

Competencies for Integrating Sustainable Development Goals (SDGs) of Chinese and English Language Teachers in Shandong Province, China

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Abstract

This study examines and compare the competencies of Chinese and English language teachers in integrating Sustainable Development Goals (SDGs) within their teaching practices in Shandong Province, China. Utilizing a quantitative research design, a questionnaire survey was conducted among 768 teachers from primary and secondary schools. The analysis focused on seven key areas of pedagogical content knowledge (PCK) relevant to SDG integration, which are knowledge of subject matter, knowledge of curriculum, knowledge of learner, knowledge of instructional strategies, knowledge of context, knowledge of educational goals, and knowledge of assessment. Descriptive statistics and t-tests were used to compare the competencies between the teachers of two languages. The findings indicate that English language teachers exhibit higher proficiency in knowledge of curriculum, knowledge of instructional strategies, and knowledge of assessment, whereas Chinese language teachers demonstrate a stronger understanding of SDG-related subject matter. These differences highlight the need for targeted professional development to enhance teachers' capabilities in integrating SDGs into their teaching. The study underscores the importance of providing adequate resources, training, and institutional support to foster sustainable development education, ultimately preparing students to become informed and responsible global citizens.

Keywords: Sustainable Development Goals (SDGS), Education For Sustainable Development (ESD), Pedagogical Content Knowledge (PCK), Language Teachers.

Introduction

Since the first industrial revolution, human society and science and technology have been developing at an ever-increasing pace, bringing about tremendous changes and impacts on our lives. However, this rapid development has also been accompanied by excessive consumption of the Earth's resources and severe environmental damage, leading to increasing threats to global society and the environment (Gomes da Silva et al., 2020). In response to these challenges, the United Nations adopted a set of goals in 2015 aimed at achieving a sustainable and equitable future, known as the Sustainable Development Goals (SDGs). The SDGs consist of 17 goals covering a wide range of social, economic, and

environmental domains, which individual member states are required to strive to achieve by 2030 (Jayasooria et al., 2023). The SDGs aim to address global social, economic and environmental challenges, and they embody humanity's vision of a better, fairer and more peaceful future.

The integration of Sustainable Development Goals (SDGs) into education has become increasingly significant in the context of global efforts to achieve sustainability by 2030. Language teachers, particularly those teaching English and Chinese, play a crucial role in embedding these goals into their curricula, which can have far-reaching implications for student awareness and action on global issues. Despite the growing interest in SDGs within education, there is a noticeable gap in comparative studies focusing on how these goals are integrated by language teachers across different cultural and linguistic contexts (Yu et al., 2024; Cordova, 2024). This study is essential because it not only addresses this gap but also offers insights into the competencies required by language teachers to effectively incorporate SDGs into their teaching practices. By examining the differences and similarities between Chinese and English language teachers in Shandong Province, China, this research provides valuable information that can inform policy-making, teacher training programs, and curriculum development, ultimately benefiting educators, students, and the broader community.

The main focus of this study is on Goal 4 (provide quality education) of the SDGs. Education is one of the key factors in realizing the SDGs, which not only improves people's quality of life and well-being, but also fosters social cohesion, progress, and innovation (Faustino et al., 2023). The relationship between education and SDGs is bidirectional, as education can both support and promote SDGs, as well as gain inspiration and guidance from SDGs. Therefore, the integration of education and SDGs is an important and urgent topic, which involves all aspects of education, including content, methods, evaluation, and environment, and requires educators and learners to have knowledge, skills, and attitudes for sustainable development (Abera, 2023).

However, education is also faced with the problems and opportunities of interfacing and integrating with the SDGs (Li, 2023). In particular, research on the integration of SDGs in the field of Chinese and English language education has rarely been addressed, and it lacks a full understanding of and attention to the specificity and importance of this field (Song, 2023). Similarly, research on education and SDGs in China has mainly focused on the macro level and lacks research on the micro level in different regions, subjects and teachers (Yue, 2023). In particular, research on language and English education and SDGs in Shandong Province lacks a systematic and in-depth discussion, and lacks a comprehensive and accurate grasp and reflection of the current state of education and educational needs in the region (Jiao & Liang, 2022). Chinese and English are two core subjects for students' learning, which involve not only the teaching of language knowledge and skills, but also the development of culture, thinking, and values. English education is important for students' personal development, social participation and international communication (Susilo Adi, 2020). Therefore, integration of SDGs in the field of language and English language education is of great value in terms of improving the quality of education, developing students with sustainable development literacy, and promoting educational innovation and reform.

