Application of Fuzzy Clustering in Higher Education General Management Based on Internet Environment

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General education is an important part of university education aiming at cultivating students’ comprehensive quality and sense of responsibility. As professional sports colleges and universities, higher sports colleges implement the curriculum reform of general education relatively late, and there is a problem of curriculum system construction in the process of implementing general education. The purpose of this paper is to research and discuss the application of general education management in higher education based on fuzzy cluster analysis in the Internet environment. This paper first discusses the teaching mode in the Internet environment and then analyzes the application of fuzzy cluster analysis in general education. Through fuzzy cluster analysis, the students’ understanding of general education before and after learning general education courses is compared, which paves the way for the promotion of general education in colleges and universities. Finally, this paper takes the general education curriculum system of higher physical education colleges as the research object and conducts fuzzy cluster analysis on it. The experimental results show that before studying general courses, 66.7% of the students hope to improve their language communication and expression skills, and 52.8% and 46% of the students hope to improve their practical ability and logical thinking ability. After receiving general education, only 23.5% of students have improved logical thinking ability, and only 13.7% of students have improved language communication and expression skills. The results show that general education does not meet the expectations of students, general education in higher physical education colleges is not effective, and the realization of general education needs to be further improved. To this end, schools can purchase network information resources, cooperate with well-known universities at home and abroad, develop general education courses with a global perspective, train students’ spirit of independent thinking, and master correct thinking methods.

1. Introduction

In the ordinary course system of education, there are phenomena such as disorganized course contents, unreasonable course structure, and poor teaching quality. In order to adapt to the globalization and diversified society, higher sports colleges have gradually begun to implement the reform of general education. However, compared with other comprehensive universities, sports colleges pay more attention to the imparting of professional knowledge and skills and do not really cultivate students to form an independent personality and a sense of social responsibility. The implementation of general education is the correction of the professional education model of higher physical education colleges, which can expand their horizons, cultivate their sentiments, and conduct extensive research on various disciplines. It can also improve their personalities, form their own outlook on life, values, and world outlook, and finally achieve the all-round development of college students and achieve “whole person” education. Physical education colleges have strong professionalism and outstanding characteristics. How to carry out general education and how to set up general education courses are issues that every education reformer should think about. Therefore, it is necessary to
attach importance to the diversification of general education and to the exploration of general education in sports colleges and universities. In view of the issues in the curriculum system of general education in higher physical education institutions, the concept of curriculum system is initially constructed to offer some reference of theory for the reform of general education curriculum in higher physical education institutions. This paper aims to research and discuss the application of general education management in higher education based on fuzzy cluster analysis in the Internet environment, in order to make certain contributions to general education.

According to the research progress abroad, different researchers have also conducted corresponding cooperative research in general education. Fung et al. revealed the views of more than one hundred Hong Kong educators who were urged to rethink the delivery of liberal studies in middle schools in response to the latest government scrutiny of disciplinary courses [1]. Andrea organized the literature according to factors in the micro-, meso-, macro-, extrinsic, and temporal systems that influenced individual students’ decisions to access general education courses [2]. Miedema organized the literature according to factors in the religious and cosmopolitan pedagogues in general, and to focus on the development of durable methods of teaching and learning in general education [3]. Maˇcianskiene and Bijeikiene focused on providing an inclusive learning environment for children whose native language differed from the school language and recommended language sensitive teaching (LST) as a response to the increasing challenges of multilingualism. The findings suggested that LST could serve as an important part of accommodating general education [4]. Faritov proposed a pedagogical pattern for developing students’ engineering skills in general fundamental training. The proposed module provided a theoretical and practical basis for the successful organization of students’ engineering studies, extramural project activities, and works in the field of science and technology [5]. However, these scholars’ research on general education lacks certain technical arguments. It is found that there are better studies in general education based on fuzzy cluster analysis. In this regard, the relevant literature on fuzzy cluster analysis has been consulted.

