its first comprehensive preschool education ordinance, "The Kindergarten Ordinance." Despite fluctuations due to World War II, the number of kindergartens in Japan experienced growth and subsequent decline. By 1985, Japan counted 15,220 kindergartens nationwide, with 41% being public institutions, and enrollment surpassing 2 million children <sup>[5]</sup>. During the 1960s, Japan launched several pivotal initiatives to invigorate preschool education, including the "7-Year Plan for Early Childhood Education" in 1962, the "10-Year Plan for the Revitalization of Early Childhood Education" in 1972, and the "Revitalization Plan for Early Childhood Education" in 1991. These plans aimed to ensure universal access to kindergarten education for all 3 to 5-year-olds within the subsequent decade, allocating special funds from the budget for kindergarten construction or renovation.

By 1980, kindergarten enrollment had surged to 2.4 million children, marking a tenfold increase over the preceding 30 years. On June 1st, 2023, the Future Children Strategy Committee reviewed and endorsed the "Draft Future Children Strategy," intending to foster high-quality development in preschool education, reduce childcare burdens, and realize a "universal child daycare system for all" <sup>[6]</sup>.

### 2.1.3. China

During the late Qing Dynasty, the first education system, known as the "Imperial School Regulations," was promulgated in 1902. This marked the initial integration of preschool education into the Chinese educational framework. In 1903, the Qing government established China's first kindergarten, the "Hubei Kindergarten," followed by the promulgation of the "Guimao Xuezhì" ( 癸卯学制 ) legislation in 1904. This officially incorporated preschool education into the national education system, thereby establishing China's public preschool education system.

At the inception of New China in 1949, there were 1,300 kindergartens nationwide, with over 130,000 children enrolled. In 1950, China adopted international preschool education experiences and models, leading to the issuance of the "Decision on Reforming the School System" in 1951. This decision marked a significant milestone in the scientific and planned development of preschool education in China. However, during the period from 1966 to 1976, preschool education in China faced severe disruptions and stagnation.

Following the reform era, preschool education development gradually regained momentum. The state enacted the "Regulations on Kindergarten Work (Trial)" to underscore the crucial role of preschool education. From 1977 to 2000, the total number of kindergartens in China surged to over 180,000. However, state-owned enterprise reforms led to the "closing, merging, and transforming" of kindergartens, resulting in a rapid reduction to over 110,000 kindergartens.

Since 2001, the state has issued multiple directives, including the "Outline of Preschool Education Guidance (Trial)," fueling rapid development in kindergartens. By 2022, the gross enrollment rate of preschool education had reached 89.7%. Over the past two decades, the number of children enrolled in kindergartens has more than doubled <sup>[7]</sup>.

## 2.2. The current situation of preschool education teacher development

### 2.2.1. The current situation of teacher development

With the advancement of society and increased government attention, China, Japan, and South Korea have achieved remarkable progress in preschool education. Resources for preschool education have seen continuous improvement and enrichment, and both the quantity and quality of teachers have undergone rapid development (Table 1). However, in recent years, issues in preschool education have been on the rise due to population aging. Challenges include regional disparities in educational resources, the coexistence of “teacher shortage” and “teacher surplus,” and significant attrition among rural preschool teachers. These factors contribute to escalating conflicts between the phenomenon of teacher vacancies and the clustering of teachers in urban areas.

**Table 1.** The number of on-campus children, preschool teachers, and the development of kindergartens in China, Japan, and South Korea from 2011 to 2022

Year	China			Japan			South Korea		
	On-campus children	Preschool teachers	Kindergartens	On-campus children	Preschool teachers	Kindergartens	On-campus children	Preschool teachers	Kindergartens
2011	3,424.45	131.56	16.68	159.62	11.04	1.33	56.48	3.87	0.84
2012	3,685.76	147.92	19.86	160.42	11.08	1.32	61.37	4.22	0.85
2013	3,894.70	166.35	19.86	158.36	11.11	1.30	65.82	4.61	0.87
2014	4,050.71	184.41	20.99	155.75	11.11	1.29	65.25	4.85	0.88
2015	4,264.83	205.10	22.37	140.24	10.15	1.17	68.26	5.10	0.89
2016	4,413.86	223.21	23.98	133.98	9.99	1.13	70.32	5.29	0.90
2017	4,600.14	243.21	25.50	127.19	9.78	1.08	69.35	5.38	0.90
2018	4,656.42	258.14	26.67	120.79	9.56	1.05	67.60	5.49	0.90
2019	4,713.88	276.31	28.12	114.56	9.36	1.01	63.35	5.34	0.88
2020	4,818.26	291.34	29.17	107.85	9.18	0.97	61.22	5.37	0.87
2021	4,805.21	319.10	29.48	100.90	9.02	0.94	58.22	5.36	0.87
2022	4,627.55	324.42	28.92				55.28	5.37	0.86

The data are obtained from the following websites: Chinese Ministry of Education “Annual Education Statistics of the Year of History” ([http://www.moe.gov.cn/jyb\\_sjzl/](http://www.moe.gov.cn/jyb_sjzl/)); Japanese Ministry of Education, Culture, Sports, Science and Technology (<https://www.mext.go.jp/>); Korean National Statistical Service’s (<https://kostat.go.kr/portal/korea/index.action>).

### 2.2.2. The situation of preschool teacher staffing

In terms of enrollment rates (Table 2), Japan has essentially achieved full coverage of preschool education. China’s kindergarten enrollment rate reached 89.7% in 2022, marking a 27.4 percentage point increase from 2011. However, South Korea’s kindergarten enrollment rate remains relatively low, with less optimistic development over the past decade.

Furthermore, regarding the student-to-teacher ratio, both Japan and South Korea maintain lower ratios, which have steadily declined over the years. In 2011, China’s student-to-teacher ratio was 1.8 times higher than that of Japan and South Korea. However, significant reductions have occurred over the past decade, narrowing the gap. Nonetheless, there remains a shortage of kindergarten teachers.

Additionally, the impact of population aging on the preschool education teacher workforce is becoming increasingly evident. In Japan and South Korea, the unemployment rate among kindergarten teachers has risen annually due to population aging. China’s construction of preschool education teachers will also encounter substantial challenges in this regard.

**Table 2.** The enrollment rate and the teacher-student ratio of kindergartens in China, Japan, and South Korea from 2021 to 2022

Year	The student-teacher ratio			The enrollment rate (%)	
	China	Japan	South Korea	China	South Korea
2011	26.1	14.5	14.6	62.3	41.1
2012	24.9	14.5	14.5	64.5	44.2
2013	23.4	14.3	14.3	67.5	47.4
2014	22.0	14.0	13.4	70.5	47.3
2015	22.8	13.8	13.4	75.0	49.4
2016	19.8	13.4	13.3	77.4	50.7
2017	18.9	13.0	12.9	79.6	50.7
2018	18.0	12.6	12.9	81.7	50.6
2019	17.1	12.2	11.9	83.4	48.7
2020	16.5	11.7	11.4	85.2	49.0
2021	15.1	11.2	10.9	88.1	50.6
2022	14.3	10.5	10.3	89.7	52.7

Japan launched the “Second Kindergarten Promotion Plan” in 1972 and subsequently achieved full preschool education coverage, thus the enrollment rate is not further analyzed.

### 3. The demand for preschool education resources in the context of low fertility rates

#### 3.1. South Korea

Data from the South Korean Statistical Agency reveals that over half of the regions in South Korea have experienced a significant decline in newborn numbers. Over the past four years, more than 8,000 kindergartens have been forced to close, resulting in a substantial number of unemployed or redeployed early childhood educators. The government’s 2022 educational statistics indicate that small-scale kindergartens, each with one class, constitute 49.6% of all public kindergartens in the country. In comparison with 2018, kindergarten enrollment has decreased by 18.2% in 2022 and is projected to decline even further over the next five years, with an anticipated 32% decrease from 2022. The population of 3–5-year-old children (in ten thousand people) has decreased from 135.5 in 2018 to 108.9 in 2022, with further anticipated declines to 98.5 in 2023 and 73.9 in 2027 (Table 3).