In China's primary and secondary education system, Chinese and English subjects run through the entire compulsory education stage and even the high school education stage, which has an important impact on students' learning and development (Mei, 2023). As a multi-ethnic country dominated by the Han nationality, China has a history and culture of thousands of years. Therefore, Chinese is an important subject for cultural inheritance and national identity. In addition, with the globalization of the economy, the exchanges between countries in the world are becoming increasingly close. The world is no longer an era of information isolation, but an era of global communication. As the most widely used language in the world, English is an indispensable skill for Chinese students to contact the cultures of different countries, conduct scientific research, and go global in the future. Therefore, this study selected teachers of these two subjects as the research objects, in order to explore their current status and differences in integrating SDGs, and then put forward corresponding suggestions.

As two important areas of language education, Chinese and English education have a profound impact on the development of students' language abilities, cultural literacy, communication skills, and thinking patterns (Liang et al., 2022). The integration of language education and sustainable development goals not only enriches and expands the content and form of education, but also cultivates and improves students' sustainable development literacy (Jiao and Liang, 2022). English education is a fundamental education for cultivating students' foreign language and cross-cultural communication abilities, as well as an important way to cultivate students' sustainable development goals and abilities (Noreen, 2023). The integration of language and English education with sustainable development goals can be achieved through teaching materials, teaching methods, and student participation, to achieve internal development and quality improvement of language education and provide support and opportunities for cultivating students' sustainable development literacy.

Following this, the study aimed to explore the competencies of Chinese language teachers and English teachers integrating the SDGs in their teaching. In addition, the study aimed to compare the competencies between teachers of the two different subjects. The comparative was meant to better adapt Chinese education to the challenges of the 21st century and cultivate future leaders and citizens who can promote sustainable development on a global scale.

The importance of this study lies in three key aspects. First, it provides empirical data for educational decision-makers on the integration of language and English teachers into sustainable development goals to guide policy formulation. Second, the research findings will provide practical experience for teachers to effectively implement sustainable development education in the classroom. Finally, this study will provide practical suggestions for sustainable development for the global education community, promoting international education cooperation and innovation. By analysing the challenges and successful cases of teachers in Shandong Province, this study aims to propose specific improvement methods and contribute insights and solutions to the achievement of global education sustainable development goals. Therefore, the significance of this study lies in its potential to guide educational institutions, policymakers, and curriculum developers in designing more effective training and professional development programs that enhance teachers' abilities to integrate SDGs into their teaching. This research is particularly beneficial for educators, as it provides a comparative analysis that

highlights specific areas where professional development is needed, thereby improving the overall quality of education and promoting sustainable development through informed teaching practices.

Sustainable Development Goals

Sustainable development is a development model that meets the needs of the present without compromising the ability of future generations to meet their own needs (United Nations, 1987). The core of sustainable development is to balance the three dimensions of development - economic, social and environmental - and to realize the harmonious coexistence of human beings and nature (United Nations, 2015). In order to promote sustainable development, the United Nations adopted the 2030 Agenda for Sustainable Development in 2015, which put forward 17 Sustainable Development Goals (SDGs), covering a wide range of aspects such as eradicating poverty, safeguarding health, providing education, promoting equality and protecting the environment (United Nations, 2015).

Among the SDGs, education is a key factor in achieving sustainable development and is the fourth goal of the SDGs, which is to "ensure inclusive and equitable quality education for lifelong learning for all" (United Nations, 2015). Education is not only a fundamental human right, but also a powerful tool for social change and development (UNESCO, 2017).

In order to promote the integration of education with the SDGs, some countries and regions have developed corresponding education policies to guide the objectives, content, methods, and assessment of education. For example, The EU actively advocates integrating Sustainable Development Goals (SDGs) into the education system (Kioupi & Voulvoulis, 2019) and the "Reshaping Education and Training: European Cooperation Framework (2021-2030)" released in 2021 lists sustainable development as one of the eight key competencies for European education and training cooperation, emphasizing the importance of integrating SDGs into curriculum, teaching, and learning environments (Alexiadou & Rambla, 2023). In addition, the 2019 EU Youth Strategy (2019-2027) emphasizes the role of youth in achieving SDGs and encourages the promotion of SDGs in youth work and informal learning. The European Union also provides funding to support SDGs education projects through programs such as Erasmus+, and publishes a large number of resources and case studies on the European Commission website to provide guidance and support for educators (Nogueiro, Saraiva, & Rolo, 2023).