Some scholars also have some research on fuzzy cluster analysis. In order to improve the scheduling efficiency, Li DR proposed an improved fuzzy clustering cloud task scheduling algorithm. The algorithm outperformed the traditional cluster-free algorithm in execution time [6]. Xue and Yang introduced the fuzzy cluster analysis algorithm [7]. Gavrylenko et al. aimed to study methods for identifying the state of computer systems. Its purpose was to develop a computer system abnormal state identification method based on fuzzy cluster analysis [8]. Zeng et al. applied fuzzy k-mean clustering analysis to a subset of parameters reported in CALIPSO LIDAR Level 2 data products [9]. Vovan and Ledai presented a new fuzzy time series model that allowed efficient prediction of the future by interpolating the historical data [10]. However, these scholars did not research and discuss the application of general education management in higher education based on fuzzy cluster analysis in the Internet environment, but only discussed its significance unilaterally.

This paper aims to study the application of general education management based on fuzzy cluster analysis in higher education in the network environment. Using the fuzzy clustering method, the class hours and credits of general education are clustered and assigned, and the students’ knowledge of general education before and after the general education course is compared. In this way, a solid foundation is laid for the promotion of general education in the university. The questionnaire survey showed that 49.5% of college students were dissatisfied with the choice of general education courses, while 15.8% of the students said that the courses they chose could meet their needs. Only 10.9% of students thought the school’s electives were important. This showed that they did not fully understand the connotation of general education and thought that general education was not very important to them. Through questionnaires and interviews, it was found that 66.7% of the students wanted to improve their communication and expression skills before general education, and 52.8% and 46% were interested in improving their practical ability and logical thinking ability. Through the study of general courses, only 23.5% of the students have improved their logical thinking level, and 13.7% of the students have improved their communication and expression skills. As a result, general education cannot meet the expectations of students. The effect of general education in higher physical education colleges is not ideal, and the realization of general education needs to be further improved.

The innovation of this paper is reflected in: (1) the teaching mode in the Internet environment is analyzed and discussed; (2) the application of fuzzy cluster analysis in general education is analyzed, aiming to pave the way for the promotion of general education in colleges and universities; and (3) the general education curriculum system of higher physical education colleges is taken as the research object, and the fuzzy cluster analysis is carried out to discuss some problems in the general education curriculum.

2. Fuzzy Clustering Method Based on Internet Environment

2.1. Teaching Mode in the Internet Environment. The classroom teaching mode in the Internet environment mainly refers to a three-dimensional teaching platform that fully utilizes Internet technology and multimedia technology in teaching activities and dynamically introduces sound, image, and text into the teaching process, as shown in Figure 1. This teaching mode is no longer the traditional teaching-centered, but emphasizes the student-centered. Teachers can no longer be the person who imparts knowledge, but should be the assistant and guide of teaching activities. This model emphasizes students’ experience and the interaction between students and the knowledge they have learned. It can stimulate students’ enthusiasm for learning and curiosity through different and individualized group discussions and can discover and solve problems independently [11]. At the
same time, in the Internet environment, students can also choose different courses according to their own abilities. The richness of teaching resources cannot be read by students, and students can find the knowledge they need and innovate in a relatively short period of time.

Among them, distance network teaching refers to a new teaching method that realizes distance education through computer and Internet technology. Compared with traditional teaching methods, distance network teaching is more convenient and more conducive to the cultivation of students’ ability to acquire, process, and process information [12].

These advantages of distance network teaching are largely inseparable from the powerful functions of computers and the Internet. Distance network teaching can not only cultivate students’ autonomous learning ability but also enhance students’ information literacy. Figure 2 shows the network structure of the distance education platform. These information literacy can be used as a means of self-learning and lifelong learning for students, and at the same time, it also lays a good foundation for the future modernization of informatization [13].

In distance online teaching, teachers still have to make courseware (word, ppt, and pdf) in the original way and teach classes on time. The only difference is that the classroom has changed from a real classroom to an online platform. It is completely possible to build a real classroom online. Students can still see the teaching content prepared by the teacher, provided they log in to the class in time.

