Coastal atmospheric climate and political teaching of sustainable development based on GIS

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Abstract
China regards sustainable development as a new task and goal of development at this stage, which not only conforms to the concept of this new era but also meets the practical needs. Nowadays, people all over the world pay close attention to the ecological environment. Ecological problems cannot be solved only by a country or a society. China has always been a responsible country and plays an important role in the process of global sustainable development. Nowadays, the main contradiction of our society has changed. In order to meet people’s needs for life, we need to create more spiritual wealth and material wealth. In order to meet people’s demand for beautiful ecological environment, it is necessary to provide more healthy products for people. People all over the country hope to achieve sustainable development, because this is the premise of a better life. In this context, this paper studies the sustainable development and mainly studies the atmospheric climate. Through GIS technology, we can use computer to analyze the information of atmospheric climate. Nowadays, GIS technology has been applied in many aspects, such as weather forecast and forecast of meteorological disasters. The application of GIS technology in atmospheric climate can promote sustainable development.

Keywords GIS · Coastal area · Atmospheric climate · Sustainable development

Introduction
In the era of pursuing high-speed economic development, people exchange environment for economic development. Nowadays, the natural environment has been seriously damaged by people. Glaciers are melting and desertification is aggravating. The destruction of environment has brought a series of problems and triggered people’s thinking. People begin to exchange economy for environment. People generally believe that sustainable development is more and more important in education. It also deepens the concept of sustainable development. At the educational level, cultivating students with the concept of sustainable development can promote the harmonious coexistence between man and nature and promote the construction of a beautiful China. Sustainable education is not only reflected in the education of professional courses but also in the level of humanistic education, such as legal provisions and sustainable ideas. It includes not only imparting knowledge but also government’s guidance to public behavior. Before the education of sustainable development concept for students, it is necessary to cultivate the concept of sustainable development in China, so as to make the concept of sustainable development more perfect and promote the improvement of education ability of sustainable development in China. In the education of the concept of sustainable development, it is particularly important to improve the educational effect of the concept of sustainable development.

Nowadays, globalization is developing faster and faster. As a comprehensive subject, geographic information system (GIS) is widely used in all levels. Through the hardware and software of computer, the collected data can be analyzed and stored by GIS technology. Because GIS technology has powerful functions in data management and analysis, it is widely used in various industries, such as forestry, transportation, and meteorology. In recent years, GIS technology has been applied to the study of the atmosphere. GIS technology is used...
to manage the historical data of the atmosphere, divide the climatic regions according to the data analysis, and report the weather forecast. The new weather radar plays an important role in weather forecast and warning of disastrous weather, providing a lot of high-quality data (Sui et al. 2011). Using the new generation of weather radar data detection can improve the accuracy of hazardous weather forecast and enhance meteorological services and the ability to resist natural disasters. With the development of social economy, meteorological service has been paid more attention. The new generation of weather radar can continuously monitor the weather, it has high spatial-temporal resolution, so it can provide more accurate data. Nowadays, it has become a trend to use weather radar data and GIS to provide meteorological services for people to meet the needs of the government, the public, and other people.

In this paper, the author uses GIS technology to study the coastal atmospheric climate. Some suggestions on the sustainable development of new technology or new field are put forward to enrich the field of teaching and research. In this article, the author discusses and studies various problems encountered in the process of sustainable development and how to promote the education of sustainable development. In the research, a variety of disciplines are involved, and different disciplines promote the development of research in different aspects (Sun et al. 2013).

**Application of GIS technology in meteorological field**

**Application of meteorological data management in GIS**

In recent years, through the use of GIS technology to better manage meteorological data, these data can be integrated to establish a meteorological data database. GIS can provide a variety of spatial data structures, including point, line, and area data. The data can be stored and operated so that the relationship between various meteorological data can be established. GIS spatial database can be used to predict the current air pollution degree, detect the current air quality, and also manage the meteorological data. Up to now, China’s Meteorological Bureau has established the basic geographic information database and meteorological data database. In order to better observe the weather, the Meteorological Center has also established a satellite observation image database. The establishment of these databases makes the data better managed, provides the basis for people’s work, and brings better meteorological services to people.