**Table 3.** Development trend of kindergarten classes and number of children in South Korea from 2018 to 2022

Years	2018	2020	2022	Increase/decrease compared with 2018
The recognized classes (in kindergartens)	37,748	36,634	35,799	↓ 5.1%
The children enrolled (in kindergartens)	675,998	612,538	552,812	↓ 18.2%
The teacher enrolled (in kindergartens)	65,631	59,470	53,671	↓ 18.2%

Data was obtained from the “Third (2023–2027) Development Plan for Preschool Education” released by the South Korean Ministry of Education on April 10, 2023. The number of teachers is calculated based on the latest student-teacher ratio of 1:10.3 in Japan.

### 3.2. Japan

The impact of low fertility rates has led to a continual decline in the number of kindergarten-aged children in Japan. In 2019, the kindergarten-aged population in Japan was less than 1.2 million, marking a halving over the subsequent 30 years (Table 4). It is noteworthy that Japan boasts the world’s highest kindergarten enrollment rate, and recent years have witnessed near-universalization of preschool education. Consequently, the decline in kindergarten-aged children primarily stems from reduced newborn numbers.

**Table 4.** Japan’s population development, kindergarten seat and teacher demand from 2021 to 2030

Years	Number (10,000 people)				Rate (%)		
	Number of births	Number of deaths	Natural growth	Degree demand	Teacher demand	Birth rate	Natural growth
2021	81.2	143.8	-625	292.86	27.89	6.3	-5.1
2022	77.7	15.24	-758	284.14	27.06	6.3	-6.2
2023	73.9	14.82	-743	272.97	26.00	6.1	-6.1
2024	75.5	14.99	-744	262.44	24.99	6.3	-6.2
2025	74.9	15.16	-767	251.76	23.98	6.2	-6.4
2026	74.4	15.32	-787	242.99	23.14	6.2	-6.6
2027	74.3	15.46	-803	232.81	22.17	6.3	-6.8
2028	74.4	15.60	-816	227.15	21.63	6.3	-6.9
2029	74.3	15.73	-830	224.30	21.36	6.4	-7.1
2030	74.1	15.85	-843	224.80	21.41	6.4	-7.3

Data on births, deaths, and natural growth in Japan are estimated by the median birth/death method based on data published by the Japanese Statistics Bureau. Since the newborn mortality rate in Japan is very low at 1.9‰, the demand for kindergarten seats is calculated as the total number of children aged 3–6 years old, without considering this factor. The raw data come from the National Institute of Population and Social Security Research of Japan’s “Summary of the Projected Population of Japan (FY 2050).”

### 3.3. China

China experienced negative growth in the number of kindergarteners in 2021 due to a sudden drop in the birth rate. The Ministry of Education of China released the “2022 National Education Development Statistical Bulletin,” indicating 289,200 kindergartens in China by the end of 2022, a decrease of 5,610 compared to the previous year. The number of kindergarteners also decreased by 1,776,600, a decline of 3.7%. Utilizing CPPS population software, this study predicted the kindergarten-aged population based on China’s Seventh National Census data (Table 5).

Additionally, correlation analysis was conducted to examine the relationship between teacher demand and degree demand, revealing a positive correlation among 3-year-olds, 4-year-olds, and 5-year-olds. The sharp decline in China’s preschool-aged population has consequently reduced degree demands, leading to a significant decrease in the demand for preschool teachers.

**Table 5.** Predicted results of the number of kindergarten-aged population and the degree demand from 2023 to 2030 (unit: 10,000 people)

Year	3-year-old	4-year-old	5-year-old	Degree demand	Teacher demand
2023	263.52	316.22	335.68	915.42	61.03
2024	260.35	263.47	316.17	839.99	56.00
2025	252.06	260.30	263.43	775.79	51.72
2026	243.92	252.01	260.26	756.79	50.45
2027	236.21	243.92	251.97	732.1	48.81
2028	229.13	236.21	243.83	709.17	47.28
2029	222.89	229.09	236.13	688.11	45.87
2030	217.71	222.85	229.05	669.61	44.64

Data was obtained from the 2020 Seventh National Census data as the benchmark data, combined with educational bulletins and relevant United Nations data to predict the relevant data of preschool mobile children from 2023 to 2030. Teacher demand = degree demand ÷ 15. Based on the teacher-student ratio average of 1:15 set in the “Interim Measures for the Assignment of Kindergarten Staff and Personnel (Provisional)” issued by China.

## 4. The impact of low fertility rates

### 4.1. Declining teacher employment

Firstly, according to the Korean Statistical Information Service, out of the 228 regions in Korea in 2022, 136 regions had fewer than 1,000 newborns. The South Korean newspaper reported that the number of teachers in public kindergartens, primary schools, middle schools, and high schools in Korea would be reduced to 344,906, a decrease of 2,982 compared with the previous year<sup>[8]</sup>. Simultaneously, due to the sharp decrease in students, many kindergartens have been converted into nursing homes, leading to a significant reduction in the number of kindergarten teachers. In 2023, 7,000 kindergartens closed down.

Secondly, in Japan in 2015, the Ministry of Finance requested the Ministry of Education to cut 37,000 teachers nationwide. In 2016, the Ministry of Finance announced that nearly 50,000 primary and secondary school staff would be laid off. Over the past decade, more than 300 schools have closed down every year in Japan, and many kindergartens have permanently closed down.

Finally, concerning China, the impact of low fertility on teachers is becoming increasingly severe. In the first half of 2023, China experienced its “first round of kindergarten closures,” resulting in significant changes for kindergarten teachers. Based on China’s official documents stipulating an average teacher-student ratio of 1:15, approximately 127 kindergarten teachers will face unemployment.

### 4.2. Declining student numbers and teacher shortages

In June 2023, Japanese official media highlighted that Japan’s aging population is outpacing expectations in the education sector, leading to the closure of 200 universities due to a lack of students. Gakushuin University and Kobe Seiko Gakuin University have publicly announced the cessation of student admissions.

In 2021, many first-tier city schools in South Korea had fewer than 50 students. According to information from the South Korean Ministry of Strategy and Finance, the Ministry of Public Administration and Security, and the Ministry of Education, the public teacher quota of 2024 will be set at 342,388 people, a decrease of 2,982 compared with 2023. The South Korean National Law Information Center published a table of national civil service quotas for public schools at all levels, indicating reductions in the number of teachers in various fields.

Primary and secondary school teachers and kindergarten teachers account for 85% of these reductions. In 2021 and 2022, the number of primary and secondary school teachers and kindergarten teachers decreased by 351 and 1,039 respectively compared to the previous year.

There are numerous “hollow kindergartens” in rural China. Despite the current shortage of kindergarten teachers, with the sharp population decline, the employment prospects for education graduates are worrisome.

## **5. Countermeasures for preschool education teacher development**

### **5.1. Improving the friendly childcare service policy to increase fertility intentions**

Firstly, the low fertility rates in Japan and South Korea preceded that in China, thus the measures taken by these two countries to address population issues can offer valuable insights to China. From 1994 to 2023, Japan implemented various childcare policies such as the “Angel Plan,” the “Specific Implementation Plan for Focusing on Countermeasures against Childlessness,” and the “Child and Childcare Assistance Law”<sup>[9]</sup>. Similarly, South Korea began encouraging fertility in 2003 and established its first basic plan in 2006 to foster a child-friendly social environment. It emphasized the participation of social entities and the expansion of diverse and high-quality childcare infrastructure. Drawing from these experiences, China can enhance the construction of diversified service methods and channels, improve service quality and efficiency, expedite the cultivation of professional talent teams, support diverse childcare service methods, and promote diverse entities in running schools. Concurrently, it can promote the implementation of fertility policies, such as reducing educational costs for families with multiple children, to increase fertility intentions.