Under the remote network teaching mode, students do not have to study knowledge in the classroom all day, but can study the courses offered at home, and also communicate with teachers and classmates. Video courses, WEB teaching materials, multimedia courseware, and so on are important means of distance network teaching. Distance network teaching breaks through the limitations of time and space and will become the mainstream in the future with the promotion of educational informatization [14].

2.2. Application of Fuzzy Clustering in General Education. According to different actual situations, a large number of fuzzy clustering algorithms have been proposed. The more representative ones are the method based on similarity relationship and fuzzy relationship, the transitive closure method based on fuzzy equivalence relationship, and the maximum support method based on fuzzy graph theory. However, these algorithms are not suitable for large-scale and high real-time demand scenarios, so they are not popular in practice. Currently, the most popular is the fuzzy clustering algorithm based on the objective function [15]. It reduces clustering into a constrained nonlinear programming problem and obtains fuzzy partitioning and clustering of data sets through optimization. This algorithm has the advantages of simple structure and wide application range. It can also be transformed into an optimization problem and solved with the help of nonlinear programming theory of classical mathematics, and it is easy to implement on a computer. Among the clustering methods based on objective function, the fuzzy average method is the most perfect and widely used one in theory [16]. The purpose of this paper is to explore the application of fuzzy clustering analysis in general education management in higher education and to carry out fuzzy clustering analysis of general education courses carried out by higher sports colleges. Problems in carrying out general education courses are also pointed out and appropriate recommendations are made.

From the perspective of mathematics, the following mathematical models can be obtained by clustering analysis of general education courses carried out by physical education colleges. Let \( A = \{a_1, a_2, \ldots, a_p\} \) be a course for all general education (called “discourse”) to be clustered, and each object (called a sample) \( a_h \ (h = 1, 2, \ldots, p) \) in \( A \) is often characterized by a limited number of parameter values. Each parameter value describes some characteristic of \( a_h \), such as the student’s level of interest in general education courses. Object \( a_h \) then appears with vector \( I(a_h) = (a_{h1}, a_{h2}, \ldots, a_{hc}) \), where \( a_{hm} \ (m = 1, 2, \ldots, c) \) is the assigned value of \( a_h \) on the \( m \)-th characteristic, and \( I(a_h) \) is called the eigenvector or pattern vector of \( a_h \). The duration and credits of general education courses are assigned, and students’ understanding of general education before and after learning general education courses is compared through fuzzy cluster analysis.
The membership relationship of sample $a_h (1 \leq p)$ to subset $A_n (1 \leq n \leq s)$ can be represented by membership function.

\[ v_{nh} = \begin{cases} 1, & a_h \in A_n, \\ 0, & a_h \notin A_n. \end{cases} \]  

Among these parameters, the membership function must satisfy condition $v_{nh} \in T_l$. This means that every kind of sample must belong to a class, and every subset must be nonempty [17]. Therefore, such cluster analysis is generally referred to as hard partitioning.

\[ T_j = \left\{ v_{nh} \in [0,1] \sum_{h=1}^{s} v_{nh} = 1, 0 < \sum_{h=1}^{p} v_{nh} < p, \forall n \right\}. \]  

Fuzzy cluster analysis is an important method of data segmentation or packet processing. It looks for valuable information from a specific dataset, and its goal is to divide a set of unclassified labeled vectors into several subsets according to certain similarity criteria, so that each subset represents the whole or specific features and attributes [18].

Thus, hard partition $T_j$ can only take values on the $s$ unit basis vectors of the unit super-$s$ cube.

\[ T_j = \left\{ v_n \in T_j \sum_{n=1}^{s} v_{nh} = 1, \forall h \right\}. \]  

Cluster analysis has been widely used in many fields, including pattern recognition, data mining, image processing, and market research. In business, clustering can help market analysts discover different customer groups from the customer base. In biology, clustering is used to deduce the classification of plants and animals, and classifying genes can also classify documents on the Web to discover information.

3. Experimental Results in General Education Management in Higher Education

Objects and Methods: This paper takes the general education curriculum system of higher physical education colleges as the research object and conducts fuzzy cluster analysis on it.
It takes 7 higher sports colleges as examples, including Shanghai Institute of Physical Education (A), Beijing Sports University (B), Chengdu Institute of Physical Education (C), Xi’an Institute of Physical Education (D), Shenyang Institute of Physical Education (E), Wuhan Institute of Physical Education (F), and Guangzhou Institute of Physical Education (G).