**Application of GIS technology in meteorological disaster risk zoning**

Meteorological disasters include not only flood and high temperature but also typhoon, which is one of the main natural disasters. Meteorological disasters have brought great harm to people’s life and property safety and hindered the development of social economy. A variety of factors will produce meteorological disasters, and if it is a meteorological disaster risk, it must be the harm caused to people under the weather. The harm includes not only the harm of personal level but also the harm of property. Only in this way can we call it a kind of risk. In ancient times, people could do nothing about meteorological disasters. It cannot be predicted in time, nor can it be remedied in time when the harm occurs, which brings a lot of losses to people (Sun et al. 2009). Now, with the development of science and technology, we can assess the risk of meteorological disasters and divide the meteorological disaster areas, so that we can effectively prevent the occurrence of meteorological disasters, so as to minimize the disasters brought by the weather to people. In the process of meteorological disaster risk zoning, the use of GIS technology is of great help to the planning of disaster reduction and provides a reference for the development of defense plans (Liu and Li 2019b).

**Application of GIS technology in agroclimatic regionalization**

With the development and wide application of science and technology, a large number of science and technology have been introduced into agricultural production. Agricultural production must be based on the local conditions and the climate of the region to determine what kind of crops, so before planting crops, we must carry out a reasonable survey of the local agricultural climate; only in this way can we ensure the yield of crops and improve the quality of crops. The improvement of quality is conducive to economic growth, so as to meet people’s needs (Liu and Li 2019c). Different crops need different conditions to grow. The growth of different organisms has very strict requirements on local temperature, precipitation, and light, so farmers or technicians who master science and technology will cultivate crops suitable for local planting according to the local climate zone. In this way, the goal of making full use of natural resources and promoting economic growth has been achieved. Some farmers do not master science and technology (Li et al. 2018). They rely entirely on their own subjective consciousness when planting crops or judge which crops to plant according to the experience of the past years. In this way, it is not sure whether they can make profits, which further leads to the poverty of the people. The division of agricultural climate regions can provide some help for farmers, so that farmers can choose crops more scientifically, which is of great significance to farmers (Liu et al. 2015).

Nowadays, GIS technology has been widely used in the field of agricultural climate. In order to make agricultural products more refined, it is necessary to analyze the relevant factors of agriculture and comprehensively use various agricultural, meteorological, and topographic data to interpolate...
the surface meteorological elements of a certain region. Based on the analysis of GIS and DEM data, the agricultural climate regionalization map is formed (Wang et al. 2012). According to the conditions of different crops’ growth, select the appropriate area to plant crops.

**Application of GIS technology in weather forecast**

At the level of spatial analysis, GIS has powerful functions. In recent years, GIS plays a more and more important role in weather forecast. The application in weather forecast mainly shows the following aspects: (1) the data of each station is represented by grid. According to the different requirements, the equations are established, and then the various data information data are analyzed by using the equations, so that we can get all kinds of data data that people need. (2) In order to make weather forecast more digital, we can use the processing and display function of GIS. The forecast results of different meteorological elements can be drawn by GIS. Using the results of the analysis to get weather data, we can carry out more accurate weather forecast. (3) It can provide data information for local weather forecast by summarizing various meteorological factors such as illumination hours and temperature and analyzing the influence of terrain on weather.

**Application of GIS technology in weather modification**

Artificial weather modification is mainly through taking some artificial means to make the weather change in the direction that people want. Weather modification mainly affects precipitation and hail. Under certain conditions, in order to change the weather phenomenon in a certain place, people use artificial catalysis technology to intervene the local atmosphere to avoid disasters. In meteorological services, one of the key contents is weather modification, which is mainly manifested in artificial rainfall. In areas with severe drought, it may not rain for months. The lack of water in the soil will cause the land to dry up, which will make it impossible to plant crops and lead to famine, in order to enable people to cultivate in time and increase crop yield, artificial rainfall is adopted for local rainfall. Using GIS technology, we can manage the local information systematically, monitor the local situation, make scientific decisions, and artificially affect the local weather.

