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International Education Forum

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Learner Autonomy as an Instructional Strategy in Enhancing Language Learning

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Abstract: The purpose of this research is to assess the applicability of learner autonomy as an instructional strategy in language learning, specifically English as a second language. The study made use of the descriptive correlational research design with a Microsoft Form questionnaire as the main instrument in gathering the data needed from the senior high school students. The results revealed that most senior high school students were enrolled in academic track and the majority of them have outstanding academic performance. The findings also showed that learning technologies were often utilized by these students and collaborative assistance were very often employed. Meanwhile, the extent of manifestation of learner autonomy to language learning is up to great extent. Moreover, a significant relationship between manifestation of learners' autonomy and profile variables were found except, the relationship between academic performance and control over learning management and control over cognitive processing. Also, the respondents were able to identify several problems and challenges in their autonomy. Finally, based on the findings of the study, a learning strategy matrix was prepared to further enhance the learner autonomy in language learning among senior high school students of Lyceum of the Philippines University campuses.

Keywords: Learner autonomy; Instructional strategy; Collaborative assistance; Learning technologies; Learning strategy matrix

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1. Introduction

Today's learners are considered the center of the teaching and learning process. Learning is no longer restricted to the four walls of a typical classroom, where the teacher serves as the focal point of all educational activities and students are merely passive recipients of instruction with no autonomy. 21st-century education currently focuses on the skill development and critical thinking skills of the learners. Suskie [1] described that students of today can master content from a wide variety of subjects while synthesizing, evaluating, and producing information with an understanding of and respect for diverse cultures. Virtual tools and open-source software,

which are the highlights of the 21st century, create borderless learning grounds for students of all ages, anytime and anywhere.

The current setting in the educational system advocates learner autonomy. Today's classrooms are now training venues for self-efficacy and independence. Among educators, the growing inclination towards learner-centeredness was a radical shift, which involved the primary focus of learning moving from the teacher to the learner. Whereas traditional learning relies heavily on the teacher as the interpreter and presenter of knowledge, learner-centered education opens up opportunities for individual learners to be participants in their own learning [2].

Learners now drive their learning, with opportunities for self-management, collaboration, discovery, creation, and self-assessment, guided by teachers. Globally, curricula aim to cultivate independent learners prepared for local and global challenges. Accordingly, the current educational principles emphasize lifelong learning and life skills development. Tamer [3] explained that the trend among students is to be more and more independent of teachers. Students are being transformed into independent learners, assuming more responsibility for their own learning, and teachers are only becoming facilitators, advising more and lecturing less. Today, where classrooms are spurred by advances in information technology, students can be autonomous.

In the Philippines, few studies have been conducted regarding learner autonomy (LA) in language learning [4]. Learner autonomy is a new concept in Philippine education, but it is a significant move by the government to change the old curriculum into a learner-centered curriculum, which is a big leap toward learner autonomy. The Philippine educational system acknowledges the importance of learner autonomy; however, learner autonomy seems to be less recognized as an educational aim in the country than the others [5].

The implementation of the K–12 curriculum, which focuses on learner-centeredness in curriculum design, implementation, and evaluation [6], implied that education in the Philippines may see a more autonomous learning scenario in the near future. Language learning may lead the way for more autonomous learning in the Philippines since research shows autonomy in language learning is most effective. Lewis, *et al.* [7] asserted that independence, autonomy, and the ability to control learning experiences have come to play an increasingly important role in language education.

Further, Nugraheni [8] pointed out that the teacher should provide learning activities that develop and exercise learning competencies. Students need guidance and encouragement to help them set goals, make choices, show interest in different learning tasks, and engage more actively in learning activities. In addition, teachers must be aware of the progress made or the difficulties encountered during autonomous learning in order to provide immediate and appropriate support [9].

Learner autonomy, once a fringe idea challenging traditional teaching, is now globally recognized, especially in language learning. It emphasizes learners' independence, which can occur with support from teachers and peers both inside and outside the classroom [10]. Autonomy entails psychological independence in the learning process and content, not just learning mode [11]. It is distinct from terms like self-instruction or distance learning, focusing on learners' abilities and attitudes to learn independently [12].

Autonomous learners excel in self-learning but are not limited to it [11]. Globally, language learning emphasizes learner autonomy [2], crucial for adapting to rapid changes in science and technology through lifelong learning. Its integration into education aims to cultivate responsible learners capable of self-directed learning, both in class and outside, to improve language proficiency [13].

Abun *et al.* [14] highlighted that Philippine classrooms often feature teacher-dominated environments, with controlling behavior prevalent over autonomy support. Autonomy-supportive teachers motivate students and foster open discussion, whereas controlling behavior involves excessive teacher talk and limited student input. This approach is typically reinforced with rewards, praise, or punishment based on student participation [14].

In contrast to many Western educational systems, Philippine classrooms remain entrenched in traditional teaching methods, lacking emphasis on learner autonomy. Passive learning prevails, with students often relegated to the role of mere listeners and observers, resulting in poor retention and lack of motivation. To address this issue, promoting strategies that foster learner autonomy is crucial. Incorporating learner autonomy as an instructional approach in language learning can help overcome this educational challenge.

Filipino students generally exhibit developing proficiency levels in English, as indicated by past and current English standardized tests administered by both the Department of Education (DepEd) and private academic institutions. This suggests a lack of communicative competence in English within the current educational context. The findings align with the 2018 Program for International Student Assessment (PISA) report, which highlighted below-average English reading literacy among Filipino students compared to the OECD average. Alarmingly, only one out of five Filipino students achieved at least the minimum proficiency level in overall reading literacy, resulting in one of the lowest rankings worldwide [15].

While the current academic challenges facing senior high school students at the Lyceum of the Philippines University are daunting, they present an opportunity for improvement rather than despair. The researcher suggests that a shift in instructional strategy could address these challenges effectively. Embracing autonomous learning empowers students to understand their learning processes, including strengths and weaknesses. This self-awareness is crucial for language proficiency acquisition and fosters lifelong learning skills.

The study examined learner autonomy as an effective instructional strategy for enhancing language learning, specifically English as a second language. Furthermore, it envisioned the development of learner autonomy among English language students. Being autonomous, therefore, in the initial state, meant being scaffolded by teachers to enhance the learning process. Finally, the investigation aimed to promote a learning strategy matrix that could enhance learner autonomy among senior high school students. This learning strategy matrix for learner autonomy development would have been very useful for the transition of learners from teacher-dependent learners to autonomous learners in English. With the aid of a competent English teacher, this matrix for autonomous learner development would have helped facilitate activities that exposed these learners to numerous autonomous learning opportunities.

2. Objectives of the study

This study aimed to determine the applicability of learner autonomy (LA) in language learning as an instructional strategy for senior high school learners.

Specifically, this study achieved the following objectives:

(1) To describe the profile variables of the senior high school students in terms of:
   (a) strand;
   (b) academic performance;
   (c) utilization of learning technologies; and
   (d) collaborative assistance.
(2) To determine the extent of manifestation of learners' autonomy as instructional strategy in language learning relative to the following controls over:
   (a) learning management;
   (b) cognitive processing; and
   (c) control over content.
(3) To find out the relationship between the extent of manifestation of learners' autonomy and profile variables.

3. Hypothesis of the study

The study was premised on the following null hypothesis:

There is no significant relationship between the respondents' demographic profile variables and the extent of manifestations of their learner autonomy.

4. Results and discussion

4.1. Profile of the senior high school students

This study examines the demographic profile of senior high school students in a private school, encompassing their academic track, performance, use of learning technologies, and collaborative assistance. Understanding these factors is crucial for assessing students' autonomy in language learning, as they significantly influence attitudes, motivation, and strategies. The sample includes 799 students from a total population of 3,317, offering insights into students' characteristics and their implications for language learning autonomy.

Understanding the track and strand in language learning is essential for assessing learner autonomy. Different tracks and strands offer varying degrees of freedom to learners, impacting their ability to take charge of their learning. Profiling enables teachers to identify learners' abilities and challenges, providing tailored support and resources to foster autonomy. This approach enhances learner motivation and engagement, leading to improved language learning outcomes. Profiling track and strand helps identify learners' needs, facilitating targeted teacher support and autonomy promotion.

Table 1 shows more than half (53%) of the student-respondents were enrolled in the Science, Technology, Engineering, and Mathematics (STEM) strand. The result also showed that most of the respondents are enrolled in academic track. This was almost similar to the study conducted by Brillantes *et al.* [16] wherein the largest concentration in the distribution of enrolment by strand/track was in academic and Technical-Vocational-Livelihood (TVL) tracks.

Table 1. Strand of the respondents

Strand/Track	Frequency	Percent*
Science, Technology, Engineering, and Mathematics (STEM)	424	53.10
Accountancy and Business Management (ABM)	187	23.40
Humanities and Social Sciences (HUMSS)	80	10.00
Technical-Vocational-Livelihood Track: Home Economics Strand:	60	7.50
Arts and Design Track (ADT)	30	3.80
General Academic Strand (GAS)	18	2.30
Total	**799**	**100.00**

*Percent is based on the total respondents of 799

Table 1 reveals that a majority of student-respondents were enrolled in the Science, Technology, Engineering, and Mathematics (STEM), Accountancy and Business Management (ABM), and Humanities and Social Sciences (HUMSS) strands within the academic track. This suggests a significant inclination towards pursuing college degrees among students. Academic track, designed for college-bound students, emerged as the most popular choice in the K–12 curriculum [17]. This trend aligns with prior studies, such as those conducted by Brillantes *et al.* [16], which also observed high enrollment concentrations in Academic and Technical-Vocational-Livelihood (TVL) tracks.

However, there were also students opting for the Technical-Vocational-Livelihood Track, with strands like Information and Communication Technology (ICT), Home Economics: Tourism cluster (HET), and Home Economics: Culinary Arts cluster (HEC). This choice indicates a preference for immediate employment after senior high school, bypassing college education. The TVL track is tailored for students aiming to enter the workforce directly after completing basic education. Overall, the data suggests that most senior high school students are inclined towards pursuing college education after completing basic education.

4.2. Academic performance

As for the academic performance category, **Table 2** presents the academic performance of the students. Based on the data presented in **Table 2**, a significant percentage of the students belong to the group with very satisfactory and outstanding grades. Likewise, the study of Tus [18] supported this finding by indicating that the academic performance of senior high school students mostly belonged to the very satisfactory and outstanding group.

Table 2. Academic performance of the respondents

Academic performance	Frequency	Percent
90-100 (Outstanding)	543	68.00
85-89 (Very satisfactory)	187	23.40
80-84 (Satisfactory)	52	6.50
75-79 (Fairly satisfactory)	17	2.10
Total	**799**	**100.00**

*Percent is based on the total respondents of 799

Scholars also agree that the academic success of students is a "net product" of their cognitive and non-cognitive attributes [19] as well as the sociocultural context in which the learning process takes place [20,21].

Although it can be seen in the table that there are some students who have fairly satisfactory grades, the study of Quinn-Nilas *et al.* [22] believed in the significance of self-management and academic success courses in coaching students with successful strategies for performing well in their studies. Their study revealed that lack of personal capacity positively predicts academic resourcefulness, which in turn, predicts academic degrees. Therefore, it is particularly important to understand the factors that affect the academic performance of students if educators intend to foster a culture of academic success.

Additionally, Magulod's [23] research looked at the learning style preferences, study patterns, and level of academic achievement of students. His study revealed that most students have a high degree of academic achievement. Based on the results in **Table 2**, it could be concluded that most senior high school students of the four LPU campuses were able to achieve high academic success.

4.3. Utilization of learning technologies

Table 3 shows that half of the learning technologies were used very often by the students. The grand mean indicates that senior high school students often utilize learning technologies such as the internet, social media, multimedia, and computer-based/gadget-based in their everyday learning. This was evident especially in this time of pandemic where students were not allowed to interact face-to-face with their classmates and teachers. The amount of time they spent using the learning technologies increased. The current finding was similar to the study of Ubaedilla and Damar [24] stating that learning technologies are often used in distance learning.

Table 3. Utilization of learning technologies by the respondents

Learning technologies	Mean	Standard deviation	Interpretation
1. Internet	3.81	0.481	Very often
2. Computer-based/Gadget-based	3.59	0.764	Very often
3. Multimedia	3.51	0.736	Very often
4. Video	3.50	0.649	Very often
5. Social media	3.36	0.781	Very often
6. Pen and paper	3.13	0.841	Often
7. Non-multimedia	2.92	0.829	Often
8. Audio	2.85	1.077	Often
9. Simulations	2.51	1.031	Often
Composite mean	**3.24**	**0.401**	**Often**

For interpretation, the following remarks apply to mean interval: 4: 3.50–4.00 Very often/Great extent; 3: 2.50–3.49 Often/Moderate; 2: 1.50–2.49 Seldom/Slight; 1: 1.00–1.49 Very seldom/Least

Ratnasari and Haryanto [25] supported the utilization of learning technologies, noting their positive impact on student learning achievement. They emphasized the significance of gadgets and other learning technologies in modern education, suggesting their increasing importance in the future. They urge curriculum planners and policymakers to recognize the potential of learning technologies in accommodating diverse learning styles.

Similarly, Francis [26] advocated for technology in education, highlighting its role in fostering alternative learning approaches and community building. Despite some students' continued use of traditional methods like pen and paper, the Internet is perceived as a stronger and more convenient resource, particularly during the pandemic. It serves as a vital knowledge source, enhancing reading habits and academic performance.

The Internet's accessibility has revolutionized education [27], with a large percentage of students owning smartphones, granting them constant access to educational resources [28]. It offers vast information resources, including online libraries, research papers, articles, and multimedia content, facilitating comprehensive learning experiences [29]. Additionally, the Internet enables interactive learning through multimedia elements like videos and simulations, promoting engagement, critical thinking, and knowledge retention [30,31].

In-depth, the Internet promotes collaborative learning by enabling seamless communication and knowledge-sharing among students and teachers. Learning management systems and video conferencing tools, for example, encourage virtual collaboration by allowing students to participate in group projects, peer reviews, and real-time discussions [32]. The Internet's collaborative nature encourages social interaction and knowledge co-construction.

Multimedia technology has become prominent in education due to its ability to enhance learning retention, engage learners through multisensory experiences, provide interactive environments, and cater to various learning styles. Leveraging visuals, audio, and interactivity, multimedia fosters active engagement, deep understanding, and knowledge application. As technology evolves, multimedia's role in education is poised to expand further, offering students innovative and immersive learning experiences.

By incorporating multiple sensory modalities, multimedia technology enhances learning retention. The integration of visual, auditory, and kinesthetic elements aids learners in processing and retaining information. Research indicates that multimedia, such as videos, animations, and graphics, improves learning outcomes and

long-term memory [33].

Multimedia technologies also engage learners through multisensory experiences. Multimedia captures learners' attention and stimulates their senses by incorporating visual, auditory, and interactive components. This multisensory engagement encourages active learning and allows for greater comprehension [34]. Learners can visualize concepts, hear explanations, and interact with the content, resulting in a more engaging learning experience.

Multimedia technologies offer interactive learning environments, engaging students through simulations, virtual reality (VR), and gamification, promoting exploration, critical thinking, and knowledge application [35]. Additionally, multimedia accommodates various learning styles by presenting content in different modes, catering to visual, auditory, and kinesthetic learners [36].