This paper defines comparative education from the perspective of cluster analysis and thinks that the comparative research method of cluster analysis in education is to conduct cluster investigation on two or more related things according to certain standards. It is a research method to observe and understand things through the comparison of the relationship and difference between things, so as to seek the law. This paper conducts a longitudinal cluster analysis on the goals of general education courses, the curriculum setting of general education courses, and the content of general education courses in 7 higher sports colleges and universities. The comparative analysis of the problems existing in the setting of the general education curriculum system in various higher physical education colleges has certain reference significance for the establishment of the general education curriculum system in other colleges and universities.

The questionnaire mainly surveys the sophomore, junior, and senior students of four higher sports colleges, namely Beijing Sports University (B), Shanghai Institute of Physical Education (A), Xi’an Institute of Physical Education (D), and Chengdu Institute of Physical Education (C). This paper designs a questionnaire on the current situation of the implementation of undergraduate general education courses in higher physical education colleges and adopts a random sampling method to investigate the sophomore, junior, and senior students of four higher sports colleges. Each school distributed 110 questionnaires, collected a total of 440 questionnaires, 423 were recovered, and the recovery rate reached 96.1%. SPSS22.0 software was used to sort out the collected data, excluding invalid questionnaires, including 397 valid questionnaires, and the effective recovery rate reached 90.2%.

3.1. Distribution of Credits and Hours of General Education Courses. The general education curriculum system refers to the types of disciplines and their proportional relationship established by higher physical education colleges to achieve the goal of general education. It refers to the overall curriculum system of general education courses, including the categories, modules, and credit distribution of general education courses.

Based on fuzzy cluster analysis, cluster analysis and comparison of the hours and credits distribution of general education courses are carried out, as shown in Figure 3. In general, general education courses have not received much attention in higher physical education colleges. The credits and hours of general education courses of Beijing Sport University (B) are the highest among the sports institutes, with 49 points and 748 hours, respectively. The general education courses of Guangzhou Institute of Physical Education (G) have the lowest credits and credit hours, 26 credits and 416 credit hours, respectively. Only Beijing Sports University (B) and Wuhan Institute of Physical Education (F) have more than one-third of the credits of general education courses. The general education courses of Shenyang Institute of Physical Education (E) and Guangzhou Institute of Physical Education (G) are only 31 and 26 credits. There is a big difference with other higher sports colleges, and the corresponding credits and credit hours are also very different. The general education courses of Guangzhou Institute of Physical Education (G) and Shenyang Institute of Physical Education (E) only account for 15.4% and 18.8% of the total graduate credits. The general education courses of Beijing Sports University (B) accounted for 33.2% of the total credits for graduation, the highest proportion among the seven higher sports institutions studied. Wuhan Institute of Physical Education (F) ranks second in the credit ratio at 30.5%. This is related to the early implementation of general education by Beijing Sports University and Wuhan Institute of Physical Education. In the undergraduate training plan of Beijing Sports University in 2003, it was proposed to increase the professional direction, strengthen general education, and allow students to freely choose general education courses. The share of general education credits among all credits at US. universities is: 38% at Harvard, 44% at Yale, 33% at Stanford, 41% at Columbia, and 50% at Chicago. It shows that there is still a certain gap between domestic general education and general education in foreign universities.