### **5.2. optimizing teacher resource allocation based on population prediction**

The factors influencing population dynamics are complex, with significant variations in population size, structure, fertility rate, and urbanization rate across different regions. Consequently, conducting comprehensive analyses of birth population scale and direction becomes highly uncertain. Population prediction research is thus conducted using census data, with adjustments and optimizations made to predict results based on emerging social phenomena and issues. Strengthening population monitoring and prediction enhances the national management system for changes in population structure, monitoring fertility trends to more accurately evaluate population changes and the number of newborns. Teacher allocation is adjusted and optimized in accordance with population changes and trends. Based on population density and specific needs, the spatial layout of educational resources is improved to match the adaptability of service subjects. The teacher team is scientifically allocated, establishing quotas for college students majoring in education according to actual teacher needs, and cultivating “quasi-teachers” in line with development trends to reasonably replenish teacher resources. Actively planning the teacher allocation mechanism helps avoid resource wastage.

### **5.3. Coordinating teacher teams and promoting high-quality teacher sharing**

Encouraging kindergarten teachers to transition to childcare teacher groups enhances the quality of teacher training and broadens professional planning and channels for preschool teachers. This elevates the overall quality and work skills of the teacher team, enhancing teacher competitiveness. “Excess” teachers are reassigned or redeployed, receiving professional training in “nurturing” or “infant care” and transferring to inclusive childcare services institutions such as nurseries, early education centers, or baby centers. Alternatively, establishing an integrated service system allows “excess” teachers to receive professional training and be redeployed for childcare-related work. This not only resolves the issue of “excess” kindergarten teachers but also effectively promotes the construction and implementation of inclusive childcare service systems in China.

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# Research on Issues and Paths in Patriotism Education for College Students in the New Era

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**Abstract:** This article adopts a perspective rooted in the new era to elaborate on the significance of patriotic education for college students. It proposes innovative solutions to address existing problems in the educational content, methods, teacher teams, synergy, and assessment of patriotism education in this era. Emphasizing the consideration of contemporary characteristics and student changes, it strives to discover effective methods for cultivating patriotism among college students in the new era. The ultimate goal is to enhance college students' awareness and behavior toward patriotism while fulfilling the fundamental educational task of nurturing moral character.

**Keywords:** New era; Patriotism; College students; Training path

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## 1. Introduction

Patriotism embodies the national spirit and essence of the Chinese nation, representing its most valuable spiritual asset<sup>[1]</sup>. Upholding and promoting the spirit of patriotism necessitates viewing patriotic education as an enduring imperative<sup>[2]</sup>. College students, as the nation's hope and future, play a pivotal role in the long-term stability and sustainable development of the nation. Cultivating and instilling patriotism among college students is paramount for fostering the nation's enduring prosperity and advancing the cause of socialism with Chinese characteristics.

In today's rapidly evolving landscape, contemporary college students must possess not only a robust foundation of knowledge in their respective fields but also a nimble and innovative mindset. Alongside proficiency in their disciplines, they require comprehensive qualities such as creativity, teamwork, and global competitiveness. Against the backdrop of the new era's dynamics and the demands for skilled professionals, patriotic education for college students must not only uphold traditional values but also evolve to meet the exigencies of the times. It must empower students to emerge as forward-thinking individuals equipped with deep-seated patriotism and global acumen.

## **2. The significance of patriotism education for college students in the new era**

### **2.1. Theoretical significance**

#### **2.1.1. Deepening recognition of the theoretical system of socialism with Chinese characteristics**

The theoretical system of socialism with Chinese characteristics serves as the foundational theory for fostering patriotism among college students in the new era. By incorporating the principles of socialism with Chinese characteristics into the framework of patriotic education, students are guided to develop a profound understanding and practical application of this theory. This deep comprehension enables students to align with the fundamental direction of national development and appreciate the distinctive advantages of socialism with Chinese characteristics. Consequently, they cultivate a strong sense of identification with the path, theory, system, and culture, thereby enhancing their allegiance to the theoretical system of socialism with Chinese characteristics.

#### **2.1.2. Facilitating the cultivation and practice of socialist core values**

Socialist core values underscore the significance of patriotism at an individual level. Patriotism education for college students in the new era, rooted in core socialist values, assists students in forming a correct outlook on life, values, and worldview. Patriotism serves as fertile ground and a motivational force for nurturing and implementing socialist core values. Therefore, patriotic education for college students in the new era fosters an environment conducive to the cultivation and application of socialist core values.

#### **2.1.3. Enriching the theoretical connotation of patriotic education**

Patriotism lies at the heart of the Chinese national spirit and maintains historical continuity. Its spiritual essence remains consistent throughout history, reflecting ancient ideals of serving the common good, the nation's resilience amidst modern societal changes, and contemporary devotion to the Party, patriotism, and socialism. While patriotism retains its core values, its interpretation evolves with time. To effectively conduct patriotic education for college students in the new era, it is imperative to draw insights from history and address present-day challenges within the context of current national conditions. This approach enriches and expands the theoretical underpinnings of patriotic education, facilitating its inheritance and advancement.

### **2.2. Practical significance**

#### **2.2.1. Contribution to safeguarding national security**

Patriotism education fosters a profound attachment to the nation and a sense of duty towards national security among students. It instills a strong national consciousness and responsibility, encouraging active contributions to the country's long-term peace and stability. By fostering identification and cohesion with the nation, patriotic education helps cultivate a harmonious social environment, mitigating societal divisions and unrest, thereby facilitating the country's enduring peace and stability.

#### **2.2.2. Contribution to enhancing social cohesion**

Patriotism education for college students not only nurtures shared values and cultural identity but also fosters teamwork spirit and social responsibility, bolstering social cohesion. This fosters a positive and far-reaching impact on building a stable and harmonious social milieu and advancing national prosperity and progress.

#### **2.2.3. Contribution to cultivating the all-round development of citizens**

The theory of comprehensive quality education underscores that nurturing the holistic development of individuals is the cornerstone of education. As a component of holistic education, patriotism education

promotes the multifaceted development of college students across ideological, moral, cultural, and other domains by evoking patriotic sentiments and fostering a sense of social responsibility. Humanistic educational theory emphasizes students' autonomy, creativity, and sociality in the education process. Patriotism education encourages students to contemplate deeply on topics related to the country, society, and culture, cultivating their capacity for independent thought and self-directed learning, thereby enhancing their comprehensive quality. Social identity theory underscores individuals' intrinsic motivation in learning and personal growth. Patriotism education empowers students to actively integrate into society by nurturing their love for the country and sense of societal responsibility, thereby enhancing comprehensive abilities such as social interaction, cooperation, and leadership.

### **3. Dilemmas faced by patriotism education for college students in the new era**

#### **3.1. Lack of contemporary relevance and pertinence in patriotic education content**

Patriotism, by nature, is concrete and contextual <sup>[3]</sup>. Its connotation evolves with historical circumstances. In the new era, patriotism embodies a profound unity of love for the motherland, the Party, and socialism. However, the current content of patriotism education for college students often fails to reflect contemporary nuances or integrate relevant real-life experiences. Unlike general patriotic education, educating college students demands attention to their unique physiological and psychological traits, as they bear significant historical responsibilities. Growing up in an environment where international and domestic affairs hold greater significance, students exhibit heightened political awareness. Nevertheless, the existing patriotic education content lacks relevance to the contemporary landscape, resulting in subpar educational outcomes. Thus, there is an urgent need to optimize educational content to resonate with students effectively.