Video technology has transformed education delivery, captivating learners with compelling visual content that enhances understanding and retention [37]. With the widespread accessibility of smartphones and other devices, learners can easily access video content anytime, anywhere [38]. Videos engage learners emotionally, sparking curiosity and increasing motivation [39], while offering a versatile instructional tool for lectures, demonstrations, simulations, and more [40].

Social media platforms serve as effective learning technologies, fostering community and collaborative experiences [41]. Users can create and share educational content, promoting active participation and knowledge creation [42].

Social media platforms offer personalized learning experiences by tailoring content to users' interests, preferences, and learning styles. Algorithms analyze user behavior to recommend relevant resources, courses, and communities, enhancing learner engagement and motivation [43].

What sets social media apart for learners is its capacity for rapid information dissemination, enabling access to real-time updates, news, and trends. Educators utilize platforms like Twitter, Facebook, and LinkedIn to share timely resources and learning materials, keeping students informed and adaptable to changing educational landscapes [44].

With its ability to foster social connectivity, facilitate user-generated content, provide personalized learning experiences, and enable real-time information dissemination, social media stands out as the most widely used learning technology. Learners engage in collaborative learning, create and share educational content, receive personalized recommendations, and access up-to-date information through social media platforms. As social media continues to evolve, its impact on education will redefine traditional learning paradigms and increase global learner engagement.

4.4. Collaborative assistance

Students who engage in collaborative assistance in language learning demonstrate willingness to work with others, effective communication in the target language, ability to provide constructive feedback and support, and integration of their own learning needs with those of peers. This collaborative approach allows them to benefit from collective knowledge and support, potentially leading to greater language learning success and a more enjoyable experience (**Table 4**). Self-paced, grouping, and online methods are commonly employed for collaborative assistance among senior high school students, reflecting the importance of contemporary learning environments.

Table 4. Collaborative assistance of the respondents

Collaborative assistance	Mean	Standard deviation	Interpretation
1. Online	3.67	0.582	Very often
2. Self-paced	3.50	0.666	Very often
3. Grouping	3.40	0.489	Often
4. Dyadic	3.12	0.869	Often
5. Coaching	3.03	0.776	Often
6. Mentoring	2.96	0.851	Often
Composite mean	**3.28**	**0.425**	**Often**

For interpretation, the following remarks apply to mean interval: 4: 3.50–4.00 Very often/Great extent; 3: 2.50–3.49 Often/Moderate; 2: 1.50–2.49 Seldom/Slight; 1: 1.00–1.49 Very seldom/Least

Students prefer comparing skills with peers rather than solely relying on coaching from teachers. Reinders and White [45] emphasized that learner autonomy involves interdependence, not just freedom. This notion is supported by Sulaiman and Shahrill's study [46], which found that collaborative learning positively influenced student attitudes and enhanced learning outcomes. Collaboration fosters active learning, positive social support, teamwork, and exposure to multiple cognitive perspectives. However, students also face challenges in collaborative learning, including teamwork, communication, personal priorities, and external constraints [47].

Numerous studies highlight the benefits of collaborative learning. Mosley *et al.* [48] support this notion, emphasizing collaboration's diverse educational applications, including enhancing critical thinking and fostering positive group dynamics. Collaborative learning provides students with opportunities to develop confidence and skills in challenging subjects, making them more academically competitive.

Online collaborative assistance stands out as the most prominent indicator of language learning autonomy, empowering learners to actively engage in language acquisition and practice. Online platforms offer enhanced accessibility, allowing learners to connect and collaborate with peers and language experts worldwide. Regardless of geographical constraints or time zones, learners can access language resources, participate in discussions, and seek assistance, thanks to the ubiquity of the Internet and mobile devices.

Online collaborative platforms facilitate interactive communication, enabling meaningful interactions among learners and native speakers of the target language. Through features like video conferencing, instant messaging, and discussion forums, students can practice language skills, receive feedback, and engage in authentic conversations [49]. This interactive communication fosters learner autonomy while enhancing linguistic and cultural competence.

Moreover, online collaborative assistance empowers learner autonomy by granting students control over their learning experiences. Learners can set objectives, choose materials, and engage in self-directed learning at their own pace [50]. These platforms offer diverse resources, including online courses and language exchange communities, enabling learners to personalize their learning journey.

Furthermore, online collaborative language learning platforms provide personalized experiences tailored to individual needs and preferences. Adaptive technologies and machine learning algorithms assess progress, strengths, and weaknesses, offering targeted recommendations and feedback [51]. This personalization enhances engagement, motivation, and learning outcomes.

Due to its increased accessibility, interactive communication, learner autonomy, and personalized learning experiences, online collaborative assistance has emerged as the dominant approach to fostering language learning autonomy. Language learners can connect with a global community, engage in authentic interactions,

and take control of their learning journeys through online platforms. As technology continues to evolve, online collaborative assistance will continue to shape the landscape of language learning autonomy, empowering learners to achieve their proficiency goals.

Mentoring serves as a crucial component of collaborative assistance in language learning autonomy, offering personalized guidance and support to learners. Mentors, typically experienced language users or educators, provide individualized feedback, resources, and assistance tailored to learners' specific needs and goals [44]. This personalized support enables learners to identify strengths and areas for improvement, enhancing the effectiveness of their language learning experiences.

Moreover, mentoring plays a pivotal role in boosting learners' motivation and self-efficacy. Mentors act as role models, offering encouragement, inspiration, and positive reinforcement [52]. Through regular interactions, mentors help learners set achievable goals, monitor progress, and overcome challenges, fostering intrinsic motivation and persistence in language learning [53].

Significantly, mentoring promotes the growth of cultural competence in language learning. Language mentors can help students understand cultural nuances, norms, and communication styles associated with the target language [54]. Mentors help learners become more effective communicators and gain a deeper appreciation for intercultural diversity by providing insights into cultural contexts and facilitating authentic language use.

Mentoring also encourages learners to engage in self-reflection and metacognition. Mentors help learners develop critical thinking skills by guiding them to reflect on their language learning strategies, progress, and goals [55]. Mentors encourage learners to evaluate their learning approaches, make informed decisions, and develop autonomy in managing their language learning journey through discussions and feedback.

In the end, through mentoring relationships, learners receive personalized guidance, motivation, and cultural insights, enabling them to take ownership of their language learning process. As mentoring continues to evolve in online and offline contexts, it will continue to play a crucial role in supporting language learners on their path to autonomy.

4.5. Extent of manifestation of learners' autonomy in language learning

4.5.1. Control over learning management

Control over learning management refers to the extent to which learners are able to manage their learning environment by using resources, tools, and technology available to them. In language learning, this includes the ability to use language learning software, mobile apps, online resources, and social media to enhance language learning. Moreover, learners may use various tools and technologies to monitor their learning progress and seek feedback, such as language learning journals, online language assessments, and language learning platforms.

When learners have control over their learning management, they are more likely to customize their learning experience to their individual needs, which can enhance motivation and learning outcomes. Therefore, the manifestation of learners' autonomy in language learning relative to control over learning management is crucial for effective language learning. Control over learning management is described as planning, organizing, and evaluating the learning process [56].

Table 5 shows that the manifestation of the learner's autonomy to control over learning management is to a moderate extent. The majority of the students were able to set the pace of their own learning according to their learning style, choose resources on their own, and improve their language learning through self-practice. In short, learners make decisions that have a huge effect on the results of their learning.

Table 5. Extent of manifestation of learners' autonomy in language learning relative to control over learning management

Item	Mean	Standard deviation	Interpretation
1. Set the pace and place of studying in accordance with own style of learning	3.51	0.637	Great extent
2. Choose the means and resources for my studying if given the opportunity	3.46	0.612	Moderate extent
3. Improve English proficiency through self-induced language skills practice	3.45	0.637	Moderate extent
4. Set practical use of learned skills in the English language	3.44	0.565	Moderate extent
5. Use various learning materials from school, community, friends, and home to achieve learning goals	3.28	0.708	Moderate extent
6. Hone language skills by doing additional out-of-school activities such as listening to English podcasts and watching English videos	3.26	0.800	Moderate extent
7. Read learning materials on my own even outside the school	3.23	0.737	Moderate extent
8. Define specific learning goals on a daily, weekly, or monthly basis	3.20	0.750	Moderate extent
9. Assess own learning after every lesson discussion	3.16	0.760	Moderate extent
10. Visit the library often and look for supplementary and advanced materials for learning	2.09	0.978	Slight extent
Composite mean	**3.21**	**0.438**	**Moderate extent**

For interpretation, the following remarks apply to mean interval: 4: 3.50–4.00 Very often/Great extent; 3: 2.50–3.49 Often/Moderate; 2: 1.50–2.49 Seldom/Slight; 1: 1.00–1.49 Very seldom/Least

The study conducted by Muhammad [57] revealed that students demonstrated the ability to manage their learning independently, leading to a sense of ownership and control over their learning styles and preferences. Similarly, Balakrishnan and Gan [58] explored the factors influencing students' intentions to use social media for learning, highlighting the effectiveness of student-centered teaching methods. Lumanog [59] and Wong [60] emphasized the importance of teaching styles in enhancing learning experiences, supported by Magulod [23] and Aventijado *et al.* [61], who emphasized the impact of tailored strategies on student success.

Moreover, learners' autonomy in language learning involves setting their own pace and studying in environments that suit their preferences [62,63]. Learners can select methods and resources that align with their learning goals, promoting self-directed learning and increasing their chances of success in language acquisition [64,65]. Self-initiated practice is crucial for improving language proficiency, as emphasized by Oxford and Crookall [66] and Camilleri [67], enabling learners to focus on specific skills and areas for improvement.

While some indicators, such as defining specific learning goals and utilizing library resources, were perceived as less relevant, they still reflect learners' autonomy in setting goals, self-assessment, and seeking additional materials to support their learning journey. Learners exercise control over their learning management and increase autonomy in language learning by personalizing their learning experiences and accessing diverse resources to enhance their language skills [65,68].

4.5.2. Control over cognitive processing

Learner autonomy in language learning is evident in cognitive processing. Firstly, autonomous learners take charge of their learning journey by setting goals and crafting strategies to achieve them. They actively seek language practice opportunities through various means like online resources, conversations with native speakers, or reading in the target language. Secondly, autonomous learners engage in deeper cognitive processes such as critical thinking and analysis. They question information, seek additional resources for validation, and connect new concepts with existing knowledge, enhancing their understanding and retention of the language.

Table 6 displayed that the manifestation of the learner's autonomy to control cognitive processing is to a moderate extent. Students were able to acknowledge their limitations and challenges and do something to improve their weaknesses, use background knowledge effectively to absorb and process current lessons, and gain knowledge and skills through collaboration with others.

Table 6. Extent of manifestation of learners' autonomy in language learning relative to cognitive processing

Item	Mean	Standard deviation	Interpretation
1. Acknowledge limitations and challenges and do something to improve my weaknesses	3.46	0.640	Moderate extent
2. Use background knowledge effectively to absorb and process current lessons	3.43	0.623	Moderate extent
3. Gain knowledge and skills through collaboration with others	3.38	0.751	Moderate extent
4. Plan learning activities such as time, strategy to be used, source, quality, and quantity of learning materials	3.37	0.649	Moderate extent
5. Put newly learned language skills into practice	3.33	0.683	Moderate extent
6. Use various learning approaches if the current one is not working well to stimulate interest in language learning	3.32	0.665	Moderate extent
7. Make some efforts to overcome emotional issues that may hinder language learning	3.30	0.720	Moderate extent
8. Keep in line with the predetermined plan during the process of completing academic tasks.	3.29	0.653	Moderate extent
9. Understand the lessons even with less supervision from the teacher	3.27	0.708	Moderate extent
10. Provide an opportunity for self-assessment as a part of learning	3.25	0.752	Moderate extent
Composite mean	**3.34**	**0.444**	**Moderate extent**

For interpretation, the following remarks apply to mean interval: 4: 3.50–4.00 Very often/Great extent; 3: 2.50–3.49 Often/Moderate; 2: 1.50–2.49 Seldom/Slight; 1: 1.00–1.49 Very seldom/Least

The findings suggest that independent learners are more likely to succeed in language learning as they acknowledge limitations, use background knowledge effectively, and collaborate with peers [7]. This task knowledge, part of metacognitive knowledge, is crucial for controlling cognitive processing, which entails managing attention, reflection, and metacognitive knowledge itself [59]. Muhammad's study emphasized students' attentiveness, error awareness, and willingness to help others as signs of cognitive control [57]. Similarly, Yildiz and Akdag argued that students with high metacognitive knowledge tend to act more strategically and productively [69]. Research by Warni *et al.* further supported this, showing the feasibility of involving students in decision-making about learning objectives and self-evaluation [70], while also highlighting the importance of teachers sharing control over classroom learning with students. Ultimately, learners' autonomy in language learning, regarding control over cognitive processing, involves students taking charge of their learning process and actively employing strategies to enhance their learning, characterized by acknowledging challenges, using background knowledge effectively, and collaborating with others.

4.5.3. Control over content

Learners' autonomy in language learning entails taking charge of their learning journey, including setting goals, selecting strategies, and owning their outcomes. This autonomy is evident in various forms, such as choosing materials, pacing their learning, and selecting topics aligned with their interests. Controlling content is particularly crucial, as it enhances engagement and motivation by allowing learners to choose relevant

materials that cater to their preferences and needs, ultimately leading to a more enjoyable and effective learning experience.

Table 7 shows the manifestation of the learner's autonomy to control content to a moderate extent, which explains how it allows learners to tailor their learning to their individual strengths and weaknesses, leading to improved language proficiency over time.

Table 7. Extent of manifestation of learners' autonomy in language learning relative to content

Item	Mean	Standard deviation	Interpretation
1. Decide what to learn during self-study	3.47	0.714	Moderate extent
2. Check the authenticity and reliability of researched learning materials	3.46	0.675	Moderate extent
3. Understand clearly the objectives/goals of the lesson whenever I look for supplemental resources	3.42	0.638	Moderate extent
4. Choose the learning materials needed based on learning objectives	3.40	0.659	Moderate extent
5. Research for additional learning materials that could help master the learning competencies	3.36	0.702	Moderate extent
6. Choose the reading materials and performance tasks that I have personal preference	3.34	0.699	Moderate extent
7. Choose learning objectives for self-study	3.32	0.757	Moderate extent
8. Compare and contrast teacher-provided materials and self-provided materials for better understanding	3.26	0.795	Moderate extent
9. Check learning material content that can be used in practical ways	3.25	0.723	Moderate extent
10. Scrutinize books and other learning materials to make sure they fit my learning needs	3.07	0.781	Moderate extent
11. Look for indigenous materials that I can use for my own learning	3.02	0.858	Moderate extent
12. Suggest more effective learning materials to my teachers	2.73	1.010	Moderate extent
Composite mean	**3.26**	**0.491**	**Moderate extent**

For interpretation, the following remarks apply to mean interval: 4: 3.50–4.00 Very often/Great extent; 3: 2.50–3.49 Often/Moderate; 2: 1.50–2.49 Seldom/Slight; 1: 1.00–1.49 Very seldom/Least

Students were able to decide on what materials to learn during self-study, check the authenticity of their learning materials, choose the learning materials they needed based on the learning objectives, etc. Students' control relates to their freedom to choose activities that agree with their expectations, needs, and choices. They reflect integrated ideas related to the optimistic, healthy growth, motivation, and engagement of students, combined as a voice and choice. This result was consistent with the findings of the study by Ding and Shen, revealing that control over content provides an ingenious context for learners to exercise proactive autonomy.

