

Investigation and Study of Science Disciplines Normal Student on Interdisciplinary Teaching Literacy

Xiaoyan Zhou, Minghua Ou

School of Physics Science and Technology, Lingnan Normal University, Zhanjiang, Guangdong, China

Abstract: This study refers to Yinuo Zhou's questionnaire on teachers' interdisciplinary teaching literacy, which includes interdisciplinary knowledge literacy, interdisciplinary teaching ability literacy and interdisciplinary teaching beliefs and willingness, and takes 218 science normal students of Lingnan Normal University as the research object. The study found that the level of interdisciplinary knowledge literacy, interdisciplinary teaching ability literacy and interdisciplinary teaching beliefs and willingness of science normal students is above the medium level. The interdisciplinary teaching literacy of science normal students is not closely related to gender and major, which is related to grade and the attitude of developing interdisciplinary teaching literacy and shows significant differences, and put forward relevant suggestions to improve the interdisciplinary teaching literacy of science normal students.

Keywords: Science Disciplines Normal Student; Interdisciplinary Teaching; Interdisciplinary Teaching Literacy; Questionnaire Investigation; Case Interview

1. Research Background and Research Status

1.1 Research Background

In order to win more competitiveness in the future, countries around the world have participated in curriculum reform one after another. For example, STEM education has been widely promoted by countries around the world. In 2021, president xi Jinping's speech reflects the importance and attention to China's education and talent training at the meetings of the National People's Congress of the People's Republic of China and the National Committee of the Chinese People's Political Consultative Conference^[1]. When the president visited Tsinghua University, he advocated

cross-integration between disciplines^[2]. The 'Compulsory Education Science Curriculum Standards' promulgated in 2022 clearly refers to the science curriculum as a comprehensive curriculum, highlighting interdisciplinary teaching, etc^[3]. It can be seen that under the background of the development of the new era, it is a trend for science education to focus on interdisciplinary integration.

1.2 Research Status

Baucus Mansler believes that interdisciplinary learning is a process in which individuals and groups integrate views and ways of thinking in two or more disciplines^[4], such as comprehensive schools in Europe and Germany, focusing on examining and understanding the teaching effects of interdisciplinary science teachers^[5]. In 1989, American scholar Shumek believed that 'interdisciplinary teaching' is to cross the boundaries of the discipline itself in the teaching process and establish the internal relationship of the curriculum^[6]. Finland has incorporated and implemented basic education tasks and national goals into the core curriculum, which is divided into seven interdisciplinary qualities^[7]. In 2011, the EU Working Group on Education and Training 2020: 'Teacher Professional Development' released "Teacher Core Competencies: Needs and Development"^[8]. In 2013, the EU issued the "In order to better learning outcomes, supporting the development of teacher core literacy," which further clarified and determined the meaning of teacher literacy^[9]. At present, only the "Guidelines for Comprehensive Practical Activity Curriculum in Primary and Secondary Schools" and "Chinese STEM Teacher Ability Level Standards^[10]" in China are related to interdisciplinary literacy. Chinese scholars Kanwei and others believe that teachers' interdisciplinary teaching literacy mainly includes four aspects: subject integration awareness, cross-knowledge structure, interdisciplinary thinking and cross-teaching

strategy ability. Qingfang Hu and other researchers put forward seven aspects according to the process of interdisciplinary teaching literacy^[11]. Dequan Zhu believes that teachers' interdisciplinary teaching literacy should be a combination of teachers' interdisciplinary teaching knowledge, interdisciplinary teaching ability and interdisciplinary teaching affection^[12]. Therefore, teachers' literacy needs to be continuously developed, including knowledge, skills and affection^[13], and constantly promote the growth of self-professional quality. In general, interdisciplinary teaching literacy can be understood as the ability and quality of teachers possess to integrate different subject knowledge and carry out interdisciplinary teaching activities in teaching practice^[14], which is a new evaluation method for the development of teachers' literacy in the future education development, liberates the shackles of knowledge and turns to literacy teaching.