#### **3.2. Lack of diversity and innovation in patriotic education methods**

Colleges and universities serve as the primary platforms for systematic patriotism education. However, current educational methods predominantly rely on traditional classroom instruction, lacking diversity and innovation. Ideological and political courses, though essential, often lack practical engagement and fail to foster deep emotional connections with patriotism. The prevailing didactic approach leads to superficial comprehension among students, hindering genuine understanding and internalization of patriotic values. To address this, there is a pressing need to introduce diverse and innovative teaching methodologies that stimulate students' crucial thinking and emotional engagement with patriotism.

#### **3.3. Lagging construction of the patriotic education teacher team**

The effectiveness of patriotism education hinges on the competence of teachers. However, many educators lack the requisite expertise in Chinese studies, history, and cultural traditions necessary for effective patriotic education. Additionally, there is a dearth of specialized training programs to cultivate patriotic education instructors. Moreover, the teaching staff's proficiency in modern educational technologies is inadequate, hampering the adoption of contemporary teaching methods. Addressing these deficiencies requires comprehensive reforms in teacher training programs and investment in modern educational resources and technologies.

#### **3.4. Insufficient collaboration in patriotism education**

Patriotism education necessitates collaboration among various stakeholders, including educators, students, and parents. However, existing collaborative mechanisms in colleges and universities often fall short. Disconnects

between academic affairs and student activities, as well as the separation of offline and online learning environments, impede synergistic educational efforts. To enhance collaboration, institutions must foster a culture of mutual engagement and coordination, leveraging both offline and online platforms for holistic education.

### **3.5. Lack of scientific basis in patriotism education evaluation**

The evaluation of patriotism education for college students often relies on subjective criteria, making it challenging to quantify and objectively measure outcomes. Subjective indicators such as students' love for the country are prone to evaluator bias, undermining the scientific rigor of assessments. Furthermore, the absence of comprehensive and objective assessment tools hampers accurate evaluation of student's moral development and the effectiveness of patriotism education initiatives. Enhancing evaluation methodologies requires the development of standardized, scientifically sound assessment tools aligned with the objectives of patriotism education <sup>[4]</sup>.

## **4. Optimization path of patriotism education for college students in the new era**

### **4.1. Enriching diverse educational content**

Patriotism education for college students must be tailored to the contemporary landscape, reflecting the spirit of the times. It is imperative to integrate Marxist principles with China's unique realities while upholding and promoting the nation's rich traditional culture. Strengthening confidence in the path, theory, system, and culture of socialism with Chinese characteristics is paramount. Specifically, patriotism education should be grounded in the thought of socialism with Chinese characteristics for a new era, guided by core socialist values, and aligned with the Chinese dream of national rejuvenation. This approach aims to elucidate the original mission of the Party and the historical imperative of pursuing the people's well-being, guiding students to cherish their motherland and bolster cultural confidence. Moreover, fostering students' theoretical, emotional, and behavioral allegiance to patriotism necessitates immersive education and practical activities. Leveraging "red resources" and patriotism education bases, universities can infuse the essence of patriotism into students' thoughts and deeds.

### **4.2. Innovating compound education methods**

Comprehensive education methods entail the synergistic utilization of diverse teaching strategies and resources to enhance educational outcomes. This involves interdisciplinary integration, blending online and offline modalities, incorporating social engagement, and fostering international exchanges. Integrating patriotism education across various disciplines creates a multidimensional learning environment. By infusing national history, culture, and politics into professional courses, students gain a profound understanding of the country's development trajectory and core values. Engaging students in social practices and field trips allows for firsthand experiences of the nation's progress and transformations. Organizing visits, community services, and volunteer opportunities instills in students a deep-seated love and sense of responsibility for their country. Leveraging modern information technology, universities can seamlessly integrate online learning with practical applications, offering diversified resources while enhancing students' practical skills. Encouraging participation in international academic and cultural exchanges broadens students' global perspectives and fosters a comprehensive understanding of the nation's role and responsibilities on the global stage. Embracing innovation in compound education methods entails the flexible utilization of various teaching approaches tailored to students' characteristics, societal needs, and available educational resources, culminating in a holistic approach

to enhancing patriotism and the overall quality of education.

### **4.3. Building advanced teaching staff**

Addressing the challenge of lagging teachers in patriotism education requires a multifaceted approach. First, enhancing teachers' subject knowledge and research proficiency is essential, necessitating the establishment of a more scientific selection process. Second, comprehensive teacher training should be prioritized, introducing modern teaching methodologies and educational concepts to ensure instructors remain abreast of contemporary demands. Lastly, to instill patriotism effectively, it is crucial to enlist passionate individuals with patriotic fervor, such as revolutionary predecessors, descendants of martyrs, retired soldiers, and exemplary role models. Establishing a hybrid team of full-time and part-time educators fosters collaboration and augments the effectiveness of patriotism education <sup>[5]</sup>.

### **4.4. Strengthening collaborative education mechanisms**

Colleges and universities must forge stronger partnerships with society and families to enhance patriotism education. Collaborative mechanisms between educational institutions, society, and families require refinement. While schools primarily deliver classroom instruction, students' ideological influences often stem from familial and societal contexts. Therefore, patriotism education for college students should adopt a "trinity" educational framework, where families serve as the foundation, schools as the primary conduit, and society as a supportive pillar. The extracurricular domain should be dynamic and inclusive, incorporating online resources, special lectures, elective courses, and social engagements as platforms for patriotism education. In addition to traditional ideological and political courses, diverse campus activities and practical education initiatives, leveraging new media platforms, should be employed.

### **4.5. Create scientific assessment tools**

Enhancing the scientific rigor of patriotism education evaluation necessitates embracing modern educational assessment methods. Introducing objective and quantifiable indicators, along with scientific evaluation tools, is imperative. Long-term effects should be considered, with evaluations conducted from multiple perspectives and dimensions. For instance, comprehensive measurement indicators encompassing knowledge levels, emotional attitudes, and behavioral performances should be developed. Employing both quantitative and qualitative research methodologies allows for a more nuanced understanding of students' patriotism education outcomes. Engaging various stakeholders, including students, teachers, parents, and social professionals, enables a holistic assessment, thereby enhancing evaluation comprehensiveness and objectivity.

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# A Survey of the Literature About the L2 Motivational Self System Theory

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**Abstract:** The second language (L2) motivational self system (L2MSS) literature has been analyzed for this investigation. The results offer a theme-by-theme comprehensive summary of L2MSS research. The field has shown strong growth since 2005, and a wide range of interesting issues have emerged. The most common approach uses cross-sectional data, quantitative techniques, university students, English as the target language, and Asian contexts, including mainland China. A significant discovery of the research is the parallel expansion of studies on multilingualism and English as a foreign language in recent years, suggesting an acknowledgment of the significance of both strands for a thorough comprehension of language learning motivation. This trend implies that the discipline is actively working to overcome its bias toward monolingual speakers and is growing more accommodating to the requirements of a wider variety of language learners. This study provided fresh insight into the conceptual knowledge structure of a topic from a methodological standpoint, highlighting areas for future research and providing insights into knowledge gaps.

**Keywords:** L2 motivation; L2 motivational self system (L2MSS); Multilingualism; Languages other than English (LOTEs); English as a foreign language (EFL)

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## 1. Introduction

According to Dörnyei and Ushioda <sup>[1]</sup>, motivation is a crucial element in attaining success when learning a second or foreign language. Understanding the reasons behind learning a second or foreign language is the subject of a fast-growing corpus of study <sup>[2]</sup>. The L2 motivational self system (L2MSS) idea has become more well-known within this expanding corpus of study <sup>[3,4]</sup>. L2MSS was determined to be the predominant theoretical framework in the field of L2 motivational research, according to two literature studies on the subject: one on research from 2005 to 2014 and the other on research from 2010 to 2019 <sup>[2,5]</sup>. Because of L2MSS's leadership position and volume of research, it is critical to comprehend and synthesize L2MSS research to develop the area.