**The significance of sustainable development and political teaching**

Before carrying out a new idea, we should change people’s thinking. A long time ago, people generally believed that the environment was not important, even if it was damaged, it could be restored to its original state according to its own repair ability, so people did not consider sustainable development. However, with the development of time, due to the destruction of the environment, the woodland is destroyed, and the destruction of the environment makes the living environment of organisms lose. We can find that some of the creatures that the older generation often see are almost invisible now (Li et al. 2015). It is a difficult and long-term process to change people’s thinking, and the main way to change people’s thinking is education. To realize the sustainable development, it is necessary to carry out the education of the concept of sustainable development in the whole country. In recent years, people have a gradual understanding of sustainable development education, but there are still some misunderstandings about sustainable development education. In the process of education, sustainable development education is always at the edge of education. Many schools only put forward sustainable development education as a secondary content of a class in the classroom, and do not pay enough attention to sustainable development (Li et al. 2018a). Therefore, people do not have enough understanding of sustainable development and do not establish a scientific sustainable development system. As the concept of sustainable development is not well publicized, people’s understanding of sustainable development is insufficient. If you want to change the current situation, we need to find new ways.

If we want the education of the concept of sustainable development to go on, we must take the means of political teaching. The cultivation of the concept of sustainable development is actually determined by people’s teaching quality. The higher the teaching quality is, the easier it is to carry out the work. People’s political teaching literacy also affects the results of sustainable development education. First of all, we should add the concept of sustainable development into the basic teaching, so that people can understand the concept of sustainable development when they are young and that the concept is deeply rooted in people’s hearts (Khanal et al. 2012). Daily educational materials should include some concepts of energy conservation, emission reduction, and green consumption, so that people can form the habit of classifying garbage. So that people can practice the concept of sustainable development in the invisible.

With the development of the times, teaching is also in progress. Political teaching can reflect the characteristics of an era and reflect the needs of an era and the direction of development (Li et al. 2014; Wang et al. 2017). In the process of political teaching, we should pay more attention to the grasp of the times and carry out some targeted education according to the existing contradictions. On the one hand, it can cultivate people’s concept of sustainable development; on the other hand, it can enrich the teaching content. Political education is to make people form good ideological and moral concepts and moral quality. Through political education, people can establish their faith and form quality and good social fashion. The function of political education in cultivating talents can be used to promote sustainable development.
Materials and methods

Data acquisition

The data used in this study include administrative division data, highway layer data, and data information of some villages. These data have reliable sources, which are obtained from the national geographic information public service platform and MapInfo. By reading longitude and latitude, the geographic information layer and atmosphere layer are drawn in the form of projection (Huan 2016). The transparent layer is superimposed by science and technology, and the function of GIS is realized by control combination and control technology.

Implementation of GIS operation

Data acquisition of provincial, prefecture, and county administrative divisions and administrative stations

Find the development resources in the tianmap platform, and select the administrative division in the service options. You can find an introduction to administrative divisions and examples. The administrative division of Tiantu map can provide the name code and outline of administrative division, as well as the superior administrative division of the region. But before using this platform, you need to register and apply for key. The parameters are shown in Table 1 (parameters can be set freely according to the demand).

Realization of GIS basic operations

In the process of drawing geographic information, we must first clarify the longitude and latitude position of the visual center and the longitude and latitude range of the query area. By sliding the mouse to expand or shrink the range of latitude and longitude displayed in the area, redraw and display geographic information (Jo 2018). Add a PictureBox control in the view, the initial property is false, click the left mouse button to take a screenshot of the displayed area image, and present it in the PictureBox control. If you set the Visible property to true, you can zoom in and out of the view by moving the mouse and moving the position of the PictureBox control. When you release the mouse, the image will be redrawn and displayed according to the center point of the image, so that the zoom and drag functions can be realized.

Structure of coastal atmospheric climate GIS systems

The system has a three-level approval structure and two sets of real-time online transmission networks (Fig. 1). In the event of a network failure, the approval can be seamlessly switched. The provincial command center is equipped with a synchronous monitoring and analysis system, and by issuing the indicators, the completion status of the indicators of the lower-level departments can be monitored.

Research design

This study uses a lot of data, and the data comes from the CMISS system of the Meteorological Bureau, so the quality is guaranteed. Some obviously wrong indexes due to mechanical failures were deleted.