2. Research Design

According to the research content, the questionnaire is designed and carried out by the questionnaire method. The questionnaire topic is referred to the teacher's interdisciplinary teaching literacy questionnaire in Yinuo Zhou's master's research paper^[6], which consists of three parts, namely, personal basic information, interdisciplinary teaching cognition and attitude, and interdisciplinary teaching literacy, and is divided into three first-level dimensions and eight second-level dimensions. It is designed in the form of a scale, and according to the Likert scale, the five levels are very inconsistent, inconsistent, generally consistent, consistent,

and very consistent, with corresponding scores of 1 to 5 points.

2.1 Research Object

The subjects of the survey are 218 science normal students from five different majors in Lingnan Normal University, which are science education (normal), physics (normal), chemistry (normal), biological science (normal) and geographical science (normal), and the survey information includes gender, grade, major, learning year and attitude towards the development of interdisciplinary teaching literacy.

Ten science normal students of different majors were selected as interviewees, and the interview contents were recorded and sorted out in an anonymous form.

2.2 Data Source and Reliability and Validity Analysis

From late March to early April 2024, electronic questionnaires were distributed on the questionnaire star platform in the form of electronic questionnaires, a total of 225 questionnaires were recovered with a recovery rate of 100 %, seven invalid questionnaires were eliminated with an effective rate of 96.89 %, and 218 valid questionnaires were used for analysis (see table 1). The data were collated, and the reliability and validity were analyzed (see table 2 and 3) by SPSS 26.0 software. According to the content is divided into three dimensions, which are centered on the dimensions of interdisciplinary teaching attitude, knowledge, ability and belief, so as to ensure the reliability and accuracy of the survey results.

Table 1. Research Object Information

| variable | option | frequency | Percentage (%) |
|----------|--------------------|-----------|----------------|
| grade | freshman year | 41 | 18.80 |
| | sophomore year | 37 | 17.00 |
| | junior year | 58 | 26.60 |
| | senior year | 82 | 37.60 |
| gender | male | 64 | 29.40 |
| | female | 154 | 70.6 |
| major | science education | 95 | 43.60 |
| | physics | 41 | 18.80 |
| | chemistry | 30 | 13.80 |
| | biological science | 31 | 14.20 |
| | Geographic science | 21 | 9.60 |
| sum | | 218 | 100.0 |

Table 2. Reliability Analysis of Total Scale

| item | number of terms | Cronbach's alpha |
|----------------------|-----------------|------------------|
| Reliability analysis | 30 | 0.950 |

Table 3. Validity Analysis of Kaiser-Meyer-Olkin and Bartlett's Test of Sphericity

| item | KMO value | Bartlett's Test of Sphericity | | |
|-------------------|-----------|-------------------------------|---------|----------|
| | | Approximate chi square | df | P |
| Validity analysis | 0.948 | 3078.206 | 435.000 | 0.000*** |

3. The Overall Perception of Interdisciplinary Teaching Literacy of Science Normal Students

3.1 Overall Perception of Interdisciplinary Teaching Literacy

The scores of interdisciplinary knowledge literacy, interdisciplinary teaching ability literacy and interdisciplinary teaching beliefs and willingness of science normal students are

3.6183, 3.6777 and 3.7283 respectively (see Table 4), all of which are at the upper middle level. The scores of interdisciplinary teaching beliefs and willingness are the highest, and the scores of interdisciplinary knowledge literacy and interdisciplinary teaching ability literacy are low, indicating that science normal students have higher interdisciplinary teaching beliefs and willingness, but the mastery of interdisciplinary knowledge and interdisciplinary teaching ability literacy is weak.