However, a thorough analysis of the L2MSS literature has not yet been carried out. The two types of

L2MSS syntheses that currently exist are critical research synthesis and meta-analysis<sup>[6-8]</sup>. Although these reviews have produced insightful analyses of L2 motivational research, their breadth was inevitably constrained by their concentration on a small section of L2MSS research. Yousefi and Mahmoodi<sup>[8]</sup>, for example, only included quantitative research from six journals in the field, which may have excluded significant earlier studies on the subject. Similarly, Mendoza and Phung's critical review was restricted to languages other than English (LOTEs), which meant that studies on English could not be included and that it was not possible to compare studies on LOTEs with English<sup>[6]</sup>. It is necessary to give a brief synopsis of the L2MSS framework, which serves as the basis for this review, before delving into the specifics of the current investigation.

## 2. L2 motivational self system

As an alternative to Gardner's socio-educational model<sup>[9]</sup>, which had previously dominated the paradigm for analyzing L2 motivation, Dörnyei first developed the L2MSS in 2005. The socio-educational paradigm emphasizes integrative motivation in bilingual environments in Canada<sup>[9,10]</sup>. Here, language learning motivation is influenced by the desire to integrate with the target language community. Although integrativeness is highly relevant for French language learners in Canada's bilingual environment, its explanatory value is limited, particularly for English language learners in foreign language contexts. Dörnyei presented a broader framework from a self-concept standpoint<sup>[3,4]</sup>, building on theoretical strands in personality psychology. The notion of imaginary integration (cf., Norton's idea of imagined communities<sup>[11]</sup>) could enhance the utility of integrativeness. Specifically, Dörnyei's model consists of three constructs. The first is the ideal L2 self, which focuses on qualities of a successful L2 user that one hopes to have in the future; the second is the ought-to L2 self, which focuses on qualities of a successful L2 user that one feels one must have to meet expectations and prevent potential negative consequences; and the third is the L2 learning experience, which represents situated motives regarding the learning environment, including peers, teachers, and curriculum.

The two theories that served as the basis for the language-specific future self-guides were the self-discrepancy theory and the possible selves theory<sup>[12,13]</sup>. Three basic categories of potential selves were explored<sup>[13]</sup>: "ideal selves that we would very much like to become," "selves we are afraid of becoming," and "selves that we could become." The first two categories had higher motivating potency. The motivating process of possibility selves — the drive to lessen the gap between one's actual and future selves — is further illuminated by Higgins' self-discrepancy hypothesis<sup>[12]</sup>.

Although the L2 learning experience has been empirically proven to be the strongest predictor of intended effort<sup>[7]</sup>, it has been criticized for being under-theorized and challenging to operationalize<sup>[14]</sup>. Dörnyei responded to mounting criticism with a conceptual article that defined the term and operationalized it as student engagement, or the active engagement and participation in behaviors related to education<sup>[15]</sup>. This can be seen as a major improvement for L2MSS, particularly from a measuring standpoint, since the engagement, as opposed to the learning experience, is a well-researched and operationalized construct<sup>[15]</sup>. It opens up new directions for future study on L2MSS as well. Apart from Dörnyei's endeavors to enhance the model, certain other academics in the domain have also contributed to its development. The 2×2 model of L2 self-guides is one prominent example among others<sup>[16,17]</sup>, which distinguishes L2 selves in terms of the regulatory domain (i.e., ideal, ought) as well as viewpoint (i.e., own, other). The 2×2 model is significant because it offers a more nuanced perspective on the varying characteristics of future self-guides and further links the L2MSS with Higgins' original idea<sup>[12]</sup>. Further empirical study supports the validity of the bifurcation of self-guides based on viewpoints and suggests intriguing avenues for further investigation<sup>[18,19]</sup>.

### 3. Research themes

#### 3.1. Overall themes

When examining the fundamental themes in the field, the theme with the top keyword “ideal L2 self” emerges as the largest theme. We may observe the other two L2MSS components as well as typical criteria variables like planned effort, which collectively can be understood as the fundamentals of L2MSS research. This issue is prominently covered in two conceptual papers: Dörnyei and Al-Hoorie redefine the learning experience as engagement <sup>[20]</sup>, while Dörnyei rethinks motivational selves for LOTEs <sup>[15]</sup>. The empirical literature comprises a variety of studies, ranging from early validations of the theory to more recent investigations on motivational interventions for vision <sup>[21,22]</sup>.

Although somewhat less than the topic of the ideal L2 self, communication readiness is another fundamental subject. One common example of a variable closely associated with L2MSS is the willingness to communicate <sup>[23,24]</sup>. LOTEs lead to another fundamental theme. This theme is distinguished by its heavy emphasis on multilingualism. The fundamental focus of this theme is encapsulated in two conceptual articles: In multilingual education, Serafini argued for the use of dynamic methods to better understand the intrinsic dynamic, emergent, and contextually embedded nature of motivational selves <sup>[25]</sup>. Henry proposed the idea of the ideal multilingual self as a higher-order construct emerging from interactions of language-specific selves <sup>[26]</sup>. Similar themes, including multiple language learning and LOTE learning <sup>[27]</sup>, are shared by empirical investigations addressing this issue <sup>[28]</sup>. In Asian cultures like mainland China and Japan <sup>[29-32]</sup>, the ideal multilingual self seems to be a driving factor behind the rising interest in multilingualism <sup>[33]</sup>.

The motor themes quadrant contains the English as a foreign language (EFL) theme. This subject is covered in one of the early conceptual works: Ushioda talked about how globalization and English’s dominance in society led to a theoretical change in L2 motivation’s focus from motivation to self and identity <sup>[34]</sup>. The majority of research on this issue focuses on English in environments where it is spoken as a foreign language, such as South Korea <sup>[35]</sup>, China <sup>[36]</sup>, and Indonesia <sup>[37]</sup>. Another popular term is “vision,” which is frequently connected to research on interventions <sup>[38,39]</sup>. As shown by the shared studies between the two themes <sup>[23,40]</sup>, this topic is likewise closely tied to the ideal L2 self. The theme of linguistic competency is considerably more compact and resembles a basic theme more closely. This subject has a lot of terms related to learning outcomes, like motivated learning behavior and proficiency, which are again strongly related to the ideal L2 self theme <sup>[15]</sup>.

The gender-led subject is important. The theme’s keywords point to an emphasis on the function of demographic factors in relation to motivating selves, such as age and gender <sup>[41-43]</sup>. Another little but extremely well-developed specialized theme is English medium instruction (EMI). In contrast to research on the EFL subject, this theme looks at L2MSS in situations where instruction is given in English rather than English as the learning target <sup>[44]</sup>. Self-discrepancy is an unusual theme. The top keyword indicates that research in this theme expands L2MSS in terms of viewpoints of self and domains of self <sup>[16,17,45,46]</sup>, and revisits and revises L2MSS by going back to Higgin’s self-discrepancy theory <sup>[12]</sup>.

There is the self-determination theory (SDT) theme, a small strand characterized by research that combines L2MSS with SDT or compares L2MSS and SDT <sup>[45,47]</sup>. The possible selves theme is a relatively small theme characterized by research that involved the two future self-guides in L2MSS or revisited Markus and Nurius’ possible selves theory <sup>[13, 45,48-50]</sup>. Both themes are comparatively low in terms of centrality and density. Whether they are emerging or declining would require a temporal perspective.

#### 3.2. Themes over time

To shed light on the thematic evolution of the field over time, the literature was divided into four periods.