Moreover, this finding was solidified by the result of the study which revealed that their respondents suggested that the automated feedback in the app should have not only stated the correct and incorrect answer but also provided an explanation [59]. This action of the students illustrated that participants have reflected on the learning process. This reflection, as believed by many scientists, is a key to the psychological element of learners' autonomy.

Though students only have a moderate extent of suggesting more effective learning materials to their teachers, looking for indigenous materials that they can use for their learning, and scrutinizing books and other learning materials to make sure they fit their learning needs, the study of Warni *et al.* [70] indicated that the concepts of learner autonomy should be viewed as closely linked to the political aspect of the teachers' freedom

to share control of various learning elements with the students. The same view as Reinders and Benson [71], who stated that the promotion of learner autonomy should take into account political aspects. Teachers are mediators for the promotion of learner autonomy practice in diverse contexts [72]. Therefore, understanding the curriculum with all its components should be taken into account to further enhance autonomy among learners.

In terms of control over content, the manifestation of learners' autonomy in language learning involves students taking control of the learning materials and resources they use. This autonomy is demonstrated by making decisions about what to learn during self-study, evaluating the authenticity and dependability of researched learning materials, and having a clear understanding of the objectives and goals of the lesson when seeking supplemental resources.

One manifestation of learners' autonomy is the ability to decide what to learn during self-study. Autonomy empowers learners to choose topics, skills, or aspects of the language they want to focus on based on their personal interests, needs, or goals. By taking responsibility for their learning choices, learners can direct their efforts toward areas that are most relevant or meaningful to them, fostering motivation and engagement [72].

Another manifestation of learners' autonomy is the critical evaluation of the authenticity and reliability of researched learning materials. Autonomy entails learners actively assessing the quality and credibility of resources they encounter. This involves checking the source, considering the expertise of the author or provider, and evaluating the accuracy and relevance of the content. By exercising autonomy in selecting reliable materials, learners can ensure that they are exposed to accurate and valuable language input.

Understanding the objectives and goals of the lesson is another aspect of language learners' autonomy. Autonomous learners understand the intended outcomes of a lesson or learning activity. When looking for additional resources, students should match their choices to the specific objectives or goals they want to achieve. This deliberate selection of materials ensures that students remain focused and effectively improve their language skills [62].

Furthermore, learners' autonomy in language learning, relative to control over content, is demonstrated through the ability to decide what to learn during self-study, the evaluation of the authenticity and reliability of learning materials, and the understanding of lesson objectives when seeking supplemental resources. By exercising autonomy over content choices, learners can tailor their learning experiences to their specific needs and goals, enhancing their language acquisition process.

4.6. Relationship between the extent of manifestation of learners' autonomy and profile variables

The extent of learners' autonomy can vary based on profile variables in this particular study. Education, track, strand, and other variables have also been found to be predictors of autonomy. Further, the manifestation of learners' autonomy is a complex and multifaceted process that is impacted by a range of variables. However, with proper support and encouragement, learners can develop their autonomy skills and take greater control of their own learning. This can lead to greater motivation, engagement, and success in educational pursuits. Teachers and educators can play a critical role in fostering learners' autonomy by providing opportunities for choice and self-directed learning, while also offering guidance and support as needed.

Table 8 also reveals that there was a significant relationship between the strand or track of students and their control over cognitive processing. For the first profile variable, the result expressed that there was a significant relationship between the strand or track of students and their control over learning management. This was supported by the study of Villas [73], which stated that students enrolled in different tracks are equally confident in the performance of academic and health-related tasks.

Table 8. Significant relationship between the extent of manifestation of learner's autonomy and their profile variables

Demographic characteristics	Usage factor	Pearson χ^2	*df*	*P* value	Interpretation
Strand/Track	Control over learning management	69.995	24	0.019	With significant relationship
	Control over cognitive processing	69.080	24	0.031	With significant relationship
	Control over content	58.850	24	0.023	With significant relationship
Academic performance	Control over learning management	11.118*	9	0.240	No significant relationship
	Control over cognitive processing	14.348*	9	0.129	No significant relationship
	Control over content	23.919	9	0.020	With significant relationship
Utilization of learning technologies	Control over learning management	458.30	9	0.000	With significant relationship
	Control over cognitive processing	877.50	9	0.000	With significant relationship
	Control over content	250.50	9	0.000	With significant relationship
Collaborative assistance	Control over learning management	594.70	9	0.000	With significant relationship
	Control over cognitive processing	962.52	9	0.000	With significant relationship
	Control over content	416.40	9	0.000	With significant relationship

*The test value (χ^2) is not significant at 0.05 level

The study revealed contrasting results with Malaga and Oducado [74], indicating no significant relationship between cognitive processing and the strand or track of senior high school students. However, it underscored a significant association between students' strand or track and their control over content, as suggested by Madrazo and Dio [75]. This relationship suggests that modules effectively prepare students for logical and critical thinking, enhancing their analytical skills [76].

When students utilize meaningful knowledge, they actively engage in various learning activities. Therefore, the hypothesis suggesting no significant relationship between respondents' demographic profiles and the extent of their learner autonomy is rejected.

The study found no significant relationship between students' academic performance and their control over learning management, differing from Cobb's [77] findings regarding web-based courses. However, it revealed a significant association between academic performance and control over content, suggesting that the availability of learning materials positively impacts students' performance. Therefore, the hypothesis regarding the relationship between demographic profile and learner autonomy is accepted for learning management but rejected for content control.

Regarding the utilization of learning technologies, the study indicated a significant relationship with control over learning management, contrary to the study by Venter *et al.* [78]. Their study suggested that factors beyond technology may influence student engagement in online learning.

Table 8 highlighted a significant relationship between the utilization of learning technologies and students' control over cognitive processing and content. The use of computers motivated students to engage actively in learning activities. The study by Abdul Rabu *et al.* [79] supported this, indicating that technology use allows flexibility in self-assessment and expands students' learning opportunities. Therefore, the hypothesis that demographic profile has no significant relationship with learner autonomy is rejected based on these findings.

The results indicated a significant relationship between collaborative assistance and students' control over learning management, cognitive processing, and content. Younger students preferred teamwork and independent problem-solving. Ikhsan [80] supported this, suggesting that collaborative assistance impacts learning discipline

and material control, allowing students to learn at different speeds. Therefore, the hypothesis stating no significant relationship between demographic profile and learner autonomy is rejected based on these findings.

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Disclosure statement

The authors declare no conflict of interest.

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Research on the Education Path of Forging a Strong Sense of Community for the Chinese Nation in Dali Junior High School

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Abstract: At the Central Ethnic Work Conference in 2021, the General Secretary stressed "building a regular mechanism of education for Forging a Strong Sense of Community for the Chinese Nation," the national education system is an important part of it. Junior high school has a special position in the national education system, which is not only in the final stage of compulsory education but also plays a role in carrying on senior high school education. Therefore, it is necessary to conduct special research on the education of forging a strong sense of community in the Chinese nation in junior middle schools. This study takes forging a strong sense of community for the Chinese nation as the motif and takes the junior high school of Dali as an example to carry out the analysis, and believes that it is important to carry out the education of the community consciousness of the Chinese nation in the middle school. Based on the investigation of the status quo and achievements of the education of forging a strong sense of community for the Chinese nation in junior middle schools in Dali Prefecture, the problems in the ways of implementation, team building, and education results are found, and optimization suggestions are put forward on this basis.

Keywords: Forging a Strong Sense of Community for the Chinese Nation; Dali Prefecture; Junior high school; Education path

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1. Introduction

"Forging a Strong Sense of Community for the Chinese Nation" is a major original judgment that was put forward by the General Secretary [1]. At the Central Working Conference about Nationality Affairs in 2021, the General Secretary clearly pointed out that it is necessary to "build a regular mechanism of education for Forging a Strong Sense of Community for the Chinese Nation" [2], the national education system is an important part of it [3]. This points out the direction for the theoretical research and practical development of the consciousness education of forging a strong sense of community for the Chinese nation.

Junior high school has its particularity in the national education system, which is not only the final stage of compulsory education but also plays a role in carrying on senior high school education [4]. Junior high school is

in the critical stage of students' physical and mental development, and the education of forging a strong sense of community for the Chinese nation in this stage is conducive to students establishing a correct view of Chinese national history and cultivating students' spirit of patriotism [5].

2. The present situation and achievement of the education of forging a strong sense of community for the Chinese nation in the junior middle school of Dali

2.1. Integration of education of forging a strong sense of community for the Chinese nation into the curriculum system

Firstly, there must be clear educational goals. Through the observation of classroom teaching in many junior middle schools in Dali Prefecture, it is learned that teachers of various disciplines will consciously guide students to deepen their understanding of a series of historical facts in which all ethnic groups jointly expand territory, write a long history, create Chinese culture, and cultivate a great spirit in the teaching process, so as to promote the realization of educational goals.

Secondly, there should be integrated teaching content. The education of the community consciousness of the Chinese nation has been incorporated into classroom teaching in different degrees in the middle and high schools of Dali [6]. Each junior high school has continuously explored the material resources of the consciousness education of the Chinese nation community and integrated them into the curriculum system of ideological and political lessons, history lessons, and Chinese lessons.

Thirdly, in addition to the main courses such as ideological and political courses, Chinese language courses, and history courses, junior middle schools in Dali have also focused on strengthening the integration of relevant content in art classes, music classes, etc. While adhering to the main position of the classroom, they have strengthened relevant education through various forms to expand the space of education.

2.2. Achievements in quality cultivation

Firstly, there is an enhancement of cultural literacy. The national standard of spoken and written language is an important bridge for students of different ethnic groups to communicate with each other, understand each other, and integrate into mainstream society. Therefore, all schools carry out learning and publicity activities to make students realize the importance of learning and promoting standard spoken and written Chinese and lay a foundation for students to use the national standard spoken and written language [7].

Secondly, we should preliminarily establish a community concept. Students of different ethnic groups are arranged to live together, so that they can find commonality with each other in the process of living together and respect and tolerate each other's differences, and they have initially established the community consciousness of mutual equality and respect in the process of symbiosis, learning, and sharing.

Thirdly, it is necessary to enhance the "Five Identities" [8]. Junior middle schools in Dali, in combination with the actual situation of the school and the ideological reality of the students, actively carry out class and team activities with the theme of forging a strong sense of community for the Chinese nation. Through the activities, students of various ethnic groups enhance inter-ethnic exchanges, narrow the psychological distance, and constantly strengthen the identity consciousness of the great motherland, the Chinese nation, Chinese culture, the Communist Party of China, and socialism with Chinese characteristics [9].

3. Weak links in forging a strong sense of community for the Chinese nation in Dali junior middle school

Based on reality, the education of Chinese national community consciousness in junior middle schools in Dali Prefecture needs to be improved in several aspects: implementation path, teacher team, and assessment mechanism.

3.1. Educational implementation path

Firstly, the main channel of ideological and political course is not fully played [10]. In the concrete teaching practice, there is tension between ideological and political courses and the education of forging a strong sense of community for the Chinese nation, both in terms of teaching content and teaching form. Due to the limitations of teaching plans and teaching hours, the connection between the two in teaching content is weak.

Secondly, the effect of thematic practice is insufficient. The themed activities carried out by various junior middle schools focus on the form but not the guidance. Many schools carry out themed activities with the help of student associations, but after students participate in the activities, they do not make collective exchange and feedback on students' experience in participating in the activities, so they miss the opportunity to improve the forms of activities and strengthen the educational objectives according to the feedback of the activities [11].

Thirdly, the infiltration of the campus cultural environment is lacking. The propaganda content of the education on the consciousness of building the Chinese nation community in the junior middle schools of Dali Prefecture is insufficient, and the role of the school propaganda carrier and the space carrier in the construction of the campus cultural environment is not fully brought into play [12].

3.2. Construction of the teaching team

Firstly, the teachers lack a professional foundation. The education of forging a strong sense of community for the Chinese nation is highly professional. In addition to very few teachers of ideological and political courses in Dali, most teachers of other subjects lack the professional foundation of relevant education [13].

Secondly, the teaching staff is unstable. On the one hand, the source of relevant teaching staff is unstable, and the composition of the team is not clear; on the other hand, the relevant teachers have not formed a stable organizational form.

Thirdly, teacher interaction is inadequate. In the construction of junior middle schools at all levels in Dali Prefecture, the obvious problem lies in the lack of cooperation among junior middle schools and their management. Teachers lack communication and go their own way. The lack of cooperation and interaction among schools is also inconducive to the collective teacher training of junior middle schools at all levels.

3.3. Effectiveness assessment mechanism

Firstly, educational effectiveness is hard to quantify. Subjects included in the scope of the high school entrance examination, with the help of the academic level test of each subject, one can intuitively evaluate the educational effect through the score. At present, the education of forging a strong sense of community for the Chinese nation is not included in the scope of high school entrance examination, so the effectiveness of teacher education is difficult to be directly quantified by students' scores.

Secondly, the index system is difficult to structure. The following aspects should be considered when constructing an indicator system. Firstly, quantitative indicators are a complex system and need to cover all aspects to play the role of scientific evaluation; the second aspect is the way to determine the indicators if quantitative indicators are to be quantified; and how the scores should be distributed is the final indicator.

Thirdly, effectiveness incentives need to be implemented. On the whole, the higher authorities' incentives for junior middle schools at all levels in Dali Prefecture to carry out education on the consciousness of the Chinese national community, and the incentives for teachers' comprehensive education in junior middle schools at all levels in Dali Prefecture have yet to be implemented.

4. The optimization path of the education of forging a strong sense of community for the Chinese nation in Dali junior high school

4.1. Improving the implementation of education of forging a strong sense of community for the Chinese nation

Firstly, we should give full play to the main channel role of ideological and political courses [14]. On the one hand, we can sort out the teaching content of ideological and political courses with the theme of the education of forging a strong sense of community for the Chinese nation, and explore the correlation between the two teaching contents. On the other hand, the carrier of ideological and political courses can be expanded to help cast the education of forging a strong sense of community for the Chinese nation.

Secondly, we need to carry out educational practice activities. Each junior high school in Dali Prefecture should combine the actual situation of the school to carry out innovative educational practice activities with its own characteristics [15]. In the process of focusing on the theme of carrying out educational practice activities, on the one hand, we should attach importance to teachers' leading role in practical activities. On the other hand, we should choose the time and place of the theme activity.

Thirdly, we should give full play to the infiltrating effect of the campus environment [16]. All junior middle schools in Dali Prefecture should strengthen the construction of the campus environment, the construction of campus propaganda positions, and the utilization of space carriers. It is necessary to give full play to the cultural popularization role of electronic screens, propaganda boards, blackboard newspapers, and campus walls, and strengthen the infiltration of the campus cultural environment with a strong sense of community of the Chinese nation [17].