Table 4. Interdisciplinary Teaching Literacy Situation

| First level dimension | Mean | standard deviation | Number of cases |
|--|--------|--------------------|-----------------|
| Interdisciplinary knowledge literacy | 3.6183 | 1.0965 | 218 |
| Interdisciplinary teaching ability literacy | 3.6777 | 1.0862 | 218 |
| Interdisciplinary teaching beliefs and willingness | 3.7283 | 1.0830 | 218 |

3.2 Interdisciplinary Knowledge Literacy Situation

The score for interdisciplinary teaching knowledge of science normal students is 3.5833, and the score for interdisciplinary teaching method knowledge is 3.6533 (as shown in Table

5). Overall, the overall level of interdisciplinary teaching method knowledge literacy among science normal students is above average, and their learning level in interdisciplinary teaching method knowledge is better than that in interdisciplinary teaching knowledge.

Table 5. Interdisciplinary Knowledge Literacy Situation

| Second level dimension | Mean | standard deviation | Number of cases |
|--|--------|--------------------|-----------------|
| Interdisciplinary teaching knowledge | 3.5833 | 1.1487 | 218 |
| Interdisciplinary teaching methods knowledge | 3.6533 | 1.0443 | 218 |

3.3 Interdisciplinary Teaching Ability and Literacy Situation

Interdisciplinary teaching ability all belong to the middle and above level (see Table 6). The comparison shows that the score of interdisciplinary teaching reflection ability is the

highest, and the interdisciplinary teaching cognition, design and practice ability of science normal students are lower than that of interdisciplinary teaching reflection ability, among which the interdisciplinary teaching practice ability is the lowest.

Table 6. Interdisciplinary Teaching Ability Literacy Situation

| Second level dimension | Mean | standard deviation | Number of cases |
|---|--------|--------------------|-----------------|
| Interdisciplinary teaching cognitive ability | 3.6750 | 1.0915 | 218 |
| Interdisciplinary teaching design ability | 3.6767 | 1.079 | 218 |
| Interdisciplinary teaching practice ability | 3.6133 | 1.1113 | 218 |
| Interdisciplinary teaching reflection ability | 3.7467 | 1.0613 | 218 |

3.4 Interdisciplinary Teaching Beliefs and Willingness Situation

The score of interdisciplinary teaching beliefs of science normal students is 3.7233, and the average value of interdisciplinary teaching willingness is 3.7333 (see Table 7), both of

which belong to the upper middle level. But the score of interdisciplinary teaching willingness is slightly higher than that of interdisciplinary teaching beliefs, indicating that science normal students have a higher recognition of interdisciplinary teaching willingness.

Table 7. Interdisciplinary Teaching Beliefs and Willingness Situation

| Second level dimension | Mean | standard deviation | Number of cases |
|--|--------|--------------------|-----------------|
| Interdisciplinary teaching beliefs | 3.7233 | 1.0887 | 218 |
| Interdisciplinary teaching willingness | 3.7333 | 1.0773 | 218 |

4. Analysis of the Differences in the Factors of Interdisciplinary Teaching Literacy of Science Normal Students

4.1 Gender Differences

There was no significant difference in interdisciplinary knowledge literacy ($p = 0.545 > 0.05$), interdisciplinary teaching ability

literacy ($p = 0.420 > 0.05$) and interdisciplinary teaching beliefs and willingness ($p = 0.443 > 0.05$) between different genders (as shown in Table 8), indicating that boys and girls have the same level of interdisciplinary knowledge literacy, interdisciplinary teaching ability literacy and interdisciplinary teaching beliefs and willingness.