Similarly, Japan released the "Japan SDGs Action Plan 2017", which includes measures in the field of education, such as incorporating SDGs into educational curricula, textbooks, and guidelines, strengthening teachers' SDGs education capabilities, promoting excellent practices in SDGs education, encouraging cooperation between schools and communities, and supporting international exchanges and cooperation (Edwards & Ashida, 2021).

In addition, Malaysia actively promotes the Sustainable Development Goals (SDGs) in the field of education, particularly Goal 4, which aims to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all (Mokshein, 2019). The 2013-2025 Malaysia Education Development Blueprint is a key policy document for Malaysia to achieve this goal. It proposes a series of reform measures aimed at improving education quality, ensuring education equality, promoting student unity, and enhancing the efficiency

of the education sector (Bakar, 2023). This blueprint is consistent with the Sustainable Development Goal 4 of UNESCO, emphasizing the provision of inclusive, equal, high-quality education and lifelong education opportunities for all. Malaysia has also participated in global and regional partnerships coordinated by UNESCO, supporting national implementation strategies, mobilizing support from partners, and coordinating monitoring and reporting on specific goals and commitments for education under Sustainable Development Goals 4-2030 (Hashim & Firdaus, 2018). These efforts demonstrate Malaysia's commitment to promoting sustainable development through education and ensuring that its education policies are aligned with the global education agenda (Yean et al., 2024).

By comparing these education policies, it can be found that the formulation and implementation of these education policies reflect the importance and support for the integration of education and SDGs in different countries and regions, as well as for the reform and innovation of education, which, in order to meet the requirements of sustainable development, also requires the participation and contribution of educators. Educators include not only teachers, but also school leaders, educational administrators, educational researchers, and educational trainers.

Sdgs and Education in Shandong Province, China

Among the provinces in China, Shandong Province is an important economic, cultural and educational province. Shandong Province attaches great importance to the development of education and has formulated a series of education policies to promote reform and innovation in education and to provide support and guarantees for the realization of the SDGs (Li & Jiao, 2021). The Modernization of Education in Shandong Province 2035 is an important plan in the field of education in Shandong Province. It proposes, among others, to "build a strong province of education, cultivate socialist builders and successors who are all-rounded in morality, intelligence, physical fitness, and aesthetics, and provide strong support for human resources and intellectual safeguards for the building of a strong socialist modernization province in an all-round way" (Shandong Provincial People's Government, 2021). The vision, which covers the goals, contents, methods, evaluation and management of education, is highly compatible with the fourth goal of the SDGs.

The Action Plan for the Implementation of the 2030 Agenda for Sustainable Development in Shandong Province specifies Shandong's vision, principles, goals, paths, and mechanisms for realizing the SDGs, which puts forward in the field of education the following: "Comprehensively improve the quality of education, promote equity in education, enhance educational innovation, and cultivate socialist builders and successors who are all-rounded in morality, intelligence, physical fitness, and aesthetics". This is highly consistent with the fourth goal of the SDGs (People's Government of Shandong Province, 2021).

The 13th Five-Year Plan for the Development of Education in Shandong Province is an important plan in the field of education in Shandong Province, which puts forward "building a strong education province, cultivating socialist builders and successors who are all-rounded in morality, intelligence, physical fitness and aesthetics, and providing strong talent support and intellectual guarantee for the building of a moderately prosperous society in all aspects". It sets out goals such as "building a strong education province, cultivating socialist builders and successors for the comprehensive development of ethics, intellect, physicality, and

beauty, and providing strong support for talents and intellectual safeguards for the comprehensive construction of a moderately prosperous society," which involves the quality, fairness, innovation, and internationalization of education, and is highly compatible with the fourth goal of the SDGs (People's Government of Shandong Province, 2016).

The formulation and implementation of these policies and plans reflect Shandong Province's emphasis on and support for the integration of education with the SDGs, and provide guidance and impetus for the reform and development of education.

Pedagogical Content Knowledge

In teaching, pedagogical content knowledge (PCK) is a core component of teachers' professional knowledge as it may indicate their teaching competencies. It represents how teachers transform subject content knowledge into teaching activities that are meaningful to students to improve their understanding (Star, 2023). Shulman (1987), first proposed the concept of PCK. He believed that PCK is the unique ability of teachers to combine content knowledge and pedagogical knowledge to adapt to students' understanding and learning difficulties.