Inverse distance weighting ratio method

Due to high efficiency and small storage space requirements, we used the inverse distance weighting (IDW) method, which has been repeatedly used in meteorological research (Wang et al. 2018). In this experiment, if the IDW estimate is more accurate, the smoothness of the difference result will be reduced. The specific formula is as follows:

\[ Z = \frac{\sum_{i=1}^{n} P_i W_i}{\sum_{i=1}^{n} W_i} \]  

Ordinary kriging interpolation

In fact, the obtained data are combined linearly to obtain the points to be interpolated (Hu et al. 2012). This method is very different from the inverse distance weighting method, and the

| Parameters   | Required | Types  | Description                                      | Defaults        |
|--------------|----------|--------|--------------------------------------------------|-----------------|
| searchWord   | No       | String | Find keywords                                    | No default value|
| searchType   | No       | String | Query type (0, query according to code, 1, according to name) | 0               |
| needSnhTnfo  | No       | Boolean| Whether to query the next level of information  | False           |
| needAll      | No       | Boolean| Do you need all child nodes (including grandchildren) | False           |
| needPolygon  | No       | Boolean| Whether the scope of administrative division is needed | False           |
| needPre      | No       | Boolean| Whether to query all the information of the upper level | False           |
difference is mainly reflected in the common kriging interpolation method. The weighting value is determined by many factors (Liu et al. 2018c), for example, the distance between the interpolated station and the point to be measured, the spatial structure, and the location of the observation point. In the absence of bias, ordinary kriging interpolation mainly solves the problem of association between data. The specific formula is as follows:

$$Z_0 = \sum_{i=1}^{n} z_i W_i$$  \hspace{1cm} (2)$$

**Test of the estimation method of precipitation area and interpolation method**

Rainfall intervals can be classified according to rainfall. Below 10mm is the first category, gradually increasing by 14.9mm, 10mm~24.9mm is the second category, and so on, and above 250mm is the sixth category. Because the difference is a grid of 1km×1km, after classification, the number of grids of different levels of precipitation is actually the precipitation area of that level (Xie et al. 2017).

The test site is not included in the calculation of the difference. Because the assumption of this method is that the data of all detection sites are ignored, the calculation is only based on the surrounding difference source site data, and then the estimated value is compared with the actual value. Average absolute error and average relative error are used in precision comparison. The calculation method is as follows:

$$MAE = \frac{1}{n} \sum_{i=1}^{n} |P_x - P_y|$$  \hspace{1cm} (3)$$

$$MRE = \frac{1}{n} \sum_{i=1}^{n} \left| \frac{P_x - P_y}{P_x} \right|$$  \hspace{1cm} (4)$$

**Results**

**Analysis of basic data of weather radar standard format**

The standard format base data can be divided into multiple areas, and each area represents a set of information. The standard format base data consists of two parts. One is the common data block, and the other is the radial data block (Table 2). The public data block provides public information, such as task configuration. The distribution database provides information on weather radar. It includes three parts: one is the radial head and the other is the radial data head. The third is radial data.

**Drawing of radar image**

**Principles of radar image rendering technology**

In China, many experts devote themselves to the research of radar echo image rendering technology. They proposed the screen coordinate reverse check method, line segment filling method, and arc filling method. Each method has its own
characteristics. When making an image, it is necessary to fill in the dots and then modify the existing image according to its own needs. Because the scanning method of each weather radar is different, the number of the radial distance library of the scanning layer is also different. Therefore, the canvas size is determined by the distance in the radar radial direction of the elevation layer that we need to preserve the original radar data as much as possible (Xing et al. 2017). For example, the radial distance library number of the radar scanning layer is k, then the area covered by this radar image is a circle with a radius of K, and then the size of the canvas is the smallest circumscribed square of the circle as shown in Fig. 2. The coordinates of the four points on the canvas are (0, 0), (2K, 0), (0, 2K), and (2K, 2K). The range of abscissa is x~2k, and the range of ordinate is x~2k. The coordinates of the center point are (k, k). According to the triangle relationship, you can get

\[ \alpha = \arcsin \frac{PA}{OP} = \arcsin \sqrt{\frac{x-k}{\sqrt{(x-k)^2 + (y-k)^2}}} \]

The distance library of point P(x,y) is

\[ M = \sqrt{(x-k)^2 + (y-k)^2} \]

Radial data can be obtained by scanning with radar, and then the direction angle \( \lambda \) and the coverage area can be obtained. If the point P(x, y) is within the coverage, then take the M-th data of the display element in the radial data, where (0 ≤ M < k). According to the regulations of China Meteorological Administration, use Bitmap, Set-Pixel statement to fill point P(x,y) with color. After repeating all the points, the drawing can be completed.