4.2. Strengthening the construction of teacher teams in the education of forging a strong sense of community for the Chinese nation

Firstly, we need to strengthen teachers' relevant theoretical learning. On the one hand, teachers should study by themselves, and the school should actively encourage the faculty and staff to deeply study the important discussion about forging a strong sense of community for the Chinese nation. On the other hand, schools should carry out at least one special lecture on the consciousness of the Chinese nation community every semester, so that teachers can fully understand the development of the education of forging a strong sense of community for the Chinese nation in our country.

Secondly, we should define the organizational form of the teaching staff. On the one hand, in the process of selecting teachers for the education of forging a strong sense of community for the Chinese nation, the junior middle schools should not only select the backbone teachers of ideological and political courses as the main force but also widely absorb excellent teachers of various disciplines. On the other hand, the school should establish a teaching and research group on the education of forging a strong sense of community for the Chinese nation, and actively explore how to integrate various disciplines into the content of the education of the consciousness of the Chinese nation community in the classroom [18].

Thirdly, we need to carry out regular teacher exchange activities. On the one hand, it is necessary to strengthen the exchanges and cooperation between schools in the region. On the other hand, we should make good use of online space for collective communication [19]. With the help of the online platform, junior high school

teachers in Dali Prefecture create and share with other excellent teachers in the education of forging a strong sense of community for the Chinese nation, achieve consensus and co-education, and move forward together.

4.3. Taking a variety of forms to motivate results

Firstly, we should construct multiple effectiveness evaluation criteria. On the one hand, the educational administrative department should take the establishment and construction of the school's consciousness of forging a strong sense of community for the Chinese nation as an important content to assess the performance of the school's leadership. On the other hand, all junior high schools in Dali should combine the actual situation of the first, second, and third grades to build multiple effectiveness evaluation criteria [20].

Secondly, we should also establish a reasonable performance evaluation system. The first level index system of the evaluation index system of the consciousness education of forging a strong sense of community for the Chinese nation in Dali junior high school should mainly include three parts: school organization and leadership, campus atmosphere construction, and educational resources coordination, and the scores of the three parts should be roughly distributed according to 4:3:3.

Thirdly, we need to take practical action to motivate results. On the one hand, the establishment and implementation of the education of forging a strong sense of community for the Chinese nation course in junior high schools should be encouraged. On the other hand, teachers of various disciplines should be encouraged to achieve the results of the education of forging a strong sense of community for the Chinese nation, mainly through honor encouragement and financial support.

5. Conclusion

The normalization of the education of forging a strong sense of community for the Chinese nation is an important deployment made at the Central Ethnic Work Conference in 2021. As a new theory in the new era, the education of forging a strong sense of community for the Chinese nation is worthy of our in-depth exploration. When carrying out the education of forging a strong sense of community for the Chinese nation in junior high schools, we should not only fully consider the characteristics of the school section, but also consider the local cultural heritage and the distribution of educational resources and other factors, and use the most appropriate methods and strategies to combine the particularity of the school section with the particularity of the local area, so as to ensure the extensive coverage and substantive effect of educational activities.

Disclosure statement

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Exploration of the Impact of Music Education on the Speaking and Hearing Abilities of D/deaf People

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Abstract: This paper reveals the influence of music education on D/deaf people's hearing and speaking abilities by analyzing the existing literature. Firstly, the importance of music education and related research background is introduced. Then, some methods and precautions to be used in literature analysis are explained. In the literature review, the methodology, sample characteristics, and main findings of different studies are compared and analyzed. Lastly, the paper puts forward some suggestions for further research and summarizes the important role of music education in the field of D/deaf people education and the future research direction.

Keyword: Music education; D/deaf learners; Auditory training; Hearing impairment; Sound perception; Inclusive education; Sensory integration

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1. Introduction

Music education has been an important research topic in recent decades, with positive effects on academic performance, cognitive development, and social-emotional learning [1]. In addition, music education plays a key role in the field of special education, especially for students with hearing loss. Dating back to 1848, pioneers such as William Wolcott Turner and David Ely Bartlett wrote in the *American Annals of the Deaf* that hearing-impaired students could learn music, this has contributed significantly to the musical education of the deaf [2,3]. Rhythm classes flourished in schools for the deaf in the 19th century, using rhythmic clapping, piano, drums, musical games, and imitative singing to train auditory skills and pronunciation [4]. The enactment of the 1975 Education for All Children with Disabilities Act (EAHCA), which later evolved into the Individuals with Disabilities Education Act (IDEA), marked an important turning point. This legislation ensures that students with disabilities can receive appropriate education in a more inclusive environment, facilitating their integration into regular classrooms, including music lessons. Building on this progress, Paula and Pederiva found through research that music education enhances the sensory experience of deaf people and promotes a deeper

understanding and appreciation of music in ways that are acceptable to deaf people [5].

2. Methodology

In this paper, a systematic approach was used for literature collection and analysis. Literature searches were conducted in multiple scholarly databases, including Semantic Scholar, Connected Papers, Summit Keyword Graph, and Google Scholar. Among them, Connected Papers can show the positioning of a particular paper in the academic field and its relevance to other papers; Summit Keyword Graph provides a keyword-based visual exploration tool that provides insight into research trends and keyword vocabulary on a specific topic. In these academic databases, the search and selection of literature were centered on keyword groups such as "music education," "D/deaf people," "hearing ability," and "speaking ability."

In addition, when conducting a literature search, preference was given to recently published literature to ensure that it reflects current research trends and the latest findings. The scope of the study focused on relevant studies published between 2000 and 2024. The selection criteria were designed to target studies that directly explored the impact of music education on D/deaf people's education, excluding studies that did not involve D/deaf people participants.

It should also be noted that in this paper, in addition to the objects studied in the literature, D/deaf people will be used to refer to people with different hearing levels. This allows D/deaf people to include a broad group of people who, despite differences in hearing levels, may benefit from music education. It is important to recognize that D/deaf people with different hearing levels may experience and respond differently to music education. Therefore, this paper will consider these differences and explore how music education can meet the needs of this diverse group and the potential impact of music education on their hearing and language development.

3. Literature review

3.1. Impact of music education on the hearing ability of D/deaf people

In terms of exploring the impact of music education on the hearing ability of D/deaf people, a total of three studies were analyzed in depth [6-8]. By comparing and connecting these three studies, the essays on the methodology and research design of each study were analyzed, thus highlighting the unique role of music education in improving the listening skills of D/deaf people.

Reifinger's study adopted the methodology of literature review and systematic evaluation, focusing on exploring the impact of music education as an effective auditory training tool on children with cochlear implants. The main findings of the study include: music education not only improves the auditory abilities of children with cochlear implants but also promotes the development of their auditory skills, especially in speech recognition and pitch perception; singing activities in music education play an important role in language ability and music perception of children with cochlear implants. However, although Reifinger's study provided insights into the use of music education in children with cochlear implants, its study design has certain limitations. The study used a short training period, which may limit a full assessment of the long-term effects of music education. To sum up, research by Reifinger showed that music education has a positive impact on promoting the development of hearing and music perception abilities of children with cochlear implants [8].

In the study by Rochette *et al.* [6], the research focused on exploring the impact of music education on the hearing ability, perception, and cognition of deaf children. This study compared profoundly deaf children who received music classes with those who did not receive music education and found that profoundly deaf

children who participated in music classes showed significant improvement in their auditory abilities, not only in the field of music but also in non-music-related auditory tasks. However, these advances also facilitated the development of hearing-related cognitive and language skills. Although the study provided a comprehensive assessment of the overall effects of music education, there are some methodological limitations to the study. The study had a small sample size, with only 14 profoundly deaf children having taken music lessons and 14 profoundly deaf children not attending music lessons. This may limit the generalizability of the findings. To sum up, the research by Rochette *et al.* showed that music education has a positive impact on the development of hearing ability, perception, cognition, and language skills of deaf children [6].

Comparing the studies by Reifinger and Rochette *et al.*, it was found that Reifinger used the methods of literature review and systematic evaluation to provide information on the impact of music education on the auditory and music perception abilities of children with cochlear implants. The study by Rochette *et al.* revealed the extensive impact of music education on the development of deaf children's hearing, perception, cognitive abilities, and language skills through actual comparative research. Although the two have differences in research methods, both emphasize the value of music education in the use of children with cochlear implants and deaf children.

Roman *et al.* focused on auditory training in cochlear-implanted children, particularly through the "voice of the hand" strategy to improve hearing and speech recognition [7]. The study involved 19 cochlear-implanted children and divided the participants into an experimental group that received training and a control group that did not receive training. The results showed that the experimental group showed significant improvements in auditory tasks and speech recognition, while the control group showed no significant changes. Research showed that this training has a positive effect on improving the hearing of cochlear-implanted children. Research has also found that early intervention is critical in the hearing development of these children. Although this study had certain strengths in design, such as the use of a control group and a large sample size, the study also demonstrated certain limitations, including not using a randomized controlled trial design, not assessing long-term effects, and lacking task-specific details. To sum up, the study by Roman *et al.* showed that auditory training has a positive impact on deaf children's auditory ability and speech recognition [7].

Compared with the first two studies, the study by Roman *et al.* focused on cochlear-implanted children, and the study showed that their auditory ability was improved by auditory training. This differs from the first two studies in that it focuses on auditory training rather than music education, which provides a contrasting perspective to the first two studies. This further emphasizes the importance of music education in improving the listening abilities of D/deaf people. Music education is a broader approach to education. In the studies of Reifinger and Rochette *et al.*, music education promoted auditory, cognitive skills, and language skills while also promoting musical interests, compared with single auditory training, music education provides a more diverse experience.

Overall, although the methods used in these three studies were different, they all highlighted the positive impact of music education on the hearing of D/deaf people.

3.2. Impact of music education on the oral language ability of D/deaf people

In terms of exploring the impact of music education on the oral language ability of D/deaf people, the following three studies with similar themes were analyzed respectively [9-11]. By comparing and connecting these three studies, the differences in methodology and research design of each study were analyzed to explore the unique role of music education in improving the oral skills of D/deaf people.

Silvestre and Valero's study explored the impact of music education on the spoken language acquisition of

deaf pupils in primary school education [9]. The study followed five deaf pupils who received music education in a mainstream school over a long period and compared them with a control group of deaf pupils who did not receive music education. The study found that the experimental group performed better than the control group in areas such as language, speech quality, and simple sentence structure. Overall, the study showed that music education at the primary education stage has a certain positive impact on deaf pupils' oral language acquisition, especially in terms of discourse organization, syntactic ability, and speech intelligibility. Although the study studied participants over a long period and added a control group, there were some limitations in the study's methodology. For example, the sample size of the study was small, which may limit the representativeness and generalizability of the findings. To sum up, the research by Silvestre and Valero showed that music education has a positive impact on the discourse organization, syntactic ability, and speech intelligibility of deaf pupils in primary education [9].

Fix's study explored the impact of music education on deaf and hard-of-hearing children [10]. The study investigated the exposure of children in oral schools to music in school by designing a questionnaire. The study found that most schools reported in the survey that they provide some form of music education in the school curriculum; most schools use music programs to help students develop language and auditory skills; students who participate in music programs are social and show positive changes in emotional behavior. These findings indicated that music education plays a crucial role in the development of deaf and hard-of-hearing children, not only promoting these children's communication skills but also having a significant positive impact on their overall development. There are still some methodological limitations in this survey study. For example, the data collection methods and measurement tools used in the study may not fully capture the characteristics or variables of the research object; the subjective bias of the researcher may affect the data analysis and interpretation process, thus affecting the objectivity and impartiality of the research. To sum up, the research by Fix showed that music education has a positive impact on the language, expression, and communication abilities of deaf and hard-of-hearing children [10].

By comparing the first two studies, it was found that although they both focused on the impact of music education on D/deaf people, their methods and focuses were different. By interviewing a small number of deaf pupils, Silvestre and Valero explored in depth the positive impact of music education on deaf students' oral acquisition, especially in terms of language and speech. In contrast, Fix's study analyzed the impact of music education on deaf and hard-of-hearing children in a broader context. Although the two studies differ in method and focus, both emphasize the importance and potential value of music education in the education of D/deaf people.

Nelson *et al.* explored the integration of music into language and literacy instruction, providing music instruction for deaf and hard-of-hearing children. The study discussed the beneficial aspects of integrating music into educational activities to enhance the hearing, speech, language, and literacy development of these children. In the article, Mrs. Adams found that Katie, a student with hearing loss, showed better language and literacy skills after adding music to her lessons. This suggests that music can have a positive impact on the spoken language skills of deaf and hard-of-hearing children. This research highlighted the huge potential of music as a tool to promote language development and literacy, particularly for deaf and hard-of-hearing children. The study demonstrated the effectiveness of incorporating music into educational programs to enhance language and literacy development in deaf and hard-of-hearing children. However, the study lacked detailed methodological details, limiting the ability to fully evaluate the study design and methods. To sum up, the research by Nelson *et al.* showed that music education has a positive impact on the language and literacy skills of deaf and hard-of-hearing children [11].

Compared with the previous two studies, the study by Nelson *et al.* focused more on the role of music in the language and literacy teaching of deaf and hard-of-hearing children. It highlighted the potential of music to promote language and literacy development in these children, but the lack of detailed study details and comprehensive assessments limits a comprehensive understanding of study design and methods.

Overall, although these three studies have differences in methodology and samples, they jointly demonstrate the positive impact of music education in promoting the development of language abilities of D/deaf people.

4. Suggestions for further research

Based on an in-depth understanding of the existing literature, particularly based on the studies by Reifinger, Rochette *et al.*, and Roman *et al.*, it can be concluded that music education has a positive impact on the development of hearing and speaking abilities of D/deaf people. These studies highlight the importance of early intervention, individualized education, and multisensory teaching approaches. Based on this, the following suggestions can be made:

First of all, we should develop a long-term music education plan for the D/deaf people. This program should begin early in their lives and continue through all stages of their development. Doing so ensures that D/deaf people receive appropriate support and stimulation during critical periods of language and hearing development, leading to better development of language skills and musical perception. Harrison *et al.* emphasized the importance of language learning in the critical period of language acquisition for D/deaf people, pointing out that early music education may have a significant impact on the language and hearing development of D/deaf people, given the close relationship between music and language [12].

Secondly, we should implement personalized music education plans for D/deaf people. Personalized education provides tailored teaching methods for D/deaf people to meet their unique needs and promote their academic performance, which can also enhance the understanding and identity of D/deaf people's culture. Thus, we can use their multiple senses in music education, such as vibrations transmitted through the floor or chairs. In this way, even if children cannot hear the music, they can experience it by seeing and feeling it [13].

In summary, these recommendations based on literature research, if implemented and maintained, may provide deaf children with a supportive and inclusive learning environment, which can help them learn and progress better.