In the context of language education, PCK plays a key role in how language teachers can effectively teach language skills by integrating content and teaching methods (Cordova et al., 2022). Language teachers not only need to master language knowledge, but also need to understand how to effectively teach this knowledge to promote students' language skill development. In addition, when it comes to integrating the Sustainable Development Goals (SDGs), teachers' PCK will determine how they integrate these concepts into the curriculum and how to design activities to cultivate students' understanding and application of these concepts (Ge et al., 2023). For example, how to integrate sustainable development education content into Chinese or English teaching so that students can have a future perspective and cultivate their literacy in sustainable development is particularly critical.

The development of PCK should be integrated with the subject knowledge and practical experience of preparatory teachers, both during the internship and in real work. This suggests that in order to effectively integrate the SDGs in language education, teachers' PCK development requires not only theoretical knowledge but also application and reflection in practice. This integration is crucial for the effective integration of the Sustainable Development Goals (SDGs) into language education, as it ensures that teachers not only have theoretical knowledge but also the ability to apply and reflect on their teaching methods in practice (Yin, 2022).

When comparing the ability of Chinese and English teachers to integrate the SDGs in Shandong Province, Chinese and English teachers may face different challenges, such as cultural differences, students' preconceptions, and understanding of the SDGs. Therefore, studying how they adjust their teaching strategies through PCK to meet these challenges is crucial to understanding and improving teachers' ability to integrate the SDGs. By incorporating PCK into teaching methods, teachers can better navigate the complexity of mixed-ability courses, technology integration, and sustainable development education, ultimately enhancing their ability to integrate the SDGs into the curriculum (Zhu, 2023).

In specific practice, Chinese and English teachers can integrate the Sustainable Development Goals (SDGs) into their teaching content through a variety of ways, relying on their PCK to achieve this goal. Chinese teachers can guide students to understand the SDGs by selecting and interpreting texts related to sustainable development. For example, when teaching literature, teachers can choose texts that reflect themes such as environmental protection, social justice, and economic development, and guide students to discuss how these themes are consistent with the SDGs. Chinese teachers can also design writing tasks to allow students to reflect on how their lifestyles and behaviors affect sustainable development and cultivate their critical thinking and problem-solving skills (Qi, Sorokina, & Liu, 2021). English teachers can promote students' language development and their understanding of global issues by integrating language skills teaching with SDGs content. For example, teachers can design project-based learning activities that require students to research and present the implementation of a certain sustainable development goal in English, which not only improves students' language skills but also enhances their awareness of global issues. English teachers can also use multimedia resources such as documentaries, interviews, and news reports to help students understand global sustainable development issues and practice oral and critical thinking skills through discussion and debate activities (Wang et al., 2022).

In addition, both Chinese and English teachers can use PCK strategies to adjust their teaching methods to better suit students' understanding and learning of SDGs. For example, teachers can adopt a collaborative learning approach, form learning groups, and let students discuss and solve problems related to the SDGs together. This teaching strategy not only promotes interaction and cooperation among students, but also deepens students' understanding of sustainable development issues through a diversified perspective (Saitua-Iribar et al., 2020). Therefore, integrating SDGs into Chinese and English teaching requires teachers to have several key abilities in PCK: first, a deep understanding of SDGs and related content, second, the ability to transform these contents into teaching activities suitable for students, and third, the ability to flexibly use a variety of teaching strategies. By continuously improving these abilities, Chinese and English teachers can effectively integrate SDGs in their courses and cultivate students' sustainable development literacy, thereby contributing to the realization of global sustainable development goals (Pano, 2019).

Therefore, PCK plays a vital role in the development of language teachers' ability to integrate the SDGs. By gaining a deeper understanding of the concept and development of PCK and how it affects teachers' teaching practices, a solid theoretical foundation can be provided for the comparative analysis of Chinese and English teachers in Shandong Province in integrating the SDGs.

Methodology

This study adopts a survey research design to explore the competencies of Chinese and English language teachers in integrating Sustainable Development Goals (SDGs) into their teaching practices. This approach emphasizes data objectivity and measurability, suitable for exploring the relationship between different variables and predicting trends (Nardi, 2018).