Table 8. Analysis of Gender Differences

| First level dimension | Mean | | standard deviation | | t | p |
|--|-------------|----------------|--------------------|----------------|--------|-------|
| | Male (n=64) | Female (n=154) | Male (n=64) | Female (n=154) | | |
| Interdisciplinary knowledge literacy | 3.5533 | 3.6483 | 1.0637 | 1.10867 | -0.575 | 0.545 |
| Interdisciplinary teaching ability literacy | 3.5931 | 3.7169 | 1.1204 | 1.0698 | -0.771 | 0.420 |
| Interdisciplinary teaching beliefs and willingness | 3.6267 | 3.7700 | 1.1182 | 1.0673 | -0.878 | 0.443 |

4.2 Grade Differences

There are significant differences in interdisciplinary knowledge literacy ($F = 6.905$, $P = 0.028 < 0.05$) and interdisciplinary teaching ability literacy ($F = 4.928$, $P = 0.011 < 0.05$) among students of different grades in interdisciplinary knowledge teaching literacy (as shown in Table 9). However, the F value of interdisciplinary teaching beliefs and willingness is 1.289, and the P value is 0.425, which is greater than 0.05 and does not meet the significance.

Among the interdisciplinary knowledge literacy, the average score of sophomore students is the highest, 3.7900. Secondly, the scores of juniors and seniors are 3.7567 and 3.7550, respectively, and there is no significant difference between the two grades. Freshmen have the lowest score, indicating that freshmen have a low level of mastery of interdisciplinary knowledge.

In the interdisciplinary teaching ability literacy,

the senior students scored high, indicating that the senior students' interdisciplinary teaching ability is strong, and the junior and sophomore students are weakened in turn and stronger than the freshmen. Among the interdisciplinary teaching beliefs and willingness, junior students have the strongest interdisciplinary teaching beliefs and willingness, followed by freshmen and senior students, and sophomores have the lowest.

4.3 Major Differences

There is no significant difference in interdisciplinary knowledge literacy, interdisciplinary teaching ability literacy, and interdisciplinary teaching beliefs and willingness among science normal students of different majors (as shown in Table 10). This may be related to the fact that the subjects surveyed receive learning in a similar educational environment and show similar performance in all three dimensions.

Table 9. Analysis of Grade Differences

| First level dimension | grade | Mean | standard deviation | F | P |
|--|----------------|--------|--------------------|-------|-------|
| Interdisciplinary knowledge literacy | freshman year | 3.0100 | 0.9612 | 6.905 | 0.028 |
| | sophomore year | 3.7900 | 1.1330 | | |
| | junior year | 3.7567 | 1.1072 | | |
| | senior year | 3.7550 | 1.0177 | | |
| Interdisciplinary teaching ability literacy | freshman year | 3.1492 | 0.9679 | 4.928 | 0.011 |
| | sophomore year | 3.7269 | 1.2238 | | |
| | junior year | 3.8038 | 1.1155 | | |
| | senior year | 3.8385 | 0.9700 | | |
| Interdisciplinary teaching beliefs and willingness | freshman year | 3.7700 | 1.0403 | 1.289 | 0.425 |
| | sophomore year | 3.4983 | 1.1983 | | |
| | junior year | 3.7867 | 1.1448 | | |
| | senior year | 3.7667 | 0.9923 | | |

Table 10. Analysis of Major Differences

| First level dimension | Major | Mean | standard deviation | F | P |
|-----------------------------|-------------------|--------|--------------------|-------|-------|
| Interdisciplinary knowledge | science education | 3.6300 | 1.0987 | 0.774 | 0.563 |

| First level dimension | Major | Mean | standard deviation | F | P |
|--|--------------------|--------|--------------------|-------|-------|
| literacy | physics | 3.6650 | 1.0228 | | |
| | chemistry | 3.4217 | 1.1893 | | |
| | biological science | 3.7317 | 1.0835 | | |
| | geographic science | 3.6117 | 1.0987 | | |
| Interdisciplinary teaching ability literacy | science education | 3.6792 | 1.0630 | 1.167 | 0.395 |
| | physics | 3.8262 | 0.9955 | | |
| | chemistry | 3.4377 | 1.1958 | | |
| | biological science | 3.7469 | 1.0926 | | |
| Interdisciplinary teaching beliefs and willingness | geographic science | 3.6485 | 1.1388 | 0.772 | 0.643 |
| | science education | 3.7167 | 1.0562 | | |
| | physics | 3.8367 | 1.0792 | | |
| | chemistry | 3.5783 | 1.1343 | | |
| | biological science | 3.8117 | 1.0662 | | |
| | geographic science | 3.6600 | 1.1612 | | |