5. Conclusion

This literature review reveals that music education has an important positive impact on the development of hearing and speaking abilities of D/deaf people. Through in-depth analysis of relevant literature, especially the research by Reifinger, Rochette *et al.*, and Roman *et al.*, we found that music education can effectively improve the auditory perception of these children, language understanding, and expression skills. By analyzing relevant research, we found that early intervention and continuous music education can significantly improve the auditory perception, language understanding, and expression abilities of these children. In addition, personalized and multi-sensory teaching methods have also been noted to have a positive impact on adapting to the unique needs of D/deaf people. However, there are some limitations to the current study, such as the small sample size and limitations of the study design. Therefore, future research should consider a wider sample and a more comprehensive research design to explore more deeply the long-term effects of music education on D/deaf people. To sum up, music education is not only an important part of the education of D/deaf people but also

a key factor in their all-round development and should receive more attention and application in educational practice.

Disclosure statement

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Study on the Current Situation of Skills Training for Pre-Vocational Chemistry Normal University Students Based on the Normal University Professional Certification

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Abstract: At present, the main task of normal universities is to train qualified teachers for primary and secondary schools. Thus, pre-service teacher skills training and some educational theories are compulsory courses for every normal university student. The level of pre-service teacher skill training of normal university students directly affects the future teaching work of students. Especially for chemistry normal university students, we should not only possess the basic teaching ability of teachers but also experimental operation skills. Therefore, transforming from an ordinary chemistry normal university student to a qualified chemistry teacher must go through many links, especially the pre-vocational chemistry normal university student skills training. Based on the relevant theory of the skill training of pre-vocational chemistry students, this paper combines its own practical experience and adopts the questionnaire method to analyze the problems existing in the skill training of pre-vocational chemistry students. This paper is divided into three parts, the qualities of the students, the current situation, and problem analysis.

Keywords: Pre-vocational chemistry normal university students; Normal university professional certification; Chemistry teacher skills training

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1. Introduction

With the development of society, the country pays more and more attention to the cultivation of talents, which cannot be separated from teachers. Therefore, the cultivation of teachers has always been a hot topic. It is particularly important to analyze and improve the pre-service teachers' skill training, so as to promote the construction of high-quality teachers and the process of teacher professional development.

2. Comprehensive quality and professional quality of pre-vocational chemistry normal university students under the background of normal university professional certification

2.1. Comprehensive literacy

In order to become a qualified middle school chemistry teacher, the comprehensive quality training of normal university students in normal colleges and universities mainly includes teaching pen and chalk writing skills, as well as Mandarin training, education information technology, speaking skills, and lecture skills [1].

For chemistry teachers, Mandarin skills are crucial. Speaking Mandarin is the basis of oral expression skills training, which can further improve the level of Mandarin and directly affect the quality of knowledge transmission and the image of teachers; teachers' language should be scientific and standardized, clear, good at summarizing, and fluent in expression [2].

Whether the writing of words is standardized is directly related to the education and teaching effect and the prestige of teachers. Especially when writing on the board, we should be skilled in the standard, symmetrical and beautiful, decent expression, smooth sentences, and writing a standard word.

The application of modern teaching resources has become increasingly extensive, interspersed with courseware teaching can stimulate students' interest in learning, but also can make students feel the content learned more intuitively. At this time, we need to know more about the use of the computer method, skilled in the application of information technology [3].

2.2. Professional quality

The professional qualities that pre-vocational chemistry normal university students should train include introduction skills, language skills, blackboard writing skills, questioning skills, demonstration skills, and summarization skills (**Table 1**).

Table 1. Evaluation table of teacher skills training

Evaluation Form of Teacher Skills Training (Lecture)		
Project	**Evaluation criterion**	**Ranking**
Introduction skills	1. Clear direction 2. Pay attention to connection 3. Communication between teachers and students 4. Pay attention appropriately to novel, unique, and positive energy	Outstanding Good Average Pass Fail
Teaching language skills	1. The pronunciation is accurate, standard, clear and complete 2. The volume is moderate 3. Rhythm is slow and moderate 4. The vocabulary and grammar are standard, accurate, insightful, easy to understand, and vivid 5. The teacher's voice should be natural, moderate, and coordinated with the oral expression	Outstanding Good Average Pass Fail
Writing skills	1. Reasonable layout (main and sub-board writing) 2. The project is clear, highly focused and enlightening 3. Neat, compact, clear, beautiful 4. The blackboard design is novel and creative, and can highlight the key and difficult points 5. Writing is standard, no wrong words, with correct use of eraser	Outstanding Good Average Pass Fail

Table 1. (Continued)

Evaluation Form of Teacher Skills Training (Lecture)		
Project	**Evaluation criterion**	**Ranking**
Questioning skills	1. Introduce the problem is simple and clear 2. The questions raised should be suitable for the students' understanding level 3. Key content and keywords to slow down and increase the volume 4. Use questions to improve students' quality of listening	Outstanding Good Average Pass Fail
Demonstrate skills	1. Demonstrate the action specification 2. There should be moderate integration with the classroom teaching content 3. Demonstration should be combined with teaching, and we should be good at transforming students' perception into thinking activities	Outstanding Good Average Pass Fail
Summarization skills	1. Time is tight, and I can summarize the key and difficult points 2. Summary and promotion, should be combined with the actual chemical life has sublimation	Outstanding Good Average Pass Fail
General comment		

3. Current situation of teacher skill training of chemistry normal university students

3.1. Problems existing in the micro-class teaching of normal university students majoring in chemistry

Through the questionnaire survey and analysis, we have analyzed many shortcomings in the skill training of pre-vocational chemistry normal university students [4].

3.1.1. Lack of understanding of micro-class teaching

Most of the teacher skills training courses for chemistry normal university students are concentrated in the third semester, with in-school lecture competitions in junior year and educational practice in senior year. Although micro-class teaching is inseparable from the skill training of normal students, many normal students do not know micro-class teaching at all [5]. In particular, the control of micro-class teaching time is not adequately managed. Typically, micro-classes require only about 10 minutes of content explanation, but some students prepare 40 minutes of content. Furthermore, there is often a lack of brief pre-class introductions, class questioning segments, and blackboard writing. Because micro-class teaching time is very short, the training focuses primarily on a few key areas. The integrity of the overall class structure should also be ensured [6]. Consequently, many normal university students interpret micro-teaching as short teaching content, with a strict time limit. As a result, some links and knowledge points are omitted in the teaching design.

3.1.2. Lack of attention to micro-class teaching

Through the investigation, it was found that in many higher normal colleges and universities, many students

are participating merely to earn credits [7]. Without teacher supervision, some students will read through the courseware just to complete the class task. A few students, in order to pass the course, directly download courseware from certain software and then go through the motions in class. They do not even understand the specific content of each courseware, and their language is not fluent [8].

3.1.3. Concentrated skills training courses for normal university students in different majors

According to the survey, some teacher skills training courses in higher normal colleges are generally opened in the junior year, followed by limited micro-classes, so that the physics professional and chemistry professional normal university students attend classes at the same time and place [9]. This phenomenon is also inconducive to the teacher skill training of normal university students.

3.2. Teaching resources for teachers' skill training

At present, some normal colleges still face the issue of staff shortages in teacher skills training courses. Specifically, there is a mismatch between the number of available teachers and the requirements of chemistry education courses. Unlike other classes, teacher skills training is a highly specialized course that requires significant teacher participation. A single teacher can tutor several students, but the tutor must have a comprehensive understanding of both middle school chemistry and middle school students. Otherwise, it is difficult to provide targeted training and achieve the expected training outcomes.

3.3. Problems existing in experimental teaching

Chemistry is a subject based on experiments. As a future chemical worker, chemistry normal university students should not only have solid and comprehensive basic theoretical knowledge but also have a strong quality to conduct chemical experiments. It is particularly important to pass on the most practical and efficient experimental content to students in a limited time [10].

The author investigated and analyzed the performance of chemistry normal university students in the middle school chemistry experiment teaching skills training, and found that the main problems are: (1) emotional tension and anxiety; (2) weak chemical knowledge in middle school; (3) weak experiment teaching skills; (4) improper experiment operation; (5) inadequate teaching preparation.

3.3.1. Emotional tension and anxiety

When chemistry normal university students carry out experimental teaching and training, they conduct chemistry experiments as teachers. They should teach knowledge points while doing experiments, and no mistakes should be made in every link. This kind of situation is an unprecedented challenge for chemistry normal university students. Therefore, in the face of such a role change, many normal university students will be nervous, anxious, and incoherent in the process of teaching experiments.

3.3.2. Weak grasp of middle school chemistry knowledge

Many normal university students show the phenomenon of weak basic knowledge in experimental teaching skills training. For example, some students cannot remember some chemical reaction phenomena, experimental precautions, the color expression of some salt solutions, or the writing of some equations. A knowledge point error will appear as a teaching accident. A good teacher should have a rich knowledge reserve.

3.3.3. Weak experimental teaching skills

Questions arise during the question-asking session. For example, when talking about the "oxygen production"

experiment, small wood strips can be used in the last step of the oxygen test, some chemistry normal university students asked about the kind of wood strips to be prepared, showing that they lack understanding of the experiment [11].

3.3.4. Improper experimental operation

Experiments are a means to learning chemistry. Middle school students are relatively unfamiliar with the operation of the experiment, so the teacher's words and actions will subtly affect the students. Thus, the teacher's experimental operation skills should be strong, but the experimental operation of many normal university students in experimental teaching is incorrect. For example, when disposing of the liquid, it is not handled according to the correct procedures in the book but is randomly poured into the beaker. The reagent label is not rinsed in the palm, the reagent bottle mouth is placed carelessly, the used beaker is not cleaned, and the test table is left insufficiently clean. The teacher's words and actions are critical. To become a qualified chemistry teacher, we should first regulate ourselves.

3.3.5. Inadequate teaching preparation

Due to insufficient preparation, there is a lack of an instrument or a certain medicine when carrying out the experiment, resulting in the experiment not being completed. Secondly, they did not consider the possible problems in the experiment during the lesson preparation, resulting in the breaking of test tubes, alcohol lamp fire, and lack of drugs in the process of the experiment [12].

3.4. Problems existing in educational practice

3.4.1. Incorrect internship attitude

When the intern first arrives at the internship school, they may not be given many teaching tasks or might be assigned to teach minor subjects. They may only teach two or three classes a week, leading them to feel that their internship work is neither valued nor important. As a result, they might not take the internship work very seriously. Additionally, some interns prioritize preparing for the postgraduate entrance examination over their internship duties. They might skip lectures at the internship school to focus on their exam preparation. While the postgraduate entrance examination is very important, we should also cherish every opportunity to gain teaching experience [13].

3.4.2. Lack of educational theory and weak professional knowledge

All chemistry normal university students were exposed to a series of courses about educational theory, such as pedagogy, psychology, educational psychology, and chemistry teaching theory, but students often only rote to deal with the final exam and get credits, and do not really understand and master the knowledge of educational theory. Therefore, it is impossible to connect theory to practical teaching. Most interns do not inspire students well in teaching, and they cannot teach them in accordance with their aptitude. Whether it is new lessons, exercises, or experiments, they all use the same teaching method [14].

4. Skills requirements for normal university students

4.1. Employment status of students majoring in chemistry education

Since chemistry is only started in the third grade, the demand for chemistry teachers is significantly lower than that of other disciplines. So as for chemistry normal university students, it is difficult to become a working teacher after graduation. On the one hand, there is a contradiction between the number of jobs and graduates;

on the other hand, there is a gap between the ability requirements for employment and the abilities of students in chemical education. From the current employment situation, it is clear that the expectations for students' thinking and practical skills do not completely align with employment requirements. While most graduates in chemical education pursue careers in education, some choose to work in chemical and pharmaceutical companies in roles such as product research and development or analysis. Additionally, a portion of students opt to pursue further studies, or careers as civil servants [15].

4.2. Job placement skills requirements for students

In addition to possessing excellent quality and extensive chemical knowledge, teachers should also have skills in using Putonghua, standard chalk writing, information technology applications, chemical experiment operations, etc.

5. Conclusion

This paper focuses on the current state of professional certification in education, grounded in a firm policy basis for normal professional certification. It examines the status of skills training for professional chemistry teachers, adhering to the theory of teacher professional development. The goal is to promote reform in the teacher skills training system and ensure the quality of teacher education in normal colleges and universities. Pre-service chemistry teachers should adopt a correct attitude, and cherish and take seriously every skills training session for teaching methods. Given the current situation, it is essential to strive to become qualified teachers, as our future students are the pillars of the country. The key to pre-service chemistry teacher training lies in practice, understanding the connotation and generation of practical teaching wisdom, and advocating for the training of practical teaching skills.

To improve the current state of skills training for pre-service chemistry teachers and to train qualified teachers, as well as to provide a reference for future professional certification work, this paper innovates in theory, conducts investigation and analysis, identifies existing problems, and proposes several improvement measures for reference.

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The Impact of Personality Stability on Smartphone Addiction Among College Students

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Abstract: The rapid progress of information technology has led to a steady rise in the diversity and ubiquity of smartphones. College students are increasingly using cell phones to access social media, as they are no longer under parental control. Therefore, the harmful effects of excessive smartphone usage are becoming increasingly noticeable, resulting in the regular emergence of various psychological problems. It is crucial to analyze the relationship between the personality traits of college students and their smartphone addiction in this specific situation. A total of 375 sets of valid survey questionnaires were obtained from college students in Mianyang City, China. The data was analyzed using SmartPLS 4.1 software. Research findings indicate that college students with a stable personality are less prone to developing smartphone addiction.

Keywords: Personality; Stability; Smartphone addiction; College students

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1. Introduction

Smartphone use has skyrocketed in the past decade, making it a vital part of our daily lives. Smartphones are increasingly important in education due to the COVID-19 pandemic. The lowering cost of smartphones and continued functionality improvements have increased their attractiveness among students and parents, driving their widespread acceptance at colleges and institutions. This has led to many school and college smartphone users. The growth of national digital education materials and online learning platforms has also made smartphone use in education easier. Smartphones meet students' educational, communication, and entertainment needs. Additionally, their powerful social elements contribute to their widespread college use. College students, being young, tend to embrace new technology. Their love for smartphones makes them crucial for school and life. Smartphones have improved student life due to their convenience and versatility, despite their disadvantages. Smartphone addiction is growing in society, especially among young people, due to the rise

in smartphone use in higher education.

Mobile phone addiction, also known as mobile phone dependence, refers to an individual's excessive addiction to mobile phones as a medium, and the strong and constant desire and dependence on its use and existence, resulting in significant social, physiological, and psychological impairment of individuals [1]. Research results show that mobile phone addiction is closely related to physical health problems, mental health problems, and interpersonal communication disorders [2]. While research shows the consequences of smartphone addiction, it is necessary to examine the factors causing smartphone addiction as numerous studies have also shown that there is a certain degree of correlation between personality traits and phone addiction. As such, it is necessary to examine the influence of personality on smartphone addiction among college students in China. As of March 2020, the 45th China Internet Network Development Statistical Report reveals that the total count of Internet users in China stands at 904 million whereby an overwhelming majority of approximately 99.3% of individuals utilize smartphones as their means of accessing the Internet. The growing use and gravity of social media in China have sparked concerns regarding smartphone addiction and its associated psychological ramifications. The aim of this study is to investigate personality stability as the independent variable, which consists of three dimensions: neuroticism, agreeableness, and conscientiousness. These three lower dimensions will later be combined into a higher-order dimension of stable personality. Regarding the dependent variables smartphone addiction, it has four dimensions: functional impairment, withdrawal, compulsive behavior, and tolerance.