Research Sample and Sampling Method

In order to ensure that the research results can truly reflect the current situation of education in Shandong Province, we need to extract a sufficient number of representative samples.

According to the "Statistical Bulletin of Shandong Province's Education Development in 2022" released by the Shandong Provincial Department of Education in 2023, there are 801,200 teachers and staff in the compulsory education stage in the province, including 410,400 in primary schools and 390,900 in junior high schools.

This study adopted a stratified random sampling method, which we divided the population of teachers into different strata based on school type (primary, middle, and high schools) and geographical regions (urban and rural areas). Within each stratum, teachers were randomly selected to participate in the survey. This approach ensured that our sample included a diverse and representative group of teachers from various educational contexts across Shandong Province, minimizing selection bias and enhancing the generalizability of our findings.

According to Krejcie and Morgan (1980), to ensure that the sample is representative enough and can effectively reflect the overall situation, this study need at least 384 participants. A total of 800 survey questionnaires were distributed, with 768 valid responses. 384 respondents represent Chinese language teachers and 384 respondents are English teachers from Shandong Province.

Data Collection Methods

Data were collected using a structured questionnaire designed to gather information on teachers' PCK for integrating SDGs in their teaching. The questionnaire comprised two parts. The first section collected demographic information such as gender, age, teaching experience, education level, and professional title. The second section consists of items related to PCK. The latter section was based on Lee et al (2018), PCK instrument, adjusted to meet the specific objectives of this study. The PCK instrument is a well-established instrument for evaluating teachers' PCK, and it has been widely used in educational research to assess various competencies (Pamintuan, 2024). This instrument is suitable for this study as it comprehensively covers the seven key areas of knowledge required for integrating SDGs into teaching practices. They are knowledge of subject matter, knowledge of curriculum, knowledge of learners, knowledge of instructional strategies, knowledge of sustainable development context, knowledge of educational goals, and knowledge of assessment.

The questionnaire was distributed to teachers online through WeChat. WeChat was chosen as the data collection platform due to its widespread adoption and familiarity among the respondents in China, ensuring high accessibility and ease of response. The platform allows for efficient and timely data collection, leveraging its extensive user base among teachers in the research location. In addition, the convenience of WeChat ensures that respondents can participate in the survey at their preferred time, enhancing the response rate without interfering with their professional responsibilities.

Data Analysis

The collected data were analysed using both descriptive and inferential statistical methods. Descriptive statistics (i.e. – mean, standard deviation, and percentages) were used to summarize the characteristics of the sample data. Independent samples t-test was employed to compare the competencies of Chinese and English teachers in integrating SDGs, analysing significant differences between the two groups. By employing these methods, the study

aimed to provide a comprehensive comparison of the competencies between Chinese and English language teachers in integrating SDGs, identifying areas of strength and opportunities for professional development.

Results

Demography of Respondents

The demographic characteristics analysed include gender, age, years of teaching experience, education level, and work location. This is crucial for understanding the context and background within which these teachers operate and their potential for integrating SDGs into their teaching practices. Table 1 summarizes the key demographic characteristics of the respondents.

Table 1

Demography of Respondents

Demographic		Percentage	
		Chinese Language Teachers (n=384)	English Language Teachers (n=384)
Gender	Female	61%	64.5%
	Male	39%	35.5%
Age	21-30 years	46.25%	41.5%
	31-40 years	35.25%	34.75%
Years of Teaching	3-5 years	29.5%	27%
	1-3 years	17.25%	19.75%
Education Level	Bachelor degree	72.75%	72.75%
	Master degree	23.75%	23.5%
Work Location	Primary School	43.25%	44.5%
	Middle School	26.75%	29.75%
	High School	30%	25.75%

The gender distribution of the respondents indicates a higher proportion of female teachers in both groups. Specifically, 61% of the Chinese language teachers and 64.5% of the English language teachers are female, while the remaining 39% and 35.5% are male, respectively.

The respondents are mostly young, according to the age distribution. 46.25% of Chinese language teachers are 21–30 years old, and 35.25% are 31–40. English language teachers are also young, with 41.5% aged 21-30 and 34.75% aged 31-40. There are fewer senior teachers in both categories. A higher number of young teachers may be more open to innovative teaching methods and technologies, which is important for sustainable development education.