4.4 Attitude Differences

The different attitudes of science normal students' interdisciplinary teaching literacy show significant differences in the dimensions of interdisciplinary knowledge literacy ($F = 16.035$, $p = 0.000 < 0.01$), interdisciplinary teaching ability literacy ($F = 17.391$, $p = 0.000 < 0.01$) and interdisciplinary teaching beliefs and willingness ($F = 15.536$, $p = 0.000 < 0.01$) (see Table 11). In interdisciplinary knowledge literacy and interdisciplinary teaching ability literacy, the mastery of science normal students has a

positive correlation with the attitude of not needing to general needs, and the score between general needs and very needs is high, indicating that most people think that interdisciplinary teaching literacy needs to be developed, and interdisciplinary knowledge literacy and interdisciplinary teaching ability literacy are related to the attitude of interdisciplinary teaching literacy, and interdisciplinary teaching beliefs and willingness are also proportional to the attitude of developing interdisciplinary teaching literacy.

Table 11. Analysis of Attitude Differences

| First level dimension | attitude | Mean | standard deviation | F | P |
|--|------------------|--------|--------------------|--------|-------|
| Interdisciplinary knowledge literacy | No need | 2.1583 | 0.5167 | 16.035 | 0.000 |
| | a little need | 2.3650 | 0.9537 | | |
| | general need | 3.8683 | 0.9402 | | |
| | comparative need | 3.8150 | 0.9607 | | |
| | very need | 3.8233 | 0.9832 | | |
| Interdisciplinary teaching ability literacy | No need | 1.8846 | 0.4895 | 17.391 | 0.000 |
| | a little need | 2.6500 | 1.0548 | | |
| | general need | 3.9077 | 0.9605 | | |
| | comparative need | 3.9215 | 0.8978 | | |
| Interdisciplinary teaching beliefs and willingness | very need | 3.8638 | 0.9378 | 15.536 | 0.000 |
| | No need | 2.2500 | 0.3535 | | |
| | a little need | 2.4817 | 1.1270 | | |
| | general need | 3.6783 | 0.9178 | | |
| | comparative need | 3.9300 | 0.9742 | | |
| | very need | 3.9483 | 0.9073 | | |

5. Discussion on the Development Status of Interdisciplinary Teaching Literacy of Science Normal Students

5.1 Interdisciplinary Knowledge Literacy of Science Normal Students Is Relatively Low

From the perspective of data analysis, the interdisciplinary teaching literacy of science normal students is above the middle level, but

the score of interdisciplinary knowledge is low, indicating that science normal students do not have enough interdisciplinary teaching knowledge.

Among the interviewees, K-Y1 indicates that they will learn interdisciplinary teaching knowledge independently, but their understanding of interdisciplinary knowledge is not deep. K-X2 said: 'Will be independent learning interdisciplinary teaching related

knowledge, have a certain ability of independent understanding. ' W-L1 means that autonomous learning will be carried out, and most of the knowledge can be mastered independently. However, W-Z2 indicates that it will not learn interdisciplinary knowledge autonomously, depending on the situation. D-W2 said it would not learn independently and had not been exposed to relevant knowledge.

Therefore, most students will choose to learn interdisciplinary knowledge independently, and some people will not take the initiative to learn, and there is a lack of learning motivation.