Overall, the field has enjoyed significant diversification, from three themes in the first period to at least seven themes in later periods. Judging by the top keywords in themes, two keywords persist through at least three periods: ideal L2 self and EFL. The ideal L2 self theme, composed of the core elements of L2MSS and criterion variables, remained largely stable over time and can be interpreted as the foundational theme of the literature. In contrast, the EFL theme has been shifting its content over the years. For instance, in 2012–2016, EFL appeared together with keywords such as age<sup>[36]</sup>. In 2017–2019, different keywords such as resilience and demotivation occurred with EFL<sup>[51]</sup>. Most recently, EFL was investigated together with different keywords such as vision<sup>[22]</sup>. In other words, research on EFL is evolving to encompass a wider range of topics and perspectives.

It is important to draw attention to the rise of LOTEs and multilingualism in recent years. Though Henry is credited with coining terms like plurilingualism<sup>[44]</sup>, this theme has mostly emerged in the last five years. A possible explanation for this trend is that learners' (developing) repertoire of multiple languages is taken into account in a multilingual perspective, which replaces the monolingual focus and views LOTEs and multilingualism as interdependent concepts (e.g., approaching LOTEs/English learning from a multilingual perspective). This interpretation appears to be supported by the surge of research in 2021 that focuses on both English and LOTEs.

#### **4. Discussion on the literature on L2MSS**

Since 2005, the field of L2MSS literature has shown substantial expansion. When it comes to design features, university students, quantitative research, cross-sectional data, English as a target language, and Asian contexts—like mainland China—are the most common. Although these traits predominate in the sector, other emerging patterns have also been noted. Studies on LOTEs (e.g., German, French, Chinese) and multilingualism (i.e., both English and LOTEs), studies on secondary learners, research in Asian contexts (e.g., South Korea), and research using longitudinal qualitative design are a few examples of the growing fields in research. Further evidence of the rich affordances of L2MSS for a variety of research approaches comes from the trend toward more inventive and diverse methods (e.g., person-centered quantitative methods, narrative inquiry), especially in recent years<sup>[2]</sup>.

Regarding themes, this is a broad field with several strands that have comparable effects; no single strand “monopolizes” the subject. Basic themes (like the ideal L2 self and LOTEs) concentrate on using and validating L2MSS, whereas niche themes (like self-discrepancy) and emerging/declining themes (like self-determination theory) concentrate on changing the L2MSS framework. The existence of both kinds of study shows that L2MSS is developing sustainably, striking a balance between establishing and expanding on current knowledge and investigating novel and cutting-edge concepts. From a temporal standpoint, while research on EFL is continuously expanding to cover a greater range of issues and perspectives, the theme typified by the essential elements of L2MSS remains constant and durable across time. Alongside the expansion of EFL study, LOTEs and multilingualism studies have also emerged in more recent times.

#### **5. Reacting to the multilingual trend: reciprocal growth vs. competitive displacement**

How L2MSS researchers as a group responded to the multilingual turn in applied linguistics is one of the review's key findings. It was discovered that the monolingual bias that has long dominated the SLA area has been actively challenged and addressed by the field of L2MSS. One may argue that there has been a recent trend toward multilingualism, as seen by the sharp rise in LOTE research since 2017 and the sharp rise in LOTE research focused on both English and LOTEs in 2021. Multilingualism is becoming more and more important

in today's globalized world <sup>[51,52]</sup>. This trend toward multilingualism is probably also a result of the need to better understand the special opportunities and challenges faced by language learners in multilingual contexts <sup>[20,53]</sup>. This trend might also be seen as a logical byproduct of the work done on developing the model, motivated by the desire to further evaluate the model's variability in various target languages and circumstances. The formation of the ideal multilingual self is a significant step in this direction <sup>[26]</sup>, moving L2MSS away from its previous monolingual concentration and beyond language-specific self-guides.

However, there is also evidence in the area of a continuing interest in EFL, with no sign of a slowdown in EFL research. This mutual advancement could indicate that the field is actively attempting to find a middle ground between investigating the complex nature of multilingualism and recognizing the unique aspects of EFL learning. Here, what was shown was not competitive displacement, whereby a reduction in English research was attributed to increased interest in multilingualism, but rather an acknowledgment that both paths were important and required for a whole understanding of language learning motivation. Furthermore, the area of EFL appears to be growing and adjusting to new issues and circumstances, as seen by the study on the subject covering a greater range of topics and views. It is imperative, of course, to continue to be aware of the possibility of sustaining the monolingual bias that results from an excessive dependence on English. Since the topic of multilingualism is still relatively new, it will be interesting to see if future research confirms that one strand is displacing the other.

## 6. Future directions and trends

When combined, the results point to several potential paths for the future that are either developing trends or areas in need of more research. It is hoped that readers will find the suggested study directions derived from this literature review helpful for their upcoming studies.

There are significant opportunities in three directions for meaningful attention. First, there is a growing trend toward future self-guides that are language-general — that is, multilingual — instead of language-specific. This change can be explained by the emergence in applied linguistics of complex dynamic systems theory (CDST) <sup>[54]</sup>. Indeed, CDST notions like emergence have a major influence on the increasingly popular construct of the ideal multilingual self <sup>[26]</sup>. In light of the numerous unexplored areas covered by the CDST framework, multilingual motivation and self-guides research is a promising area of study.

Second, revisiting the basic assumptions that gave rise to the L2MSS is a potentially fruitful avenue for innovation. Research that revisited self-discrepancy and possible selves theory had multiple small research strands, as revealed by the text network analysis. For example, reexamining the basic principles of self-discrepancy theory led to the proposal of the 2×2 model of L2 self-guides <sup>[12,16]</sup>, which in turn led to the exploration of new avenues for investigation. This implies that reexamining core ideas can resolve any gaps or inadequacies in the current framework and offer a deeper grasp of the guiding assumptions and principles of L2MSS.

Third, one major gap in the L2MSS literature is the lack of diversity among language learners and language learning situations. Only 20% of L2 motivation research from 2005 to 2014 focused on secondary-level learners, a criticism made by Boo and colleagues back in 2015 <sup>[2]</sup>. According to the data (30%), it can be stated that the state of L2MSS research has improved on this front, but there is still much space for development to create more inclusive theories of L2 motivation. The focus on classroom language instruction, whether in secondary or higher education, may have resulted in part from L2MSS's development as a reaction to Gardner's socio-education model <sup>[9]</sup>, which has little capacity to explain the experiences of EFL students. That being said,

a more thorough comprehension of L2 motivation necessitates examining the entire spectrum of learners — not just those enrolled in conventional classrooms — including self-taught individuals, international students, and those pursuing other forms of informal or non-formal education.

The need for ongoing investigation of novel research methodologies is highlighted by the growing trend of advances in mixed, quantitative, and qualitative research methods. Some difficulties warrant more attention as we continue to explore methodological advancements. The first is the dearth of longitudinal studies, especially those that are quantitative. While large-scale quantitative evidence is necessary to understand group-level trends and general patterns that can guide policy and the creation of large-scale intervention programs, qualitative longitudinal research can offer insightful information about the subjective experiences of language learners. Conversely, the prevalence of cross-sectional research further demonstrates how urgent it is to properly examine the dynamic relationships between motivation and different learning outcomes to move beyond a static view of motivation <sup>[54]</sup>.

The investigation of heterogeneity using person-centered methodologies is another exciting avenue. The current state of quantitative second-language acquisition (SLA) research is reflected in this, as more studies are utilizing sophisticated statistical modeling to produce insights that go beyond the limitations of conventional analysis <sup>[55]</sup>. One common criticism of quantitative research on L2 motivation is those traditional methods, including correlational analyses, force learners to be seen simplistically and homogeneously <sup>[56]</sup>. Person-centered quantitative approaches enable a more nuanced understanding of heterogeneity, even while they do not allow for the same depth of research as qualitative approaches. Such methods as latent profile analysis and latent transition analysis are a few examples that might lead to innovative research directions <sup>[57,58]</sup>. Meanwhile, basic techniques like structural equation modeling (SEM) can also be improved upon, as demonstrated by exploratory SEM applications to SLA research.