In light of the aforementioned statement, this study puts forth the following research hypotheses and conceptual framework:

(1) H1: Stability personality will have a negative effect on functional impairment among college students.

(2) H2: Stability personality will have a negative effect on withdrawal among college students.

(3) H3: Stability personality will have a negative effect on compulsive behavior among college students.

(4) H4: Stability personality will have a negative effect on tolerance among college students.

2. Conceptual framework

Figure 1 shows the conceptual framework of this study.

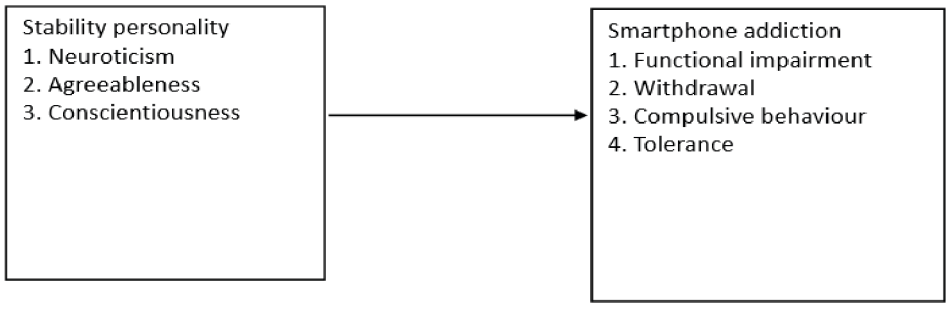

Figure 1. Conceptual framework

3. Methodology

375 sets of usable survey questionnaires were collected from four college students who are presently enrolled in Mianyang City, China. Mianyang City is the location of these four colleges: Sichuan College of Traditional Chinese Medicine, Sichuan Preschool Educators College, Mianyang China Polytechnic, and Mianyang

Teachers' College.

In order to investigate the impact of stable personality on smartphone addiction, we utilized the Chinese Big Five Personality Inventory Brief Version (CBF-PI-B), which was developed by Wang *et al.* [3]. The assessment primarily evaluates five dimensions of personality using a total of 40 items. Each dimension is assessed with eight items, and a 5-level scale is employed. A rating of 1 indicates a "strongly disagree" response, while a rating of 5 indicates a "strongly agree" response. This study utilized three dimensions of stable personality traits, namely neuroticism, agreeableness, and conscientiousness. The level of smartphone addiction was assessed using the Smartphone Addiction Scale (SPAI) developed by Lin *et al.* [4], which is derived from the Internet Addiction Scale (CIAS-R) [5]. The four aspects included are functional impairment, withdrawal, compulsive behavior, and tolerance. The Smartphone Addiction Scale (SPAI) utilized the 26-item to assess the presence of smartphone addiction.

The gathered data was analyzed using two statistical software programs, specifically SPSS version 29.0 and SmartPLS 4.1 [6]. The analytic presentation begins by providing an overview of the background information of the respondents, who are the main source of data for the study. Next, the data validation approach is described, which involves evaluating the measurement model before testing the structural model and analyzing the study hypothesis.

4. Results

During the preliminary stage of the survey, data was gathered from a total of 400 participants. In order to ensure the accuracy of the data, a technique called trimming was employed with the objective of removing responses from participants who seemed uninterested or not fully engaged. This procedure involved eliminating responses that showed consistent patterns, such as giving the same ratings to all items on a Likert scale, as well as responses that displayed inconsistency, such as answering items on a 5-point Likert scale in a sequential pattern like 5, 4, 3, 2, 1 or the reverse, and similarly for a 7-point scale. After excluding the unengaged respondents, the dataset contained 375 valid responses, which accounted for 93.75% of the original responses.

In terms of responder profiles, the gender distribution is almost symmetrical, with 55.50% being women and 44.50% being men. The majority of respondents, specifically 74.70%, fall within the age range of 16 to 20 years. This is followed by 25.10% of respondents who are between the ages of 21 and 25 and a mere 0.30% who are beyond 25 years old. The majority of the respondents, comprising 70.70%, reside in rural areas, whilst 29.30% reside in cities. 47.70% of participants utilized their mobile devices for a duration of 4–7 hours. A further 26.90% of individuals utilized their phones for a duration of less than 4 hours, while 16.30% used their phones for a duration of 7 to 10 hours, and 9.10% used their phones for more than 10 hours. Therefore, the predominant participants in the study are young individuals residing in rural areas who utilize their mobile devices for a duration above 4 hours but not surpassing 7 hours.

The study's findings, as presented in **Table 1**, demonstrate that all indicator loadings, Cronbach's alpha (CA), composite reliability (CR), and average variance extracted (AVE) values indicate strong internal consistency reliability and convergent validity. All the loadings of the measurement indicators are over 0.6, specifically ranging from 0.637 to 0.864. Based on the outcomes of Hair *et al.* [7], it is recommended that indicator loadings exceed 0.7. However, loadings between 0.400 and 0.690 may be considered acceptable if the value of AVE is higher than 0.500. **Table 1** displays the AVE value, which ranges from 0.515 to 0.739. Therefore, the reliability and convergent validity were validated. Agree3 was deleted due to low loading (loading of 0.057).

Table 1. Measurement model for reliability and validity

Dimension	Loading	CA	CR	AVE
Agree	0.637-0.828	0.859	0.879	0.515
Cons	0.828-0.815	0.879	0.903	0.540
Neuro	0.739-0.864	0.919	0.934	0.638
FI	0.714-0.816	0.901	0.920	0.591
WDW	0.680-0.839	0.874	0.905	0.615
CB	0.687-0.832	0.899	0.918	0.555
TOL	0.811-0.832	0.823	0.894	0.739

Abbreviation: Agreeableness (Agree), Conscientiousness (Cons), Neuroticism (Neuro), Functional impairment (FI), Withdrawal (WDW), Compulsive behavior (CB), Tolerance (TOL); Cronbach's alpha (CA), composite reliability (CR), average variance extracted (AVE)

The study employed the Heterotrait-Monotrait ratio of correlations (HTMT) as a method to assess discriminant validity. **Table 2** displays the calculated HTMT values for all dimensions. According to Henseler *et al.* [8], in order to prove discriminant validity, the HTMT ratio must be below 0.90. The HTMT values demonstrate that all values are below this threshold, confirming discriminant validity across all dimensions. The HTMT analysis provides evidence for the discriminant validity of the measurement model. The study's conceptions are clearly distinguished, and the discriminant validity was proven.

Table 2. Heterotrait-Monotrait ratio (HTMT)

	Neuro	Agree	Cons	Extra	Open	FI	WDW	CB	TOL
Neuro									
Agree	0.166								
Cons	0.125	0.472							
FI	0.436	0.093	0.147	0.134	0.126				
WDW	0.461	0.148	0.179	0.162	0.159	0.756			
CB	0.475	0.180	0.186	0.161	0.195	0.885	0.891		
TOL	0.357	0.104	0.129	0.159	0.135	0.745	0.703	0.852	

Abbreviation: Agreeableness (Agree), Conscientiousness (Cons), Neuroticism (Neuro), Functional impairment (FI), Withdrawal (WDW), Compulsive behavior (CB), Tolerance (TOL)

The objective of this investigation is to evaluate the variables in the model for greater parsimony by positioning stability personality traits as a lower-order construct to form a higher-order construct. In particular, the higher-order construct "personality stability" encompasses three dimensions of stable personality traits: agreeableness, neuroticism, and conscientiousness. The structure of these higher-order constructs is reflective-formative. The results of the analysis, as shown in **Table 3**, indicate that agreeableness, which has *P* values exceeding 0.05 and an outer loading of only 0.186, is substantially below the 0.7 threshold, resulting in its removal from the model. Significant outer weight results were observed in the remaining dimensions of neuroticism and conscientiousness. It is important to note that, despite the fact that conscientiousness' outer loading is less than 0.7, its substantial outer weight substantiates its inclusion in the model. Lower order dimension of agree was deleted for structural modal.

Table 3. Convergent validity for formative higher-order constructs

Construct higher order	Construct lower order	Outer weight	Sample mean	*T* value	*P* value	Outer loading
PS	Agree	0.115	0.113	1.116	0.265	0.186
	Cons	0.249	0.245	2.267	0.023	0.311
	Neuro	0.949	0.941	20.985	0.000	0.949

Abbreviation: Agreeableness (Agree), Conscientiousness (Cons), Neuroticism (Neuro), PS (Personality stability)

The results of the path analysis are presented in **Table 4**. The results suggest that the PS construct has a large and negative effect on all external constructs. The impact of the PS on FI is statistically significant with a beta coefficient of -0.412, a *t* value of 7.198, and a *P* value of less than 0.001. The study found that there is a significant negative relationship between PS and WDW (β = -0.431, $t = 7.390$, $P < 0.001$), as well as between PS and CB (β = -0.451, $t = 8.009$, $P < 0.001$), and between PS and TOL (β = -0.317, $t = 5.118$, $P < 0.001$). Therefore, H1, H2, H3, and H4 are all supported.

Table 4. Path coefficients for direct effects

Hypothesis	Direct effect	Beta	SE	*t* statistics	*P* value	Result
H1	SP -> FI	-0.412	0.057	7.198	0.000	Supported
H2	SP -> WDW	-0.431	0.058	7.390	0.000	Supported
H3	SP -> CB	-0.451	0.056	8.009	0.000	Supported
H4	SP -> TOL	-0.317	0.062	5.118	0.000	Supported

Abbreviation: PS (Personality stability), Functional impairment (FI), Withdrawal (WDW), Compulsive behavior (CB), Tolerance (TOL)

5. Discussion

Based on the aforementioned studies, we may deduce the conclusions of the four hypotheses. Personality stability has a significant negative effect on functional impairment (FI), with higher personality stability linked to lower levels of FI among college students. Similarly, personality stability is negatively associated with withdrawal (WDW), indicating that higher personality stability correlates with lower withdrawal tendencies. Additionally, personality stability has a significant negative effect on compulsive behavior (CB), as higher personality stability is associated with lower levels of CB. Furthermore, personality stability negatively influences tolerance (TOL), with higher personality stability linked to lower tolerance levels among college students. These findings suggest that a stable personality contributes negatively to various aspects of smartphone addiction in college students.

6. Conclusion and implications

Empirical evidence shows that there is a negative link between stable personality qualities and smartphone addiction among college students. People who possess consistent personality features are able to efficiently regulate their emotions, allowing them to properly control and adjust their emotions. As a result, they are less likely to rely on smartphones for emotional comfort or to escape negative emotions. Moreover, these individuals exhibit remarkable self-discipline, enabling them to effectively manage their time and regulate their

consumption of content, thus avoiding the development of smartphone addiction. Their reduced impulsivity and heightened propensity for thought and prudence in decision-making additionally contribute to a well-regulated smartphone usage pattern.

Effective stress management is essential for persons with stable personalities, as they are more inclined to utilize positive coping strategies rather than relying on smartphones to deal with emotional and scholastic stress. These individuals frequently participate in a range of interests and activities, such as sports, social events, and hobbies, that aid in diminishing their reliance on smartphones. In addition, individuals often derive happiness from internal pursuits and personal accomplishments rather than external stimuli, such as smartphone usage. This drives them to pursue long-term objectives and experience profound contentment rather than seeking immediate gratification.

This study is crucial for comprehending the psychological mechanisms behind addictive behaviors and for formulating efficacious preventative and intervention measures to improve the mental well-being of college students. The research investigates the impact of personality factors on smartphone usage and explores how various personality types may contribute to smartphone addiction.

Disclosure statement

The authors declare no conflict of interest.

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Exploration of the Interplay Between Perceived Usefulness, Perceived Ease of Use, Facilitating Conditions, Computer Self-Efficacy, Instructor Efficiency, and Behavioral Intention to Distance Learning

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Abstract: This study explores the acceptance of educational support technologies in distance learning within a Chinese higher education context. It examines the influence of perceived usefulness, perceived ease of use, facilitating conditions, computer self-efficacy, and instructor efficiency on students' behavioral intention toward distance learning. Utilizing a quantitative approach with surveys and structural equation modeling, data from 720 participants at Mianyang Teachers' College, China, were analyzed. The findings reveal significant positive effects of these factors on the intention to engage in distance learning, offering valuable insights for enhancing technology acceptance in educational settings.

Keywords: Distance learning; Perceived usefulness; Perceived ease of use; Facilitating conditions; Computer self-efficacy; Instructor efficiency; Behavioral intention

Online publication: June 20, 2024

1. Introduction

In recent years, Open and Distance Learning (ODL) has witnessed a surge in popularity within the higher education field in China. This transformation is driven by various factors, including the increased demand for university education, challenges related to overcrowded residential facilities, and the growing need for advanced learning opportunities [1]. The rapid global development of information and communication technologies (ICT) has played a pivotal role in reshaping the education landscape, prompting substantial investments in technical infrastructure by educational institutions [2]. This article explores the impact of technology on the evolution of Open and Distance Learning in China, examining how institutions are adapting to paradigm shifts and integrating technology into their curriculum to address contemporary challenges.

2. Problem statement

In recent years, educational institutions, including Mianyang Teachers' College, have invested significantly in modern technology, ensuring access to up-to-date computers, and internet connectivity. The intention is to leverage technology seamlessly in teaching and learning processes, aligning with pedagogical principles, attitudes, curriculum requirements, and available physical facilities [3]. However, despite the widespread recognition of the importance of technology, adoption and usage issues persist, impacting both traditional and alternative (open) educational systems [4].

Data and statistics from prior studies indicate the prevalence of challenges in technology adoption [5]. However, limited research, particularly with a theoretical foundation, has been conducted on the impact of Chinese teachers and trainers on students' learning and the effective use of technology in ODL [6].

By addressing this research gap, this study aims to contribute to the literature by providing an in-depth examination of the factors influencing the acceptance of educational support technologies in distance learning programs at Mianyang Teachers' College, China, utilizing a comprehensive theoretical framework.

In order to better study this problem, the following research hypotheses are proposed in this study:

(1) H1: Perceived usefulness will have a positive effect on behavioral intention to distance learning.

(2) H2: Perceived ease of use will have a positive effect on behavioral intention to distance learning.

(3) H3: Facilitating conditions will have a positive effect on behavioral intention to distance learning.

(4) H4: Computer self-efficacy will have a positive effect on behavioral intention to distance learning.

(5) H5: Instructor efficiency will have a positive effect on behavioral intention to distance learning.

3. Conceptual framework

Based on the document search, the following research framework was established (**Figure 1**).

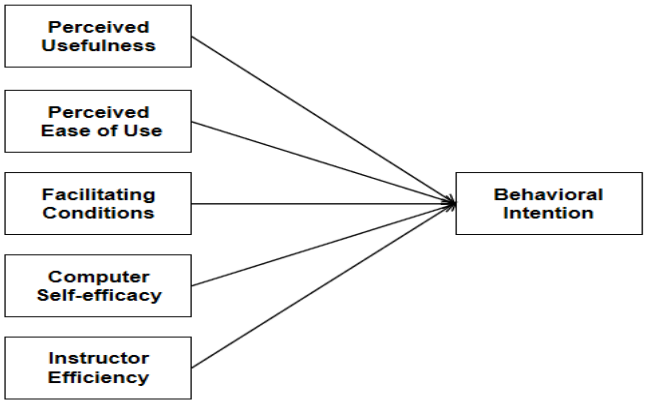

Figure 1. Conceptual framework

4. Methodology

This research used a systematic way to examine university students' adoption of educational support technology in remote learning programs at Mianyang Teachers' College, China. This chapter covers the research approach, philosophy, site, design, operationalization, data collection methods, population and sample, survey tools, data analysis methodologies, and validity and reliability.