The credit composition of compulsory and elective courses in general education is studied using fuzzy clustering method, as shown in Figure 4. The proportion of compulsory courses in general colleges and universities is too large in general colleges and universities. Among them, Chengdu Institute of Physical Education (C) reached 91.7%. However, the proportion of elective courses closely linked to general education is relatively low. Chengdu Institute of Physical Education (C) and Shenyang Institute of Physical Education (E) only have 4 credits, accounting for only 8.3% and 12.9%, accounting for only a small proportion. The elective courses with the highest credits are Xi’an Institute of Physical Education (D) and Guangzhou Institute of Physical Education (G), with 10 credits. Wuhan Institute of Physical Education (F) has the highest percentage of credits in general education elective courses, accounting for 20.5%. From the interviews with the academic administrators, it can be learned that the reform of general education in Wuhan Institute of Physical Education had a certain relationship earlier. Wuhan Institute of Physical Education implemented the reform of general education in 2004, and it has a history of 14 years of development. The general education core courses at Harvard University account for 25% of the total credits, and the required courses at American universities account for about 60% of the total credits. Therefore, when setting up general education courses in higher physical education colleges, they should increase the proportion of credits for elective courses in general education and reduce the proportion of credits for compulsory courses in combination with the characteristics of the school’s disciplines and faculty.
3.2. Contents of General Education Courses in Higher Physical Education Colleges. Content areas of compulsory courses: compulsory courses for general education are the basic courses that students must learn as stipulated by the Ministry of Education for the purpose of achieving general education. By analyzing the contents of the compulsory courses of general education in the undergraduate training programs and teaching plans of 7 higher sports colleges, it is concluded that the compulsory courses of general education include the public courses of the whole school, and the compulsory courses offered by higher physical education colleges include two courses, university foreign language, computer foundation, situation and policy, military theory, college students’ mental health education, and others. Table 1 shows the content of compulsory courses and the distribution of credits in various colleges and universities of physical education.

As can be seen from the table, the public compulsory courses of various higher sports colleges include two courses, foreign language, computer basics, military theory, and others, which are courses prescribed by the Ministry of Education of the People’s Republic of China. There are few differences between institutions, and there is no general education curriculum that reflects the characteristics of the
school. In the two courses and foreign language courses, the proportion and credits are very high. In fact, various higher sports colleges do not regard public compulsory courses as a part of general education, but emphasize the cultivation of political quality and the improvement of foreign language ability. For the cultivation of civic quality and personal development, there is less literacy training. General education does not really start from the philosophy and goals of general education. Most courses have a strong professional knowledge background. Without the formation of a truly interdisciplinary curriculum, it cannot effectively promote students to form a correct world outlook, values and outlook on life, and cannot well cultivate a free personality, focusing on cultivating students’ basic abilities.

Content areas of elective courses: combined with the undergraduate training programs of the seven higher sports colleges surveyed, fuzzy clustering analysis is carried out. Combined with the relevant materials such as the general education elective course schedules of various physical education colleges, the overall and analysis of the content of the general education elective courses is shown in Figure 5.

From the figure, it can be seen intuitively that the number of general education courses offered by Shanghai Institute of Physical Education is the largest among the seven sports colleges, and there are 78 general education elective courses. Next is Beijing Sports University, which offers 69 general education elective courses. The Chengdu Institute of Physical Education has the fewest, with only 10 general education elective courses. The number of general education courses varies widely among institutions. Investigating the reason, through interviews with relevant education experts, it can be learned that the main reasons for the difference in the number of courses are the different levels of emphasis that schools place on general education, the differences in school teachers, and the time when schools implement general education reforms.

3.3. The Implementation and Existing Problems of General Education Courses. The goal setting of general education is not very clear: It can be seen from Table 2 that students’ understanding of general education is not high. Before studying general education courses, 64.3% of the students did not understand general education or the concept of general education, and only 4.8% of the students had a certain understanding of general education. After studying general education courses, although 47.8% of students have a certain understanding of general education, 50.6% of students still do not understand general education, which shows that higher physical education colleges do not pay much attention to general education. Through interviews with students, it is known that higher sports colleges pay more attention to the teaching of students’ professional knowledge and the cultivation of competition ability. In addition, it can be learned from the interviews with teachers that because the school does not put general education in an important position, every teacher in physical education academies is required to apply for a course. However, teachers have limited energy. In addition to teaching their own professional courses, they also need to conduct scientific research. Therefore, the attention to general courses is correspondingly reduced, and the preparation time for courses is insufficient, resulting in low teaching levels and irregular curriculum settings. Higher physical education colleges generally do not pay attention to general education, and the lack of general education concepts causes teachers and students to not understand general education courses.