### Table 2: Overall structure of base data of weather radar standard format

| Block               | Content                  | Byte |
|---------------------|--------------------------|------|
| Common data block   | Universal header         | 32   |
|                     | Site configuration        | 127  |
|                     | Task configuration        | 256  |
|                     | Scan configuration #1     | 255  |
|                     | ...                      | ...  |
|                     | Scan configuration #N     | 256  |
| Radial data block   | First radial             | 64   |
|                     | Radial Data Head #1       | 33   |
|                     | Radial data #1            | 1    |
|                     | ...                      | ...  |
|                     | Radial Data Head #K       | 31   |
|                     | Radial data #K            | 1    |
|                     | ...                      | ...  |
|                     | M-th radial               | ...  |

Note: N, M, and K in the table represent elevation angle, radial, and data type, respectively. I represents the data length in the radial direction.

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### Radar image drawing technology system function

In this article, the research object is a coastal city—a city. The system functions of the ground radar image include not only basic human shadow information but also six functions such as human shadow operation information and weather satellite cloud image data (Liu et al. 2018; Zhang and Li 2011), as shown in Fig. 3.

#### Three-dimensional echo display function of radar data

The system uses radar data and displays these data through the three-dimensional display function. Calculate and generate a three-dimensional effect model according to the specified echo intensity value (Zhang et al. 2009). By changing the specified value, the model can be rendered in different colors and the size of the model can be changed (Fig. 4).

#### Rainfall monitoring data display function

According to the existing database system, precipitation data at different times in all regions can be obtained. These data can be displayed through contours or color patterns (Fig. 5).

### Analysis of interpolation results

In 2018, there were 8 local rainstorms in a city, and the 8 regional rainfall data were spatially interpolated based on the precipitation data. If the area has continuous precipitation for more than 2 days, then the calculation method is to add up the data of each rainfall station. In the detection process, 100 sites are selected as the sites to be tested, and the rest are
interpolation sites (Gao et al. 2012). According to formula (2) and formula (3), the results of each measurement are evaluated, and the specific results are shown in Table 3 and Fig. 6. According to the data in the table, we can find that the data calculated using the inverse distance weighting method and the ordinary kriging interpolation method are not much different, and the error is relatively small, so we believe that the accuracy of the two methods is higher. However, there was a large error between July 1 and July 3. This is because during this partial rainfall process, fewer meteorological stations were selected, which resulted in the accuracy of the two methods being affected by the difference between the interpolation stations. The influence of the distance between the two then produced a relatively large error.

**Analysis of the precipitation area during the regional rainstorm weather process**

After the spatial interpolation calculation of the station precipitation in the partial rainstorm process, the area of different precipitation intervals is calculated according to the rainfall level. In the representation, the estimated area of different grades of precipitation and their proportion in the area of the city are given (Chang et al. 2019). The 8 partial rainstorms in a city in 2018 were mainly distributed in the northwest, south, and southeast (Fig. 7). According to the data in Table 4, it can be found that there were four localized rainstorms covering more than 10% of the area. From a holistic perspective, between July 7 and 11, the area of local rainfall is the largest, and because it lasts the longest, the precipitation is also the most. The precipitation in these few days has brought more serious disasters to people. In this rainfall, the range of precipitation exceeding 50 is larger and the proportion is the highest. After the above analysis, we can find that compared with the data of
the rainstorm station, the rainstorm area is more scientific in reflecting the impact of rainstorm weather.

**Characteristics of atmospheric circulation in coastal cities**

According to the interannual changes in the number of thunderstorm days in the inland and coastal areas of a city from 1961 to 2019, the five years with the most thunderstorm days and the least five years were selected as the weak and strong years of thunderstorm activity. The strong years were 1986, 1991, 2005, 2013, and 2018. The weak years are 1988, 2007, 2011, 2014, and 2017. Discuss the difference in atmospheric circulation between strong thunderstorm years and weak thunderstorm years based on the synthetic test method (Liu et al. 2019).

