Active components of mountain soil based on clustering algorithm and evaluation of Internet English teaching

Ruolin Shi & Ran Cui

Abstract
According to the ICPP report, by the end of this century, global temperature will rise, leading to sea level rise and frequent extreme weather conditions, and ecosystem services and biodiversity decline, threatening global food supply and human safety and health. Soil organic carbon is the largest carbon pool in terrestrial ecosystems and plays an important role in global greenhouse gas balance. Enzymatic reaction is the rate-limiting step of SOC degradation. Therefore, it is necessary to understand the heating characteristics and the binding characteristics of SOC and soil enzymes. This relationship is very important for soil carbon sequestration and emission reduction. On this basis, combined with the adaptive weighted data fusion technology, this paper uses the clustering algorithm to optimize the dual sensor cluster to study the active components of mountain soil. With the development and popularization of the Internet, the Internet has become an important part of students’ study and life. A network learning platform can make smartphones become an important learning tool, so that students can learn new methods and teachers can provide new ideas and models of English teaching, and combine information technology to improve the efficiency of English teaching, thus greatly improving the students’ interest in learning. In this context, the traditional teaching evaluation method should be changed, and students should be regarded as the core part of classroom evaluation, so that teachers can have a more complete understanding of students, pay attention to students’ personal needs, and achieve the goal of obtaining high-quality education. Therefore, this paper analyzes how to effectively evaluate English teaching according to informatization, and puts forward several effective strategies.

Keywords Clustering algorithm · Mountain soil · Active ingredient · Internet · English teaching evaluation

Introduction
Soil enzymes are biocatalysts for the depolymerization of SOC and contribute to the degradation of SOC. Soil enzymes are also sensitive to temperature. Therefore, the temperature sensitivity of soil enzymes directly affects the decomposition of carbon, leading to global warming (Zeri et al. 2019). It is particularly important to study the temperature sensitivity of soil enzymes and the degradation of SOC related to carbon sequestration. In view of this, this paper selected farmland soils from various typical climatic regions in China, and used micro cultivation experiments to study the response of soil enzymes and the degradation of SOC to warming, as well as the relationship and mechanism differences between them (Liu 2012). Participating in the effective use of soil carbon and regulating greenhouse gas emissions to the environment is an important theoretical basis for formulating appropriate agricultural management measures, increasing soil carbon sequestration and reducing carbon loss. At the same time, this paper proposes an optimized clustering algorithm for data processing. Many traditional clustering algorithms do not consider the average distance between cluster heads when selecting cluster heads, resulting in higher power consumption and shorter network life. Simulation results show that compared with the latest eeu and mrce technologies, this method can significantly reduce energy consumption and prolong service life (Mahanta et al. 2013). With the development of mobile...
Internet, the mobile phone has become a very important part of people’s life. People can use mobile phones for entertainment, communication, and consumption (Medina et al. 2010). It also makes a lot of people in the crowd bow to mobile phone control. In college English teaching, the effect of English teaching is not very satisfactory; students are usually not interested in English (Ramakrishnan 2001). But I am very interested in the Internet. Teachers can use the network learning platform to improve students’ interest in learning. By constantly trying new things and providing information for students, students can learn English more actively. Self-learning resources and methods can make students study actively and strengthen their learning. An online learning platform enables teachers to better monitor and manage students’ learning situation, master students’ learning situation, and make targeted learning plans (Pal et al. 2015). Teaching itself is not the transfer of knowledge between teachers and students, but whether it can stimulate students’ strong interest in learning and really mastering knowledge.

Classroom assessment is an important teaching method, which can guide students’ learning and limit their improper behavior. As an intermediate step of students’ English learning, English teaching cannot be separated from assessment and teacher guidance (Prathipati et al. 2019). Of course, in the context of information, the demand for English courses is also higher and higher. Teachers must evaluate English teaching effectively according to the development of the information age, find out the learning gap in time, and take effective measures to improve it, so as to improve students’ learning efficiency (Rajeevan et al. 2008).

Materials and methods

Selection of soil samples for test

The test soil samples were collected between March 2020 and May 2020, and the basic information about the sample land is given in Table 1. For each site, this paper randomly selects 6 repeat sites; each site is about 10 m × 10 m, then 10 subsamples are taken from each site and mixed into one soil sample. After collection, the stones and roots are removed and then put back in the laboratory in a portable refrigerator. After passing a 2-mm sieve, it is packed and stored (Rangarajan and Sant 2004). Part of it is −20 °C in our refrigerator, for subsequent culture experiments and determination of microbial community composition; the other part is air-dried to determine the basic physical and chemical properties.

The basic physical and chemical properties of soil are determined by conventional methods, and the specific data are shown in Table 2.

Experimental methods

Soil enzyme method: 100 ml deionized water was added to 1000 g soil sample to make a suspension. After ultrasonic treatment for 2 min in the low-energy ultrasonic equipment, the slurry was placed on the magnetic stirrer for stirring. This condition run through the whole research process of the sample, and then 50% was added to the 96-well microtitration plate μL suspension, 100 μL substrate solution, and 50 μL mixed under 0, 10, 20, 30, and 40 °C. After incubation in the dark, the fluorescence values were measured at 365 nm and 450 nm by microplate reader. The substrate concentration of five soil enzyme activities for C, N, and P cycling was 200 μM. The incubation time was 4 h (Sen Roy and Balling 2004). When the kinetic parameters were determined, the substrate concentrations were as shown in Table 3, and the concentration gradients were 0, 10, 20, 50, 100, 200, and 500 μM. The incubation time was 4 h when the substrate concentration was 200 μ. After incubation for 1, 2, 3, and 4 h, the thermodynamic parameters and fluorescence values were measured, and then the characteristic parameters of enzyme activity were calculated (Valdez-Cepeda et al. 2012).