The content of general education courses needs to be improved: through the questionnaire survey of the students, it was found that the students believed that the general education curriculum content of the school was unreasonable and could not meet their learning needs. Among them, 49.5% of the students believed that the general education courses could not meet their elective needs, only 15.8% of the students believed that the elective courses met their elective needs, and only 10.9% of the students believed that the elective courses offered by the school were very important. It is evident that students lack a deep appreciation of the content of liberal learning, which results in students believing that liberal learning courses are not particularly important to them.

As can be seen from Figure 6, the top 3 motivations for students to take general education courses are to obtain credits (66%), broaden their horizons and horizons (57.4%), and cultivate their own interests (56.7%). Therefore, generally speaking, students take general education courses mainly to obtain credits, broaden their horizons and vision, and cultivate personal interests and hobbies. In addition, 54.2% of students hope to improve their personal ability through the study of general education courses, and only 19.6% of students think that general education courses are helpful for finding a job. It is reflected from the side that students do not have a good understanding of general education. General education is aimed at developing students’

<table>
<thead>
<tr>
<th>School</th>
<th>Two lessons</th>
<th>Foreign language</th>
<th>Computer</th>
<th>Military theory</th>
<th>Health education</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>13</td>
<td>15</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>A</td>
<td>13</td>
<td>11</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>F</td>
<td>9</td>
<td>10</td>
<td>3</td>
<td>2</td>
<td>—</td>
<td>2</td>
</tr>
<tr>
<td>C</td>
<td>15</td>
<td>14</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>D</td>
<td>11</td>
<td>11</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>G</td>
<td>11</td>
<td>7</td>
<td>2</td>
<td>2</td>
<td>—</td>
<td>1</td>
</tr>
<tr>
<td>E</td>
<td>13</td>
<td>6</td>
<td>3</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>
overall quality and ability, not just for students to obtain credits, cultivate their own interests, and broaden their horizons.

Through the cluster analysis and comparison of students’ general education elective courses, as shown in Figure 7, the top five subject content areas for general education electives that students want to add include Economics (34.5%), Law (33.2%), Arts (32.7%), Medicine (31.7%), and Education (31.7%). It shows that the content of general education elective courses in higher physical education colleges cannot meet the learning needs of students.

Curriculum implementation has not achieved the effect of general education: through questionnaires and interviews, before the study of general courses, the three abilities students most want to improve are language communication and expression ability, logical thinking ability, and practical ability, as shown in Table 3.

Among them, 66.7% of the students wanted to improve their language communication and expression skills, and 52.8% and 46% were interested in improving their practical ability and logical thinking ability. After passing the general education courses, only 23.5% of the students made progress in logic, and 13.7% of the students improved their language communication and expression skills. Therefore, it shows that general education is not meeting the expectations of students. Through in-depth interviews with students and teachers, teachers, and students generally reflect that the effect of general education has a great relationship with the general education curriculum system. Higher physical education colleges do not design courses according to the goals of general education. General education courses lack top-down top-level design and have fewer course credits and hours, which should run through the entire four-year university, and should be carried out at the beginning of admission. In the practice of general education, most of the sports colleges are taught by teachers through individual declarations, they are then divided into different fields for students to learn according to the attributes of the courses. Therefore, the establishment of specific and delicious energy is more likely to be affected by the personal factors of teachers, and it is very arbitrary. It can be seen that general education in higher physical education colleges has not

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**Figure 5:** The number and proportion of courses in general education elective courses in physical education colleges and universities.