5.2 Interdisciplinary Teaching Ability Literacy of Science Normal Students Is Relatively Insufficient

There is difficult in the process of interdisciplinary teaching. K-X2 believes that the integration of knowledge in different disciplines is difficult, it is difficult to find suitable teaching resources and cases, and there are challenges in coordination and cooperation with teachers in other disciplines. For example, in the class of ' Feel Our Breath ' is difficult, we can help students to learn by using teaching aids, such as pictures and models. H-H1 said: ' It is difficult to integrate the knowledge of different disciplines, and the integration and utilization of teaching resources are insufficient. ' H-S2 said: ' It is difficult to implement interdisciplinary teaching because of the inconsistency between the major and the subject. ' S-L1 indicates that they are not very familiar with a certain subject and encounter obstacles in guiding students to think. Both S-X2 and D-W2 indicate that no specific difficulties have been encountered yet.

On the whole, the interdisciplinary teaching ability of science normal students is relatively insufficient. Most of them show that it is difficult to integrate multiple disciplines, not deeply related to knowledge, and difficult to cooperate with other disciplines. At the same time, there are uncertainties in practical application and insufficient depth of thinking, so it is necessary to further break the discipline boundary.

5.3 Interdisciplinary Teaching Beliefs and Willingness of Science Normal Students Is Relatively High

The beliefs and willingness of science normal students to interdisciplinary teaching are different. For example, K-X2 says that it can

improve learners ' comprehensive thinking and problem-solving ability, but its effectiveness depends on many factors, such as teaching design and quality, student participation, etc. S-L1 also said: " Interdisciplinary teaching helps students to think about problems as a whole and cultivate students ' critical thinking, which is effective. " S-X2 believes that the use of interdisciplinary teaching methods can cultivate children 's ability to connect multidisciplinary knowledge. D-Y1 mentioned that interdisciplinary teaching can cultivate students ' scientific literacy and artistic literacy. D-W2 believes that interdisciplinary teaching can improve children 's comprehensive learning ability and can achieve results.

As a whole, the science normal students ' interdisciplinary teaching beliefs and willingness literacy are relatively high. The science normal students surveyed basically believe that the use of interdisciplinary teaching can generally achieve results, but it will be affected by many factors, depending on which factors, further investigation and research are needed.

6. Research Conclusions and Recommendations

6.1 Research Conclusions

Through analysis, the following conclusions are drawn:

- (1) The interdisciplinary teaching literacy of science normal students is above the average level, and the scores between the three dimensions are not significantly different, with a relatively balanced development among the three. The eight secondary dimensions are also above the medium level, but on the whole, the interdisciplinary teaching literacy of science normal students still needs to be improved.
- (2) Gender differences have little effect on the interdisciplinary teaching literacy of science normal students.
- (3) There are significant differences in interdisciplinary knowledge literacy and interdisciplinary teaching ability literacy among students of different grades, but there is no significant difference in interdisciplinary teaching beliefs and willingness. The interdisciplinary teaching ability of science normal students increases with grade, and the interdisciplinary teaching ability of senior science normal students is the strongest.
- (4) Different majors have little impact on the

interdisciplinary teaching literacy of science normal students, and the performance is similar.

(5) The attitude of developing interdisciplinary teaching literacy has a significant impact on the interdisciplinary teaching literacy of science normal students.

6.2 Research Recommendations

According to the research and analysis, the following suggestions are put forward:

First, the mastery of interdisciplinary knowledge is not enough, and the curriculum resources for learning knowledge are increased; Second, be good at exploring life materials, rationally integrate teaching design and resources, and create a good learning environment and opportunities in the implementation process; Thirdly, strengthen the professional training of interdisciplinary teaching of science normal students, and provide sufficient places and teaching tools to implement teaching; Fourth, science normal students should communicate with each other, share teaching experience and improve teaching deficiencies; Fifth, master the practical operation skills and strategies of interdisciplinary teaching, and constantly explore and promote the innovation of teaching tools.

Through the above methods to improve the mastery and recognition of interdisciplinary teaching, it is helpful for science normal students to better carry out interdisciplinary teaching activities. The 'active learner-centered' approach is to master knowledge through joint learning, promote the development of problem-solving attitudes, skills and teamwork ability^[15], so as to comprehensively promote the development of interdisciplinary teaching literacy.