Additionally, it is critical to reconcile the disparity between the quantity of quantitative research and the dearth of replication studies. Replication study confirms the robustness and generalizability of findings, which is essential for growing the field and constructing trustworthy scientific knowledge <sup>[59]</sup>. The field of second language learning in general and L2MSS research specifically lacks replication studies, as noted by Marsden and colleagues <sup>[60]</sup>. Nonetheless, a classic example of replication research on L2MSS is the preregistered replication by Hiver and Al-Hoorie of the large-scale survey study by You and colleagues <sup>[61,62]</sup>, which found a fundamental motivating function for vision. Surprisingly, the initial findings did not replicate, and an alternate model that questioned the way intended effort has traditionally been modeled in L2MSS research received support. Given the importance of vision and intended effort in the literature, it is clear that important L2MSS research findings should be verified and replicated rather than assumed to be replicable by default (Al-Hoorie and colleagues for empirical findings that highlight validity issues in the field <sup>[63]</sup>). Replication is an open research technique that should be included in the agenda of the field of L2MSS, as the field of applied linguistics as a whole is moving toward greater openness and transparency.

## 7. Conclusion

This study delves into the analysis of the L2MSS literature. The field has experienced significant and robust growth since 2005, encompassing a wide array of themes and research areas. The most frequently noted design features include cross-sectional data, quantitative techniques, English, university students, and Asian environments. Despite the prevalence of cross-sectional data and a lack of research on learners outside of traditional classroom settings and replication efforts, the field exhibits geographical diversity and is expanding

to encompass a broader range of topics, perspectives, and methodologies.

A recent development in the field is the parallel expansion of EFL and multilingualism research, indicating an acknowledgment of the utility and importance of both approaches for a comprehensive understanding of language acquisition motivation. These findings underscore the dynamic and responsive nature of the L2MSS field and point toward the potential for exciting discoveries and further research to enhance our comprehension of L2 motivation.

## Disclosure statement

The author declares no conflict of interest.

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# A Meta-Analysis of Anxiety Symptoms and Related Factors in Chinese College Students During the COVID-19 Pandemic

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**Abstract:** *Objective:* To explore the distribution of anxiety symptoms and related factors among Chinese college students during the COVID-19 pandemic, aiming to provide references for mental health education and management strategies tailored to Chinese college students amidst the pandemic. *Methods:* Both Chinese and English databases were searched to collect studies on factors related to anxiety symptoms in Chinese college students, along with surveys conducted between January 1st, 2020, and February 1st, 2023. Following the AHRQ cross-sectional study quality evaluation standards, a quality assessment of the included research data was conducted. Meta-analysis was performed using Stata 12. *Results:* A total of 1,057 references were searched, with 40 studies meeting the inclusion criteria. These studies collectively surveyed 189,005 individuals, among whom 57,456 individuals were found to exhibit anxiety symptoms. The anxiety detection rate was calculated at 25.6% (95% CI: 20.5–30.6%), significantly higher than the anxiety risk detection rate among the general Chinese population (15.8%). Gender, the impact of the pandemic on personal life, and awareness of COVID-19 were identified as factors influencing the detection rate of anxiety among college students. *Conclusions:* The anxiety levels among Chinese college students during the COVID-19 pandemic were notably severe. Consequently, university personnel should prioritize the mental well-being of these students and implement timely psychological interventions.

**Keywords:** COVID-19; College students; Anxiety; Meta-analysis

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## 1. Introduction

The COVID-19 pandemic emerged as a sudden, urgent, widespread, and highly uncertain public health crisis<sup>[1]</sup>. This pandemic significantly impacts the lives, studies, and work of individuals, particularly college students who are in the midst of transitioning from adolescence to adulthood<sup>[2-4]</sup>. Faced with such emergencies, college students often experience heightened emotional reactions and are more susceptible to negative psycho-emotional issues such as tension and anxiety<sup>[5]</sup>. While several cross-sectional surveys have examined factors associated with anxiety symptoms in college students, inconsistencies and ambiguities arise due to variations in sample sizes and confounding factors, leading to debates over the accuracy of findings. In this study, meta-

analysis was employed to investigate the detection rate and factors related to anxiety symptoms among college students during the pandemic. This approach aims to provide a reference point for mental health education and evidence-based management strategies.

## **2. Materials and methods**

### **2.1. Retrieval strategy**

Computer searches were conducted on local PubMed, Springer, CNKI, Wanfang, Weipu, China Biomedical Literature Service, and Chinese Medical Journal Full Text Databases from January 1, 2020, to February 1, 2023, to identify studies on anxiety among Chinese college students during the pandemic. Core search terms in English included: “university students,” “college students,” “anxiety,” “factors,” and “China;” core search terms in Chinese included: “高校” (*gaoxiao*, higher education institutions), “大学生” (*daxuesheng*, higher education institution students), “焦虑” (*jiaolv*, anxiety), and “因素” (*yinsu*, factors). Specific types of anxiety such as “employment anxiety” and “social anxiety” were excluded.

### **2.2. Criteria for inclusion and exclusion of literature**

#### **2.2.1. Inclusion criteria**

- (1) Descriptive epidemiological research literature published domestically and internationally between January 1, 2020, and February 1, 2023;
- (2) The main content of the literature involved the analysis of anxiety-related factors among Chinese college students, using tools such as the Self-Rating Anxiety Scale (SAS), Generalized Anxiety Disorder Questionnaire (GAD-7), Depression Anxiety and Stress Scale-21 (DASS-21), and Positive and Negative Affect Scale (PANAS);
- (3) The statistical data were complete, allowing for the extraction of data on the detection rate of anxiety symptoms.

#### **2.2.2. Exclusion criteria**

- (1) Literature where factors related to anxiety were mentioned fewer than twice;
- (2) Conference proceedings, descriptive research, reviews, and theses;
- (3) Incomplete data, where corresponding detection rates of anxiety disorders for each factor could not be obtained;
- (4) Repetitive research published or included.

### **2.3. Data extraction and classification of included literature**

Initially, abstracts were screened to remove literature that significantly deviated from the paper’s title. Subsequently, the entire texts were reviewed to eliminate duplicate or incomplete literature. Literature meeting the above criteria was then extracted. Extracted data included the title of the literature, author, sample size, diagnostic tool, publication time, anxiety detection rate, anxiety-related factors, and the detection rate of each related factor.

### **2.4. Methodology quality evaluation**

According to the observational study quality evaluation criteria of The Agency for Healthcare Research and Quality (AHRQ) in the United States <sup>[6]</sup>, an independent evaluation was conducted on the methodological quality of the included studies. Among the 11 indicators, each meeting the criteria was scored 1 point, totaling

11 points. The quality score of the study was categorized into 0–3, 4–7, and 8–11, corresponding to low, medium, and high quality.