It can be seen from Fig. 8a that in a strong year of thunderstorm activity, the temperature in coastal and inland cities is relatively low. The inland area is lower than the coastal area (Zhang et al. 2013). This may be because thunderstorms occur more frequently in inland urban areas. In the year of weak thunderstorm activity (Fig. 8b), the temperature in the entire region is relatively high, but at the same time, the inland is still lower than the coastal.

| Process time | Average absolute error/mm | Average relative error/% |
|--------------|---------------------------|-------------------------|
| May 21–22    | 10.742                    | 4.610%                  |
| June 29–30   | 8.331                     | 3.31%                   |
| July 1–5     | 13.223                    | 4.29%                   |
| July 7–11    | 8.570                     | 3.51%                   |
| July 26–27   | 10.881                    | 4.89%                   |
| August 1–3   | 6.723                     | 2.74%                   |
| August 21–22 | 7.354                     | 3.04%                   |
| September 4–6| 8.112                     | 3.17%                   |

There is a strong correlation between the temperature near the ground and the sensible heat flux on the ground. According to the sensible heat flux of a city in strong years and weak years of thunderstorm activity, we can find that in strong years (Fig. 9b) except for the southeast coastal areas,

![Fig. 5](image1) **Rainfall monitoring data display**

**Fig. 6** Error analysis of interpolation results of IDW and ordinary kriging
the sensible heat flux is negative, which means that the temperature is relatively low and the atmosphere heat transfer to the ground is also relatively low (Miao et al. 2011). There are fewer thunderstorms in coastal urban areas than inland, so the southeast coastal areas of Dalian and Dandong transport heat to the atmosphere. In a weak year (Fig. 9b), the difference in sensible heat flux in the entire region is negative, so the atmosphere transports heat to the ground.

As shown in Fig. 10, the contour is the difference between the average height field of 500 hPa from 1961 to 2012, in hPa; the arrow is the wind vector, and the unit is m·s$^{-1}$.

**Discussion**

Sustainable development cannot be accomplished overnight. It is a long-term process. To achieve sustainable development, requires the joint efforts of all people. In such an environment, if we want to promote coordinated development, we must carry out education on sustainable development. Nowadays, many regions have carried out education on sustainable development, but the effect is not obvious.

**Necessary factors for the sustainable development of political teaching in universities**

**Consistency goals**

Innovative ideological and political education and sustainable development education have the same purpose. But they have certain differences in the overall system, so they must achieve their goals according to their own differences. Under such circumstances, pursuing multiple goals will lead to conflicts between systems, which is not conducive to balancing the whole. Therefore, to transform multiple goals into the same goal, and then achieve the overall goal, only in this way can we give full play to the role of each system. Xinran innovative ideological and political education and sustainable development education focus on different goals, but the fundamental goals and essential tasks of the two are actually the same. The

| Process time   | 25–49.9 mm | 50–99 mm | 100–249.9 mm | >250 mm | >50 mm |
|----------------|-------------|----------|--------------|---------|--------|
| May 21–22      | 48,655      | 41,219   | 10,364       | 101     | 10.631% |
| June 29–30     | 58,344      | 22,605   | 822          | 0       | 4.824%  |
| July 1–3       | 99,589      | 49,276   | 26,954       | 334     | 15.763% |
| July 7–11      | 194,174     | 117,923  | 28,134       | 12,087  | 32.542% |
| July 26–27     | 36,485      | 15,896   | 1142         | 0       | 3.501%  |
| August 1–3     | 68,823      | 45,504   | 16,435       | 7       | 12.743% |
| August 21–22   | 39,989      | 18,620   | 1625         | 0       | 3.51%   |
| September 4–6  | 86,829      | 35,937   | 3474         | 0       | 12%     |
purpose of implementing both types of education is to enable students to develop in a healthy and comprehensive manner, and this goal promotes the coordination of the two.

Open system

Only opening up is conducive to access to resources, and shutting down the country will definitely lead to information backwardness. This is the experience and lessons learned since ancient times. Only an open system can obtain external resources and understand external information (Cao et al. 2016). Therefore, when colleges and universities realize the concept of collaboration, they must build an open system to allow information and resources to flow freely and break the closed situation. In an open system, the key to competing system capabilities is the sharing and configuration optimization of resources and information. Political teaching and education for sustainable development must be realized in an open system, not closed, and presented to people in an open form (PRC 2009). Openness is reflected in all aspects, such as communication between teachers, mutual help between students, dialogue between teachers and students on an equal footing, and openness in the content, themes, and methods of education (Zhang et al. 2014).