The research method was quantitative. This method quantifies the phenomenon using numerical data, supporting deductive reasoning. The quantitative approach measures factors and uses statistical analysis to

generate generalizable conclusions about educational technology acceptability.

This research was done at Mianyang Teachers' College in China. This venue was chosen strategically to study technological adoption in Chinese higher education. As a model case study, Mianyang Teachers' College can offer insights into similar educational institutions.

The main data collection method was structured survey questionnaires. This method efficiently collects quantitative data from a big sample. The surveys collect participants' views, attitudes, and actions on educational support technology use in distance learning programs.

5. Research design

This study prepared to use the method of quantitative research to collect data through questionnaires and analyze the data through the PLS-SEM to seek the relationship between perceived usefulness, perceived ease of use, facilitating conditions, computer self-efficacy, instructor efficiency, and behavioral intention to distance learning.

6. Results

774 people completed the initial survey. Trimming out disengaged responses ensured data precision. This process eliminated uniform responses (such as rating all Likert scale items the same) and inconsistent responses. After excluding unengaged respondents, the dataset had 720 valid responses, 93% of the initial responses.

After checking for variable and dataset collinearity, the study tested hypotheses. A one-tailed significance test was used to assess five positive direct-effect hypotheses. Hypothesis testing used the bootstrap method with 10,000 resamplings. The following theories were tested: Hypotheses 1–5 examined how perceived usefulness, perceived ease of use, facilitating conditions, computer self-efficacy, and instructor efficiency affect remote learning behavior.

Table 1 shows indicator loadings, Cronbach's alpha (CA), composite reliability (CR) values, and average variance extracted (AVE) values for convergent validity. All measurement indicators for each variable have loadings above 0.7. According to Hair *et al.* [7], ideal indicator loadings should surpass 0.7, however, loadings from 0.40 to 0.69 are acceptable if they do not compromise internal consistency reliability and convergent validity. All measurement items for each variable have substantial indicator loadings for variable measurement in this study, ranging from 0.718 to 0.889.

Table 1. Measurement model for reliability and validity

Dimension	Items	Loading	CA	CR	AVE
BI	BI1	0.856	0.872	0.912	0.722
	BI2	0.889			
	BI3	0.829			
	BI4	0.823			
CSE	CSE1	0.760	0.849	0.892	0.624
	CSE2	0.816			
	CSE3	0.812			
	CSE4	0.786			
	CSE5	0.774			

Table 1 (Continued)

Dimension	Items	Loading	CA	CR	AVE
FC	FC1	0.837	0.822	0.882	0.653
	FC2	0.802			
	FC3	0.820			
	FC4	0.770			
IE	IE1	0.813	0.840	0.887	0.610
	IE2	0.772			
	IE3	0.818			
	IE4	0.718			
	IE5	0.781			
PEU	PEU1	0.811	0.875	0.909	0.667
	PEU2	0.868			
	PEU3	0.817			
	PEU4	0.782			
	PEU5	0.803			
PU	PU1	0.827	0.880	0.912	0.675
	PU2	0.812			
	PU3	0.834			
	PU4	0.802			
	PU5	0.830			

Abbreviation: Perceived usefulness (PU), perceived ease of use (PEU), facilitating conditions (FC), computer self-efficacy (CSE), instructor efficiency (IE), behavioral intention to distance learning (BI)

This study used Cronbach's alpha and composite reliability to determine internal consistency reliability. According to Hair *et al.* [7], composite reliability gives slightly higher values than Cronbach's alpha, which is cautious. Reporting both values is prudent since they provide a more complete dependability assessment. Despite their different underestimating and overestimating tendencies, both approaches use 0.60. Values below this threshold indicate poor internal consistency. This study found that Cronbach's alpha and composite reliability scores exceeded 0.60, ranging from 0.822 to 0.912. This shows that study variables are internally consistent.

This study evaluates convergent validity using AVE for each variable. Hair *et al.* [7] recommended an AVE value over 0.50 to ensure that measurement indicators for each variable converge and accurately measure the variable. **Table 1** shows that the AVE values of all variables surpass 0.5, ranging from 0.610 to 0.722. These results indicate good convergent validity for model variables.

This study also used the Heterotrait-Monotrait (HTMT) correlation ratio to assess discriminant validity. In **Table 2**, HTMT ratios are calculated for each dimension pair. The HTMT ratio discriminant validity threshold is 0.85, according to Henseler *et al.* [8]. The HTMT values show that all ratios are below this threshold, supporting discriminant validity across all dimensions. The HTMT analysis confirms the measurement model's discriminant validity, proving that the study's constructs are differentiated. This conclusion strengthens their unique representation in the study framework.

Table 2. Heterotrait-Monotrait ratio (HTMT)

	BI	CSE	FC	IE	PEU	PU
BI						
CSE	0.549					
FC	0.732	0.599				
IE	0.698	0.558	0.681			
PEU	0.690	0.635	0.786	0.672		
PU	0.668	0.554	0.649	0.623	0.756	

Abbreviation: Perceived usefulness (PU), perceived ease of use (PEU), facilitating conditions (FC), computer self-efficacy (CSE), instructor efficiency (IE), behavioral intention to distance learning (BI)

Table 3 delineates the outcomes of the direct effect hypothesis testing conducted in the study. These results indicate that all five examined predictors—perceived usefulness (PU), perceived ease of use (PEU), facilitating conditions (FC), computer self-efficacy (CSE), and instructor efficiency (IE)—exert a significant influence on the behavioral intention towards distance learning (BI). Specifically, the analysis yielded the following associations: PU to BI ($\beta = 0.198$, $P < 0.05$), PEU to BI ($\beta = 0.130$, $P < 0.05$), FC to BI ($\beta = 0.256$, $P < 0.05$), CSE to BI ($\beta = 0.063$, $P < 0.05$), and IE to BI ($\beta = 0.243$, $P < 0.05$). Consequently, hypotheses 1 to 5 are empirically supported.

Table 3. Path coefficients for direct effects

Hypothesis	Direct effect	Beta	SE	*t* statistics	*P* value	Result
H1	PU → BI	0.198	0.040	4.913	0.000	Supported
H2	PEU → BI	0.130	0.051	2.544	0.005	Supported
H3	FC → BI	0.256	0.050	5.140	0.000	Supported
H4	CSE → BI	0.063	0.033	1.948	0.026	Supported
H5	IE → BI	0.243	0.053	4.550	0.000	Supported

Abbreviation: Perceived usefulness (PU), perceived ease of use (PEU), facilitating conditions (FC), computer self-efficacy (CSE), instructor efficiency (IE), behavioral intention to distance learning (BI)

7. Discussion

(1) H1: Perceived usefulness will have a positive effect on behavioral intention to distance learning.

Result: Supported (*t* statistic = 4.913, *P* value = 0.000)

Explanation: The analysis indicates a significant positive relationship between perceived usefulness (PU) and behavioral intention (BI) to engage in distance learning. This result supports the notion that when individuals perceive a technology as useful for their learning needs, they are more likely to express the intention to use it.

(2) H2: Perceived ease of use will have a positive effect on behavioral intention to distance learning.

Result: Supported (*t* statistic = 2.544, *P* value = 0.005)

Explanation: The statistical analysis reveals a significant positive impact of perceived ease of use (PEU) on behavioral intention (BI) to participate in distance learning. This suggests that when individuals find a system

easy to use, it positively influences their intention to adopt distance learning.

(3) H3: Facilitating conditions will have a positive effect on behavioral intention to distance learning.

Result: Supported (*t* statistic = 5.140, *P* value = 0.000)

Explanation: The findings strongly support the hypothesis that facilitating conditions (FC) positively influence behavioral intention (BI) in the context of distance learning. When individuals perceive that the necessary conditions for distance learning are in place, their intention to engage in it increases.

(4) H4: Computer self-efficacy will have a positive effect on behavioral intention to distance learning.

Result: Supported (*t* statistic = 1.948, *P* value = 0.026)

Explanation: The analysis indicates a statistically significant positive relationship between computer self-efficacy (CSE) and behavioral intention (BI) to participate in distance learning. This suggests that individuals with higher computer self-efficacy are more likely to express the intention to adopt distance learning.

(5) H5: Instructor efficiency will have a positive effect on behavioral intention to distance learning.

Result: Supported (*t* statistic = 4.550, *P* value = 0.000)

Explanation: The results support the hypothesis that instructor efficiency (IE) positively influences behavioral intention (BI) to participate in distance learning. This implies that when individuals perceive instructors as efficient in delivering content, their intention to engage in distance learning is positively impacted.

8. Conclusion and implications

The research concludes that several key factors significantly influence behavioral intention to engage in distance learning.

Perceived usefulness (H1): The study confirms a strong positive relationship between perceived usefulness and the intention to engage in distance learning. This aligns with the Technology Acceptance Model (TAM), indicating that when learners find technology useful for their needs, they are more inclined to use it.

Perceived ease of use (H2): The findings support the positive impact of perceived ease of use on the intention to participate in distance learning. Consistent with TAM, the easier the technology is perceived to be used, the greater the likelihood of its adoption by learners.

Facilitating conditions (H3): The study confirms that when learners believe that the essential conditions and assistance for distant learning are there, their inclination to participate in it is enhanced. This emphasizes the significance of external variables and resources in the implementation of educational technologies.

Computer self-efficacy (H4): There is a strong and positive relationship between an individual's belief in their ability to use computers effectively and their intention to engage in distance learning. Individuals with a high level of confidence in their computer skills are more inclined to embrace distance learning, underscoring the significance of self-efficacy in the acceptance of technology.

Instructor efficiency (H5): The research suggests that instructors who are both effective and efficient have a beneficial impact on learners' aspirations to participate in remote learning. The level of instruction has a crucial role in determining students' willingness to embrace and utilize online educational systems.

In summary, the study supports the fundamental principles of the Technology Acceptance Model and similar frameworks. It highlights that learners' intentions toward distance learning are influenced by factors such as perceived usefulness, perceived ease of use, facilitating conditions, computer self-efficacy, and instructor efficiency. These findings enhance our comprehension of the elements that impact the successful implementation of distance learning technologies.

This study enhances the Theoretical Framework of Distance Education. This research presents an

innovative theoretical framework for the field of distance education, utilizing the Technology Acceptance Model (TAM) and Transaction Distance Theory.

The study offers theoretical backing for educational policies and procedures. The research findings provide substantial theoretical support and practical guidance for educational decision-makers and practitioners. Research has shown that it can improve educational institutions' understanding of students' acceptance and needs for remote learning, hence facilitating the creation of more effective educational policies and teaching methods.

Disclosure statement

The authors declare no conflict of interest.

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Exploration of the Reform of Applied Linguistics Course Under the "Internet+" Platform and the BOPPPS Model

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Abstract: The teaching of linguistics courses in traditional teaching mode brings students problems such as cognitive burden, insufficient learning motivation, and lack of understanding of the course setting. According to the established problems and students' learning situation, we analyze the students' learning situation, select an experimental control class among the classes of the same grade and the same major studying the course, and carry out the course teaching reform by combining the characteristics of the applied linguistics course. The experimental class that adopts the BOPPPS model in teaching design relies on the "Internet+" Bodoudou platform to assist in teaching quizzes and carry out classroom teaching reform. The control class adopts the traditional teaching mode. At the same time, in the final results and pre- and post-questionnaire surveys, it was found that after adopting the BOPPPS model of teaching, students have made greater progress in absorbing and applying knowledge than in the previous period. The use of BOPPPS model teaching improves the absorption and mastery of knowledge, and the cultivation of learning habits is better than that of traditional teaching.

Keywords: BOPPPS; Pedagogical reform; Applied linguistics; Bodoudou

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1. Introduction

The BOPPPS model (Bridge-in, Objective, Pre-assessment, Participatory learning, Post-assessment, Summary) was proposed by Douglas Kerr of Columbia University in Canada, which stresses the core of motivating students to participate in all aspects of the classroom and is characterized by a standardized and streamlined teaching process. Students are engaged in the process of knowledge learning, knowledge accumulation as well as the process of reflection [1]. Pattison and Day [2] pointed out that the BOPPPS instructional model is a closed-loop instructional process model that emphasizes student engagement and feedback and is a model of instruction that is more highly regarded by many prestigious schools in North American countries. As of 2023, the model has been implemented in over 100 universities and institutions in more than 30 countries around the world.

Based on the literature of Zhi.com and Google Scholar in the preliminary stage of this project, it is

found that there is less teaching research on this course, mainly focusing on external teaching under applied linguistics, research methods, comparative studies, etc., and there are no experts and scholars who use the BOPPPS model to reform the teaching of the course of applied linguistics.

2. Instructional design of applied linguistics course based on the BOPPPS model

2.1. Situational analysis

The content of applied linguistics involves theoretical research and practice, which is an important course for students majoring in Chinese language and literature. Under the traditional teaching mode, the teacher teaches and the students learn passively, and the main problems caused by this teaching mode are as follows: (1) The learning atmosphere is weak and students' independent learning ability is poor, they passively accept the knowledge and information and do not effectively play out their subjective role in the classroom; (2) The students generally think that linguistic knowledge is very difficult with a heavy cognitive load and fear of difficulty; (3) The students' awareness of combining the knowledge with practice is weak and the classroom participation needs to be further improved; (4) There is only a single way of assessment and evaluation.

In the academic year 2023–2024, a total of 435 students took the applied linguistics course and 420 valid questionnaires were collected after the preliminary questionnaire survey. It was found that most of the students had a vague or negative attitude towards the question "Why should I study 'Applied Linguistics,'" among which 177 students said they did not care why they should study the course, and nearly 160 students said they had no idea/no idea at all why they want to study the course.

Since 55% of the students did not know the reason for studying the course and why they wanted to study it, the next question "How much the students know about the Applied Linguistics course" was answered in the same way: more than 100 students said that they had no knowledge of the course.

According to the above situation, we further concluded the reasons for this phenomenon through individual interviews and symposiums, there are mainly the following three points: (1) Students do not understand the professional training program; (2) The composition of the professional knowledge is unclear; (3) There is no willingness to actively learn and understand subjects, and they are more accustomed to passively accepting arrangements.

Although most students did not know enough about the reasons for and content of the course, they showed a high degree of motivation and cooperation in class. Among them, more than 46% of students said they would participate/actively participate in the class, but there is also an equal number of students with an average attitude of participation in the class, and they need to be further encouraged to actively participate in the class. Some factors that affect students' participation in the classroom are whether the class content is practical, whether the classroom atmosphere is attractive, whether the teacher's teaching method is appropriate, etc.