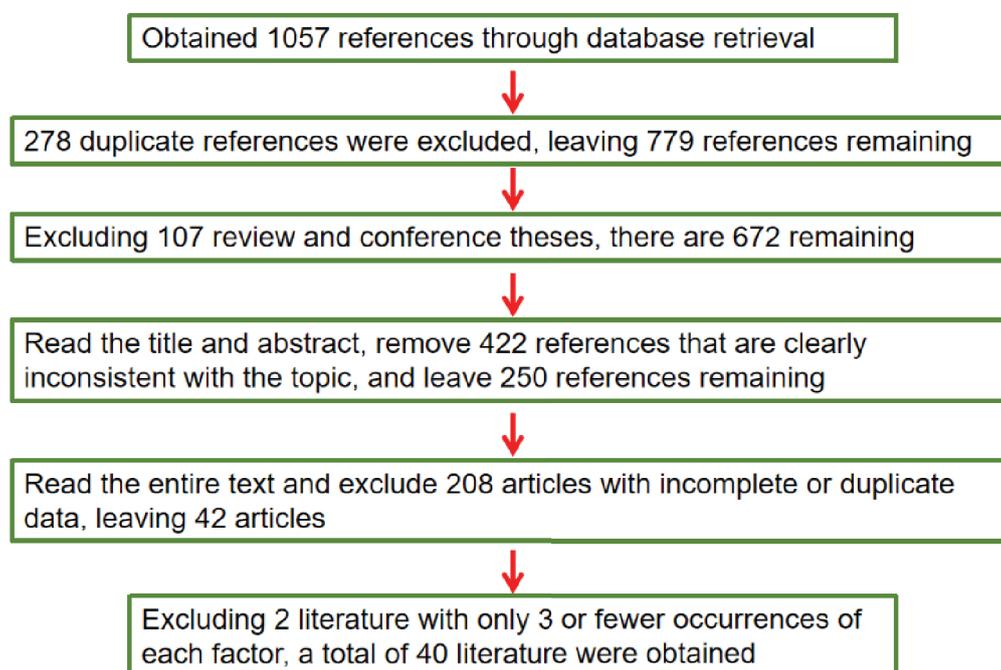
## 2.5. Statistical methods

The data were analyzed using Stata 12 software. The results of the merger effect were represented by a forest plot. Heterogeneity was assessed using the  $I^2$  statistic: If  $I^2 < 25\%$ , no heterogeneity was considered present; if  $25\% < I^2 < 50\%$ , a small degree of heterogeneity was considered present; if  $50\% < I^2 < 75\%$ , a certain degree of heterogeneity was considered present; if  $I^2 > 75\%$ , significant heterogeneity was considered present. If  $I^2 < 50\%$  and  $P \geq 0.1$ , no significant statistical difference was indicated, and analysis could be conducted using a fixed-effects model; otherwise, a random-effects model was employed.

## 3. Results

### 3.1. Basic characteristics of included literature

According to the search strategy, 40 articles were retrieved (the search process is illustrated in **Figure 1**). These articles encompassed a total of 189,005 research subjects, among whom 57,456 individuals exhibited anxiety symptoms. The survey period ranged from 2020 to January 2023, and the research spanned various regions of China. Evaluation of the included studies using the AHRQ scale revealed scores ranging from 5 to 9, indicating medium to high-quality literature.



**Figure 1.** Flowchart of articles identified

### 3.2. Meta-analysis results and heterogeneity testing of anxiety detection rate among college students during the pandemic period

Given significant differences among the studies included in the literature ( $I^2 = 99.9\%$ ,  $P < 0.01$ ), a random

effects model was employed to merge effect values and conduct a meta-analysis on the anxiety detection rate in each study. A total of 189,005 research subjects were surveyed, with 57,456 individuals found to have anxiety symptoms. The study determined that the incidence of anxiety symptoms among college students in this epidemiological survey was 25.6% (95% CI: 20.5–30.6%).

### 3.3. Analysis of factors influencing college students' anxiety during COVID-19

Among the 40 articles included in this study, factors related to anxiety symptoms among college students that were mentioned three times or fewer were excluded, leaving eight influencing factors. These factors included gender, profession, residence, being an only child, nationality, isolation status, awareness of COVID-19, and the degree of impact of the pandemic on life.

### 3.4. Assessment of heterogeneity and sensitivity analysis

As this study involved a single-group rate meta-analysis, no publication bias assessment or sensitivity analysis was conducted. The single-group rate provided descriptive results rather than comparison ones, with no “positive” or statistically significant outcomes.

## 4. Discussion

The study identified that during the COVID-19 pandemic, the detection rate of anxiety among college students in China was 25.6%, significantly surpassing the anxiety risk detection rate (15.8%) reported in the “Report on the Development of National Mental Health in China 2021–2022.” This high anxiety detection rate underscores the profound impact of COVID-19 on the living and learning environments of college students, as well as on their mental well-being <sup>[7]</sup>.

Various perspectives emerged regarding the influence of gender on anxiety in research. Some studies, like Zheng *et al.* <sup>[8]</sup>, indicated a notably higher detection rate of anxiety in females compared to males. This difference could stem from distinct psychological characteristics, with females often exhibiting greater susceptibility to anxiety due to factors like heightened emotional sensitivity and a lack of security. Conversely, findings from studies such as Wang suggested a lower positive rate of anxiety in females compared to males, possibly linked to male sensitivity to negative events <sup>[9]</sup>.

While most studies indicated that the profession had no significant impact on the detection rate of anxiety, there were exceptions. For instance, Zheng *et al.* found a significantly higher detection rate of anxiety among medical students compared to non-medical students <sup>[8]</sup>, attributed to the former's heavier academic workload and higher exam pressure. Compared with the latter, the former had a deeper understanding of infectious diseases, a wider range of professional knowledge, and a higher awareness of the epidemic, but lacked communication and was more prone to anxiety. Conversely, Jin *et al.* observed a higher proportion of non-medical students experiencing anxiety <sup>[10]</sup>, indicating the need for further investigation into the true impact of the profession.

Research generally showed that increased knowledge about COVID-19 corresponds to a lower positive rate of anxiety symptoms among college students. While individual studies may have differed, overall, a lack of understanding about COVID-19 correlated with higher anxiety detection rates. A more accurate and comprehensive understanding of the pandemic tended to foster a more optimistic outlook, reducing the likelihood of negative emotions.

Compared to the general population, college students may have limited social activities and insufficient knowledge about COVID-19, making it challenging for them to cope with stress effectively. This could lead to unstable mental states, particularly during crises like the COVID-19 pandemic. Thus, this study suggests a

heightened focus on the mental health of college students during the pandemic, especially for those who lack an understanding of COVID-19 and experience significant disruptions in their personal lives. University staff should actively promote COVID-19 awareness and education, disseminate timely updates about the pandemic, and provide support to students facing personal challenges due to the pandemic.

## 5. Limitation

The inclusion, exclusion of literature, and data extraction were performed by a single individual, which may introduce bias or errors. Some included literature differed in the definition and measurement standards of influencing factors, leading to significant heterogeneity testing and potentially affecting the reliability of research results. Hence, more comprehensive and detailed research is necessary to determine the influencing factors of anxiety among college students.

## 6. Conclusion

During the pandemic, the detection rate of anxiety among college students in China was notably high compared to the detection rate of anxiety risk among the general Chinese population. Gender, specialization, understanding of COVID-19, and the impact of the pandemic on personal life significantly influenced the detection rate of anxiety among college students. The findings highlight the importance of focusing on the mental health of college students, particularly those who lack understanding of the COVID-19 pandemic and experience disruptions in their personal lives due to the pandemic. Providing timely support and care to these students is essential. Additionally, universities should actively implement courses in health education, mental health, and other relevant areas to enhance students' knowledge of physical and mental health, enabling them to better cope with sudden public health emergencies.

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## Disclosure statement

The authors declare no conflict of interest.

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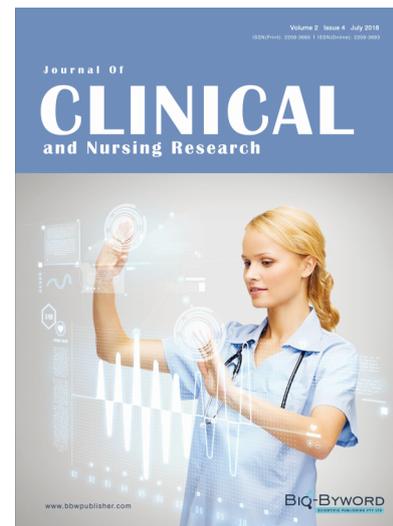
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