**Table 2:** Students’ understanding of general education before and after taking general education courses.

<table>
<thead>
<tr>
<th>How much you know about general education before studying general education</th>
<th>Number of people</th>
<th>Percentage (%)</th>
<th>How well you understand general education after taking a general education program</th>
<th>Number of people</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I do not understand at all</td>
<td>59</td>
<td>15.3</td>
<td>I do not understand at all</td>
<td>10</td>
<td>2.2</td>
</tr>
<tr>
<td>Do not know much</td>
<td>189</td>
<td>48.5</td>
<td>Do not know much</td>
<td>189</td>
<td>47.4</td>
</tr>
<tr>
<td>Generally</td>
<td>121</td>
<td>30.1</td>
<td>Generally</td>
<td>128</td>
<td>31.4</td>
</tr>
<tr>
<td>More understanding</td>
<td>21</td>
<td>4.9</td>
<td>More understanding</td>
<td>70</td>
<td>17.5</td>
</tr>
<tr>
<td>Know very well</td>
<td>4</td>
<td>1.2</td>
<td>Know very well</td>
<td>8</td>
<td>1.5</td>
</tr>
</tbody>
</table>
Figure 6: Proportion of motivation for elective general education courses in colleges and universities of physical education.

Figure 7: Percentage of students wanting schools to add general education electives.
achieved good results, and the realization of general education needs to be further improved.

Through the analysis of the general education curriculum system in colleges and universities, it can be found that the structure of general education courses in higher physical education colleges is mainly compulsory courses and elective courses, and some physical education colleges divide them into corresponding fields and modules. The general courses of Beijing Sports University and Wuhan Institute of Physical Education have corresponding fields and modules, and the setting is reasonable, which is worthy of reference and learning from other sports colleges. The general education curriculum modules of the other 6 higher sports colleges do not have clear division standards and fields.

### Table 3: Competencies that students would like to improve in general education courses.

<table>
<thead>
<tr>
<th>Ability</th>
<th>Proportion of students (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logical thinking ability</td>
<td>46</td>
</tr>
<tr>
<td>Language communication skills</td>
<td>66.7</td>
</tr>
<tr>
<td>Practical ability</td>
<td>52.8</td>
</tr>
<tr>
<td>Science and humanities literacy</td>
<td>35</td>
</tr>
<tr>
<td>Independent thinking and critical skills</td>
<td>43</td>
</tr>
<tr>
<td>Art appreciation ability</td>
<td>35</td>
</tr>
<tr>
<td>Innovation and entrepreneurship ability</td>
<td>41</td>
</tr>
<tr>
<td>Civic awareness and social responsibility</td>
<td>27</td>
</tr>
<tr>
<td>Lifelong learning ability</td>
<td>34</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
</tr>
</tbody>
</table>

4. Conclusion

Through fuzzy cluster analysis on the implementation of general education courses in higher physical education colleges, it is concluded that although there are some problems in the construction of general education curriculum system. On the whole, however, certain results have been achieved in the process of implementing general education. Among them, through investigation and research, it is known that the reform of general education courses in Beijing Sports University and Wuhan Institute of Physical Education (F) is relatively early, the curriculum training objectives are relatively specific, the division of curriculum modules is relatively reasonable, and the curriculum system construction is relatively complete. Other sports colleges can learn from in the process of implementing general education. But there are also some shortcomings. On the one hand, higher physical education colleges propose to attach importance to general education, but there is no clear general education concept as a guide, and the course offering lacks top-level design. On the other hand, due to the lack of overall planning for the general education curriculum system, sports colleges do not have a special management organization for the implementation of general education. When setting the goals of general education courses, the cultivation of students’ qualities and abilities is emphasized, but the specific qualities and abilities to be cultivated are not well reflected in the training program. In this regard, the Internet can be used to help students better learn and understand the world, especially students in higher sports colleges. The network general education course creates a free, democratic, and open educational environment for students. Schools can purchase online information resources and cooperate with well-known universities at home and abroad to develop general education courses from a global perspective. Students can learn about and master the curriculum resources of other comprehensive universities online, develop their international vision, cultivate their independent thinking ability, master the correct way of thinking, and learn to study independently. Due to the limited research time, research funds, and research capacity, the research paper has conducted research on the general education curriculum system in higher physical education colleges. However, there is no in-depth discussion and discussion on the evaluation of general education courses, which needs further research and improvement in the future.

**Data Availability**

The data used to support the findings of this study are available from the corresponding author upon request.

**Conflicts of Interest**

The authors declare no conflicts of interest.

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