To maintain the active participation of the students who are willing to participate in the class and to get the students with average attitudes to actively participate in the class, it is also necessary to know the students' study habits. The results of the survey showed that about 85% of the students in this program said that they did not have the habit of studying in advance, and only 60 students said that they would study in advance for the next class; only about 27% of the students had the habit of reviewing.

Moreover, students' learning styles are a factor to be considered to better apply the BOPPPS model in the classroom. In a comprehensive review of the literature on learning styles, no less than 71 approaches with significant differences were identified [3]. For statistical purposes, Kolb's two-dimensional coordinate theory was utilized to investigate students' learning styles. Kolb's learning styles scale is based on preferences for his experiential learning model [4]. It was found that more than 50% of the students' learning styles were

divergent thinkers, i.e., these students were imaginative and excelled when asked by the teacher to express their views. Among the remaining students, convergent thinking accounted for a relatively large proportion, but only accounted for 23% of the remaining number of students, these students focus on finding answers or solutions when encountering the teacher's questions and are more inclined to think and discover the answer by themselves. The remaining students were assimilated learners and compliant learners. The learning styles of the students were generally consistent with the teacher's evaluation of the class observations.

As the Ministry of Education has explicitly requested in the latest undergraduate education teaching audit and evaluation index system that the implementation of "learning-centered and teaching-led" classroom teaching be examined [5]. Promoting students' deep learning is the basic path to realizing the cultivation of the core qualities of higher education talents and improving the quality of teaching [6]. Based on the above information about students' learning styles, learning habits, and attitudes toward disciplines, we can establish a dynamic adjustment mechanism for disciplines and majors and a guiding mechanism for the development of characteristics, and to enhance the relevance of disciplines in higher education institutions [7]. The BOPPPS model is used as the basis for the design of curricular reforms to improve the degree of cooperation between students in the classroom, promote students' better participation in the classroom, and connect the previous and subsequent knowledge.

2.2. Instructional design ideas

The BOPPPS model consists of the following six components: Bridge-in, Objective, Pre-assessment, Participatory learning, Post-assessment, and Summary.

(1) Bridge-in (classroom introduction): This involves the activities related to the content of the teaching carried out by the teacher before class. As the main organizer and participant in the classroom, the teacher cannot merely give lectures but should take different forms of teaching organization based on the content of the knowledge imparted [8]. Its purpose is to stimulate students' interest in learning and help students prepare for the new class. Classroom introduction needs to be closely related to the content of the teaching, such as review introduction, scenario introduction, audio-visual introduction, free conversation introduction, problem introduction, and so on.

(2) Objective: Objective is one of the cores of the BOPPPS model. Students are expected to achieve knowledge, skills, and affective goals through instructional activities, and two to four instructional objectives are usually identified based on curriculum standards and specific learning situations.

(3) Pre-assessment: Pre-assessment can be used to understand students' knowledge base and pre-learning, so as to design targeted teaching. Teachers conduct pre-assessments through the online platform Bodoudou to stimulate students' minds and cultivate their habit of pre-reading before class. The contents of the pre-assessment generally include reviewing old knowledge and grasping the main knowledge of the new chapter.

(4) Participatory learning: This is the core of classroom teaching. Through the feedback of the pre-assessment, the teacher explains the important and difficult points, and designs and arranges a series of thematic and hierarchical questions that connect the previous and new knowledge through a combination of flexible and diversified teaching methods such as discussion, independent practice, online random selection, and small group activities, so as to structure and systematize the knowledge.

(5) Post-assessment: Post-assessment tests students' knowledge mastery, both as an assessment of the established teaching objectives of the lesson and to help teachers make continuous improvements to the teaching process. Post-assessment questions are designed to focus on the key points in teaching and to

test students' ability to apply their knowledge.

(6) Summary: This helps students review and reinforce knowledge points in a concise manner. Usually before the end of class, teachers and students work together to summarize the content of the lesson and chapter. At the end of the lesson, the knowledge is sorted out and summarized by designing mind maps and other means.

Based on Ausubel's pedagogical thinking, the logical starting point for setting teaching objectives is not "how much the teacher can teach" but "how much the students can learn" [9]. Through the applied linguistics course, the following teaching objectives in **Table 1** should be achieved this semester.

Table 1. Comparison of teaching objectives before and after the teaching reform of applied linguistics

Pedagogical objectives	Pre-reform	Post-reform
Knowledge goal	To develop students' knowledge of theory and research methods in applied linguistics	1. To train students in the theory and research methods of applied linguistics. 2. To cultivate students' habits of independent learning and learning with problems. 3. To develop literature reading habits, analytical skills, and basic research skills.
Skill target	To cultivate the ability to write a linguistic thesis that meets graduation requirements.	1. To apply the methods learned to solve linguistic problems in other disciplines. 2. To cultivate students' comprehensive qualities of social interaction and communication in terms of language expression, searching for information, and knowledge integration. 3. To have the ability to write a high-quality linguistic paper with attention to real-life discourse situations.
Emotional goal	-	1. Through the flipped classroom and the reflection and discussion in the classroom, students will develop dialectical thinking, a self-confident attitude, and the ability to solve problems with patience and care. 2. To have the aspire to join the development of applied linguistics in China.

The teaching objectives of applied linguistics after the teaching reform have begun to pay more attention to the cultivation of students' learning initiative and practical application, and consciously cultivate students to observe, think, and analyze current language phenomena and language policies by applying what they have learned based on books.

China's Education Modernization 2035 puts forward new requirements for changes and innovations in the form of education courses, namely, the deep integration of information technology with the education and teaching process, and the creation of a brand-new teaching environment for front-line teachers to make full use of modern information technology [10]. Combined with the analysis of students' learning situation in this major and the requirements of China's Education Modernization 2035, we explored the BOPPPS model as an applied linguistics class reform, used Bodoudou as an online pre-assessment and post-assessment platform for the classroom in order to examine students' pre-assessment and reviewing through the classroom purposeful quizzes, to help students to understand the course content in advance, consolidate what they have learned, and subtly affect their learning habits. Meanwhile, at the end of the pre-assessment and post-assessment, teachers lead students to review the wrong questions and check for learning gaps, in addition to the use of "Internet+" to assist classroom teaching and assessment (**Figure 1**).

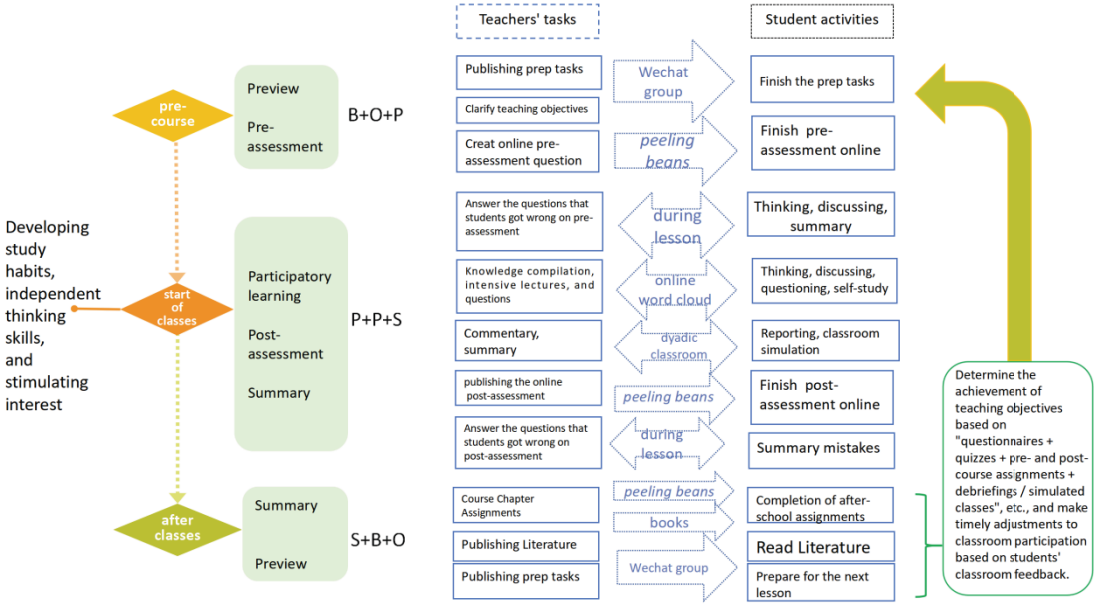

Figure 1. Classroom design of the BOPPPS model based on Bodoudou

3. Comparative study of the application of the BOPPPS model of teaching and traditional teaching practices

In this teaching reform, in addition to the basic investigation of students, in order to explore whether the BOPPPS model is effective for teaching, eight large classes of grade 21 were selected as the research subject. Four large classes used the BOPPPS model to carry out the teaching reform and the other four classes used the traditional teaching mode, which was compared and analyzed before the beginning of the research, during the research, and after the research in conjunction with the effect of actual practice.

3.1. Comparison of the effectiveness of regular learning through the platform

This course relies on the Bodoudou platform to record students' pre-assessment and post-assessment on applied linguistics before class. The BOPPPS model is used to design the classroom, which can help students understand the deficiencies of the pre-assessment, focus on their linguistic knowledge, and use questions to stimulate their thinking, so that they can participate in the classroom more actively and achieve familiarity with and absorption of knowledge.

Students' classroom discussion and interaction partly relied on the online platform and the pre-assessment and post-assessment all relied on the online platform Bodoudou, fully realizing online and offline blended teaching. In order to provide better feedback on the teaching effect, the pre-assessment of students' knowledge was carried out before class, and the average correct rate of pre-assessment course knowledge in a semester is 55.75%; as for the evaluation of students' knowledge mastery after class, the results show that after students studied in the BOPPPS mode, the average chapter test rate in the first semester after the review is 57.38%, which is effective to a certain extent. In contrast, because of the lack of access to specific assessment data in traditional teaching classes, students can only be subjectively evaluated based on the review in the course introduction, and an objective analysis of the knowledge prep and absorption of all students cannot be made.

Meanwhile, all eight classes have students participating in the BOPPPS classroom, among which, in the BOPPPS pedagogical reform class, teachers and students can enter into their roles more easily, the classroom

atmosphere and teachers' teaching attitudes are relatively more mature, and the class of pedagogical reform is more complete in the production of classroom materials and the logic of teaching due to reference to the usual classroom of applied linguistics. On the other hand, it can be found that the teachers' teaching by words and example also has a subtle influence on the students.

3.2. Comparative analysis of learning outcomes

At the end of the semester, the results showed that the final grades of the traditional class and the class taught with the BOPPPS model are normally distributed within the overall range: there are no failing grades in the traditional class and the class taught with the BOPPPS model. There were four students in the traditional class and one in the BOPPPS model class in the passing range (60 to 69 points); in the moderate range (70 to 79 points), there were 135 students in the traditional class and 110 students in the BOPPPS model class, accounting for 56.32% of the total number of students in this year's major; in the good range (80 to 89 points), there were 67 students in the traditional class and 89 students in the BOPPPS model class, accounting for 35.86% of the total number of students in this year's major; the excellent part (90 points and above) had 14 students in the traditional teaching class and 15 students in the BOPPPS model teaching class, accounting for 6.67% of the total number of students.

In the case of the same major in this grade, although the final grades of the two types of classes are normally distributed, the percentage of students with passing and moderate grades in the traditional teaching class is higher than that of the class taught with the BOPPPS model; while the good and excellent rates of the class that adopted the BOPPPS model for the reform of teaching and learning are higher than that of the traditional teaching class. It can be seen that the adoption of the BOPPPS model showed positive results in promoting students' knowledge acquisition.

In the process of teaching practice, the most fundamental difference between the BOPPPS model teaching and the traditional teaching mode is that the BOPPPS model teaching reform has added a platform to observe the effect of students' pre-study and post-study. According to the above data, the teaching reform of the BOPPPS model in applied linguistics has improved students' interest in learning, cultivated students' learning habits of pre-study and review, improved students' motivation and practical skills, and significantly improved the teaching effect.

3.3. Comparative analysis of student questionnaire data

After the course practice of applied linguistics in eight classes of Chinese language and literature 2021, questionnaires were administered to the BOPPPS model teaching class and the traditional teaching class respectively, which mainly involved the content on the ability of independent learning, the purpose of the students, and the degree of understanding of the course, with the purpose of making a comparison of the preliminary mapping.

Through the analysis of the questionnaire data, it is found that in the option of "pre-study before class," 48 students in the BOPPPS model teaching class chose "have the habit of pre-study," which is an increase of 33.33% compared with that of the previous mapping period, while 27 students in the traditional teaching class chose "have the habit of pre-study," which is unchanged compared with that of the previous mapping period. The number of students in the traditional class was 27, unchanged from the previous period. The total number of students with revision habits in the previous mapping test was 108, of which 51 were in the traditional class and 57 in the BOPPPS model class. After one semester, the number of students with revision habits increased to 54 in traditional classes and 71 in BOPPPS classes, which is an increase of 19.72% compared to the previous

semester.

In the BOPPPS model teaching, the teacher will upload the learning materials and pre-study tasks for the next class to the online platform after each class. At first, when checking the completion of pre-study in class, there have been cases in which only a few students in a class have completed it, and after a period of time of training, a part of the students have gradually cultivated the awareness and ability of independent learning.

In the question "Why do you want to take an applied linguistics course," there was a decrease in "do not know/not at all" in both classes. In the BOPPPS model class, there was a 35.29% decrease in "do not know/not at all," while in the traditional class, there was an 18.91% decrease. In the question "Knowledge of the course applied linguistics," the number of students who chose "know/very well" increased in both classes; while only four students in the traditional class indicated "know/very well" in the mapping survey, which increased to 10 in the final survey, while in the BOPPPS model class, the number of students increased from 11 to 35.

The reason for the different increases in the above problems is that the BOPPPS model class used the online platform Bodoudou to carry out classroom reform and monitor student learning. In the design of classroom teaching, effective teaching activities such as real-time quizzes, thematic discussions, and follow-up exercises were designed on the platform, taking into account the survey of students' learning situation and the content of the teaching, so as to formulate an effective implementation plan for the teaching of the applied linguistics course.

4. Conclusion

At present, most colleges and universities still adopt traditional teaching methods for Chinese language and literature courses, without fully combining "Internet+" with the actual curriculum, which leads to problems such as insufficient motivation and poor problem-solving skills of students in talent cultivation. This study carried out teaching reform through experimental control with a semester of observation and experiments and finally concluded that relying on the "Internet +" platform and using the BOPPPS model, the comprehensive quality and teaching effect of the class is better than the overall situation of the traditional teaching class.

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Disclosure statement

The author declares no conflict of interest.

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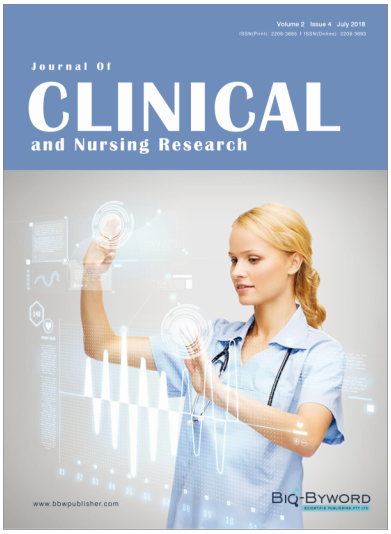

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