The role of nonlinearity

The concept of operational collaboration is mainly through nonlinear systems. Through nonlinear systems, the respective systems are independent and related to each other. When they play a role, they show different characteristics and linear relationships. Therefore, the synergy in the system is not the sum of the functions of all subsystems. The role of each subsystem in the synergy far exceeds its own functions, because each subsystem has its own role, and each subsystem can interact with each other to achieve 1+1>2. Up to now, political teaching and sustainable development education have been combined for more than 30 years, and relatively good results have been achieved in these 30 years (NCMSA 2017). The two kinds of education achieve effects that cannot be achieved by each other alone through nonlinear characteristics.

Political teaching strategies for sustainable development in universities

Realize knowledge sharing communication

We need to increase our understanding of political teaching and sustainable development education and analyze the
relationship between the two types of teaching and the differences between them. Realize knowledge sharing in a collaborative manner. From a theoretical perspective, political teaching and education for sustainable development are different in many aspects, such as theoretical basis and evaluation criteria. They also belong to different disciplines, but there is a connection between the two because they are under the same education system. Therefore, political teaching and sustainable development education can be unified. The function of each teaching is not absolute (Bruna et al. 2019). We cannot avoid the sociality in political teaching, which is also determined by the nature of political teaching. Therefore, in the political teaching and sustainable development teaching in colleges and universities, it is necessary to conduct in-depth communication and understanding of educational concepts and teaching content.

Optimize the distribution of educational resources between the two

Combining political teaching with sustainable development education focuses on sharing knowledge and rational allocation of resources. Only the reasonable use of teaching resources can improve the effectiveness of teaching (Piao et al. 2019). If teaching resources are allocated reasonably, the purpose of teaching can be achieved and the role of education in different stages can be brought into play. Therefore, in the process of teaching, colleges and universities must combine political teaching with sustainable development education. In the teaching process, the teaching content needs to be developed for all students, and all students must participate. There must be specialized personnel to guide the work of the two and use various teaching resources to promote the development of education.

The two achieve synchronous and optimized education

In the process of combining political teaching and sustainable development education, the functions of the two can be optimized, although in the past 30 years, research in this area has made achievements. But how to use research results to improve the current teaching situation to help the development of political teaching and sustainable teaching still has certain problems (Palchik 2003). In the process of education, people tend to pay more attention to the production of knowledge, but not too much attention to the use of knowledge diffusion or the transfer of knowledge. In order to change the current situation, the goals and content of the two should be optimized during the teaching process. In the teaching process, the teacher must strictly demand the students and at the same time meet the students’ psychological needs. Nowadays, the main reason why there are still problems in teaching is that students are relatively rigid in learning knowledge. In real life, they do not rely on the knowledge they have learned but only based on life experience. This is due to the fact that students only focus on theory and not practice of. Therefore, if you want to solve the current problems, you must let teachers get close to the actual situation, meet the needs of students, and combine the content of education through the knowledge of psychology and pedagogy (Rezaei et al. 2015). In the process of sustainable development education, universities should also pay attention to the actual situation and carry out practical activities according to the local environment.

Conclusion

If the concept of sustainable development is to be deeply rooted in the hearts of the people and to establish a more
harmonious relationship between man and nature, it is necessary to promote a culture of sustainable development in the whole society. Therefore, political education for sustainable development is essential. The cultivation of the concept of sustainable development does not happen overnight, it takes a lot of time, and different regions have different status quo. Teaching content and methods should be adjusted according to local needs. In the process of teaching, we must use science and technology to find new methods. In sustainable development, the study of atmospheric climate is very important. And GIS technology is also one of the more advanced science and technology nowadays. Organize and analyze data through GIS technology, apply GIS technology in the field of atmospheric climate, and provide data support for people to conduct atmospheric climate research. The use of GIS technology can transmit disaster information to people in a timely manner, so that the meteorological department can monitor the weather more accurately and reduce the losses caused by disasters as much as possible. The use of GIS technology can promote the research of atmospheric climate, and at the same time provide a certain reference for sustainable development. Based on the reality, if we want to combine political education with sustainable development under GIS technology, we must carry out educational activities. Integrate their advantages according to the technologies and methods of both parties to produce synergy. This is also the focus of this article.

Declarations

Conflict of interest The author declares no competing interests.

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