Acknowledgement

This work was supported by Fund project: Lingnan Normal University + 2022 Lingnan Normal University Basic Education Reform Project: Research on the Current Situation of Science Experimental Teaching in Primary Schools in Zhanjiang City + Lingnan Normal University Academic Affairs [2022] No. 128. Lingnan Normal University 2023 Foundation Project Supplementary Project + Research on the Current Situation of Cross-discipline Literacy of Primary School Science Teachers and the Path to Enhancement + Lingnan Normal University Research Institute [2023] No. 4.

References

- [1] Xu Shangkun. Cultivate more innovative talents in the new era (new theory) [N/OL]. 2021[2024-3-28]. <http://opinion.people.com.cn/n1/2021/0426/c1003-32087757.html>
- [2] Yu Sinan. Speed up the cultivation of compound innovative talents (innovation talk) [N/OL]. 2021[2024-3-28]. edu.people.com.cn/n1/2021/0524/c1006-32111380.html
- [3] Ministry of Education. Compulsory Education Science Curriculum Program (2022 Edition) [S/OL]. Beijing normal university press, 2022[2024-3-29]. <http://www.moe.gov.cn/srcsite/A26/s8001/202204/W020220420582355009892.pdf>
- [4] Sun Mengyao. Reflections on the cultivation of skilled talents based on the German interdisciplinary concept [J/OL]. Education and research, 2021[2024-4-2]. <http://www.chinaqing.com/yc/2021/2915450.html>
- [5] Handtke K, Bögeholz S. Self-Efficacy Beliefs of Interdisciplinary Science Teaching (SElf-ST) Instrument: Drafting a Theory-Based Measurement [J]. Education Sciences, 2019, 9(4): 247.
- [6] Zhou Yinuo. Research on the status quo of interdisciplinary teaching literacy of primary school teachers [D]. Shanghai Normal University, 2023.
- [7] Li Qiushuang. Research on Phenomenon Teaching in Finland 's Basic Education Stage Based on Interdisciplinary Literacy [D]. Northeast Normal University, 2021.
- [8] EUROPEAN COMMISSION. Teachers'Core Competences: requirements and development [EB/OL]. 2011[2024-3-30]. http://ec.europa.eu/education/policy/school/teaching-professions_en.pdf
- [9] EUROPEAN COMMISSION. Supporting Teacher Competence Development for Better Learning Outcomes [EB/OL]. 2013[2024-4-6]. http://ec.europa.eu/dgs/education_culture/repository/education/policy/school/doc/teacher_comp_en.pdf
- [10] Zhu Lili. Research on the structure model and influencing factors of interdisciplinary literacy of primary and secondary school

- teachers [D]. Tianjin Normal University, 2022.
- [11] Hu Qingfang. Current situation analysis and strategy response of interdisciplinary practice in schools [J]. *Shanghai Education*, 2019, (34): 68-69.
- [12] Zhu Dequan, Peng Hongli. Empirical study on the evaluation model of teachers ' interdisciplinary teaching literacy [J]. *Journal of East China Normal University (Education Science Edition)*, 2023, 41 (2): 1-13.
- [13] Peng Hongli. Research on the construction of evaluation index system of teachers ' interdisciplinary teaching literacy [D]. Southwest University, 2022.
- [14] Huang Yuanchun. Interdisciplinary teaching literacy of normal students and its training path exploration [J]. *Journal of Xichang College (Social Science Edition)*, 2024, 36 (1): 95-101+111.
- [15] Valeria A, Alice R. Exploring the interconnected nature of the sustainable development goals: the 2030 SDGs Game as a pedagogical tool for interdisciplinary education [J]. *International Journal of Sustainability in Higher Education*. 2024, 25(1): 21-42.