In terms of teaching experience, a significant portion of teachers have between 3 to 5 years of experience. For Chinese language teachers, this group constitutes 29.5% of the respondents, while for English language teachers, it is 27%. Both groups also have a notable number of teachers with 1 to 3 years of experience, highlighting a relatively early career stage for many respondents.

In the distribution of educational qualifications of Chinese and English teachers, the data shows that most teachers have a bachelor's degree or above. Among Chinese language teachers, undergraduate students account for 72.75%, master's students account for 23.75%, and doctoral students account for 3.5%. The distribution of English teachers is similar for undergraduate accounting for 72.75%. Master's accounting for 23.5%, and doctoral accounting for 3.75%.

The work location distribution shows a fairly even spread across primary, middle, and high schools. Among Chinese language teachers, 43.25% work in primary schools, 26.75% in middle schools, and 30% in high schools. English language teachers show a similar distribution with 44.5% in primary schools, 29.75% in middle schools, and 25.75% in high schools. This indicates that both groups of teachers are evenly represented across different educational levels.

Comparative Analysis of Competencies for Integrating SDGs

Table 2 presents the detailed findings of descriptive and inferential statistics for the two groups of the study.

Table 2

Analysis of PCK for Integrating SDGs of Chinese and English Language Teachers

PCK domains	No of items	Chinese Language Teachers	English Language Teachers	p-value
		Mean (SD)	Mean (SD)	
Knowledge of Subject Matter	5	3.45 (0.68)	3.30 (0.70)	0.008*
Knowledge of Curriculum	3	3.40 (0.72)	3.50 (0.66)	0.046*
Knowledge of Learners	4	3.30 (0.75)	3.25 (0.77)	0.327
Knowledge of Instructional	4	3.40 (0.70)	3.55 (0.65)	0.004*
Knowledge of sustainable	5	3.45 (0.72)	3.60 (0.68)	0.011*
Knowledge of Educational Goals	3	3.35 (0.74)	3.40 (0.70)	0.326
Knowledge of Assessment	3	3.35 (0.72)	3.50 (0.70)	0.022*
Overall	27	3.39 (0.72)	3.44 (0.70)	0.803

*p<0.05

The research findings reveal notable differences between Chinese and English language teachers in their competencies for integrating Sustainable Development Goals (SDGs) into their teaching practices. Chinese language teachers showed a significantly higher level of understanding in knowledge of subject matter, with a mean score of 3.45 (SD = 0.68) compared to 3.30 (SD = 0.70) for English language teachers, and a p-value of 0.008, indicating a statistically significant difference. This suggests that Chinese language teachers are better equipped to understand and convey SDG concepts in their classrooms.

In contrast, English language teachers demonstrated a stronger proficiency in curriculum knowledge and instructional strategies. The mean score for knowledge of curriculum among English language teachers was 3.50 (SD = 0.66), higher than the 3.40 (SD = 0.72) for Chinese language teachers, with a p-value of 0.046. Similarly, for instructional strategies, English language teachers scored 3.55 (SD = 0.65) compared to 3.40 (SD = 0.70) for Chinese language teachers, with a p-value of 0.004. These results indicate that English language teachers are more adept at integrating SDGs into their curriculum and employing effective teaching methods to enhance student understanding.

Further, English language teachers scored higher in their knowledge of the sustainable development context and assessment practices, with mean scores of 3.60 (SD = 0.68) and 3.50 (SD = 0.70) respectively. The p-values of 0.011 and 0.022 indicate significant differences from Chinese language teachers, who scored 3.45 (SD = 0.72) for sustainable development context and 3.35 (SD = 0.72) for assessment practices. This suggests that English language teachers are more capable of utilizing resources and assessment methods to support SDG education.

However, no significant differences were observed between the two groups in their knowledge of learners or educational goals related to SDGs. Both groups demonstrated a similar understanding of students' capabilities and challenges, as well as their ability to set relevant educational goals, with mean scores close to each other and p-values well above the threshold for significance.

Discussion

The research findings indicate that there are notable differences in the Pedagogical Content Knowledge (PCK) of Chinese and English language teachers when it comes to integrating Sustainable Development Goals (SDGs) into their teaching practices. Specifically, the data reveals that English language teachers demonstrate a higher competence in integrating SDGs across various pedagogical dimensions compared to Chinese language teachers.

This disparity may be attributed to several factors. First, English language teachers often have access to a broader range of global resources and pedagogical materials that emphasize the importance of SDGs, given the global nature of the English language. According to Yuan et al (2022), English language education in China has increasingly incorporated global perspectives, including SDGs, due to the influence of international curricula and standards. In contrast, Chinese language education tends to focus more on traditional and national content, which may limit the exposure of Chinese language teachers to SDG-related resources (Wang & Wang, 2018). Furthermore, the findings align with the research of Yu, Guo, and Fu (2024), which suggests that English language teachers in China are more likely to participate in professional development programs that include components on global education and

sustainable development. This professional engagement equips them with better tools and strategies to integrate SDGs into their teaching.

In terms of pedagogical practice, the higher scores observed among English language teachers could also be linked to their familiarity with interactive and student-centered teaching methodologies, which are conducive to discussing global issues like the SDGs (Jing, 2023). These methods foster critical thinking and awareness among students, which are essential for understanding and engaging with SDGs. On the other hand, the relatively lower scores among Chinese language teachers may reflect the traditional pedagogical approaches prevalent in Chinese language instruction, which often prioritize rote learning and examination preparation over critical engagement with global issues (Gong, Gao, & Lyu, 2020). This pedagogical focus could hinder the effective integration of SDGs in Chinese language classes.

In addition, studies have shown that language teachers' ability to integrate global perspectives, including SDGs, into their curriculum is influenced by their access to resources, professional development opportunities, and pedagogical training (Jin & Cortazzi, 2013). English language teachers, in particular, are more likely to be exposed to and incorporate international standards that emphasize sustainability and global citizenship (Jing, 2023). The findings highlight the need for targeted professional development and resource allocation to enhance the capacity of Chinese language teachers in integrating SDGs. By addressing these gaps, educational authorities can ensure a more balanced and comprehensive approach to sustainable development education across different language subjects.

Based on these, several strategies can be implemented. Professional development programs should offer tailored training sessions on instructional strategies, assessment methods, and curriculum development related to SDGs, catering to both novice and experienced teachers (Cordova, 2024). Resource allocation by educational institutions is crucial, ensuring the development and distribution of teaching materials, including multimedia resources and interactive learning tools. Policymakers should support this integration by formulating and implementing policies that provide guidelines for SDG-focused teaching and assessment, as well as incentives for effective incorporation. Mentorship programs can sustain enthusiasm by pairing experienced teachers with less experienced colleagues, fostering a collaborative learning environment. Given the higher proportion of female teachers, professional development programs should adopt gender-sensitive approaches, such as flexible scheduling and support for teachers with caregiving responsibilities. Encouraging student-centered learning through project-based and service-learning projects can make SDG content more engaging and meaningful (Yacob, Yunus, & Hashim, 2022). Finally, active involvement of community stakeholders, including local businesses, NGOs, and government agencies, can provide additional resources, expertise, and real-world relevance to classroom activities, thereby enhancing the overall integration of SDGs into the educational framework.

Conclusion

The comparative analysis using t-tests highlights significant differences in several areas of PCK related to integrating SDGs between Chinese and English language teachers in Shandong Province. English language teachers generally demonstrated higher competency in Knowledge of Curriculum, Instructional Strategies, Context, and Assessment. However, there was no significant difference in knowledge level between the two groups in understanding

learners and setting educational goals. These findings indicate the target areas for professional development to enhance teachers' ability to integrate sustainable development goals into teaching practice.

Overall, while both groups show a commitment to integrating SDGs into their pedagogy, the specific areas where one group excels over the other highlight opportunities for mutual learning and improvement. Chinese language teachers might benefit from enhanced training in instructional strategies and assessment techniques, while English language teachers could gain from deeper engagement with the subject matter content related to SDGs. This holistic approach to professional development can support more effective and integrated SDG education across different language disciplines.

The findings of this study underscore the importance of integrating Sustainable Development Goals into language education and highlight the varying competencies and challenges faced by Chinese and English language teachers in Shandong Province. By implementing targeted professional development programs, providing adequate resources, and supporting teachers through policy and mentorship, educational institutions can enhance the integration of SDGs into their teaching practices. This holistic approach will not only improve the quality of education but also contribute to the broader goal of sustainable development, preparing students to become informed and responsible global citizens.

In addition, a sustained focus on professional development, resource allocation, and community engagement will ensure that teachers are well-equipped to handle the evolving demands of SDG integration. This will ultimately lead to a more robust and effective educational framework that promotes sustainability and global awareness among students.

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