Cluster head optimization clustering algorithm design

The method in this paper uses two criteria to allocate the waiting time, that is, to allocate a shorter waiting time for the higher power nodes and a longer waiting time for the lower power nodes, and to select the node whose timer expires first as the temporary cluster head of the cluster.

The average energy of node i is given by formula (1):

\[ E(i) = \begin{cases} \frac{1}{k} \sum_{n=1}^{k} E(i), & k < 0 \\ 0, & k = 0 \end{cases} \]  

(1)

The delay value based on energy is formula (2):

\[ WT(s_i) = \frac{E(s_i)}{E(i)} \]  

(2)

The formula for calculating the trust value of a node is as follows (3):

\[ TV_{\text{nodes}} = \frac{N_{\text{FD}}}{N_{\text{REC}}} \]  

(3)

The head node of the cluster is selected according to the degree and capacity of the node. The average nodal degree \( n \) is formula (4):

\[ d_{\text{mean}}(N) = \frac{1}{n} \sum_{n=1}^{N} d(n) \]  

(4)
The minimum node degree is defined as formula (5):

\[ d_{\text{min}} = \min \{d(n)\} \quad (5) \]

Compared with EEUC, \( d_{\text{min}} \) and \( d_{\text{mean}} \) give more effective results. Node degree reduces the total communication cost of cluster head selection and prolongs the overall network lifetime. Each shared node belongs to only one cluster, and minimizing the number of clusters can maximize the average cluster size, and the densely deployed extended node is selected as the cluster head.

**Calculation of soil enzyme activity**

The formula for calculating soil enzyme activity is as follows: formulas (6), (7), (8), and (9):

\[ A_b = F^*V/(e^*V_1 + t^*m) \quad (6) \]

\[ F = (f-f_b)/q-f_s \quad (7) \]

\[ e = f_r/(C_s*V_2) \quad (8) \]

\[ q = (f_q-f_b)/f_r \quad (9) \]

where \( A_b \) is the activity of soil enzyme, \( F \) is the corrected value of sample fluorescence, \( V \) is the total volume of the soil sample suspension, \( V_1 \) is the volume of the sample suspension added to each well, \( t \) is the incubation time in the dark, \( m \) is the mass of the soil sample, \( f \) is the fluorescence value read by the microplate reader, \( f_b \) is the fluorescence value of the blank control, \( q \) is the quenching coefficient, \( f_s \) is the fluorescence value of the negative pore control, \( e \) is the fluorescence release coefficient, \( f_r \) is the reference standard of the micro fluorescence value, \( C_s \) is the concentration of the reference standard in the micropore, \( V_2 \) is the volume of the added standard sample, and \( f_q \) is the fluorescence value of the standard micropore during quenching (Valle et al. 2013).

**Results**

**Analysis of enzyme active components in mountain soil**

Figure 1 shows the activity of soil enzymes in the studied soil at different temperatures, which shows that the activity of soil

| Sample point | Abbreviation | Climate zone | Position | Soil type | Annual average (°C) | Annual rainfall (mm) | Altitude (m) | Crop types |
|--------------|--------------|--------------|----------|-----------|---------------------|----------------------|--------------|------------|
| Heilongjiang | HLJ          | Cold temperate zone | 45° 41’ 54” N 126° 49’ 07” E | Black soil | 3.6                | 530                  | 155           | Corn       |
| Xizang       | XZ           | Alpine plateau | 29° 27’ 17” N 90° 57’ 17” E | Fluvo soil | 5.2                | 355                  | 3610          | Highland barley/corn |
| Liaoning     | LN           | Cold temperate zone | 41° 33’ 49” N 123° 22’ 16” E | Brown earth | 7.5                | 533                  | 45            | Corn       |
| Shaanxi      | SX           | Warm temperate zone | 34° 18’ 04” N 108° 04’ 04” E | Loam | 13.5               | 642                  | 325           | Corn/wheat |
| Hunan        | HuN          | Subtropical     | 26° 01’ 12” N 110° 21’ 00” E | Red earth | 18.0               | 1296                 | 120           | Corn       |
| Hainan       | HN           | Tropical        | 19° 27’ 01” N 110° 41’ 03” E | Lateritic red soil | 23.9               | 1806                 | 18            | Corn       |

| Test soil | Field capacity | Clay particle | Powder particle | Sand grains | pH | Organic carbon | Total nitrogen | Alkali hydrolyzed nitrogen | Available phosphorus | Available potassium |
|-----------|----------------|---------------|-----------------|-------------|----|----------------|-------------------|------------------------|---------------------|---------------------|
| HLJ       | 41.16          | 24.29         | 28.34           | 47.37       | 5.56 | 21.70         | 1.70             | 119.70                 | 67.86               | 212.30               |
| XZ        | 26.32          | 20.12         | 16.09           | 63.79       | 7.85 | 7.87          | 0.61             | 47.25                  | 11.87               | 71.13                |
| LN        | 46.87          | 28.29         | 24.25           | 47.75       | 4.99 | 16.08         | 1.11             | 113.52                 | 43.60               | 192.30               |
| SZ        | 42.74          | 36.26         | 46.33           | 17.41       | 7.93 | 9.03          | 0.49             | 56.12                  | 6.80                | 185.63               |
| HuN       | 40.00          | 42.42         | 30.31           | 27.27       | 4.72 | 10.09         | 0.81             | 86.45                  | 8.04                | 100.00               |
| HN        | 57.93          | 46.29         | 30.21           | 23.50       | 4.46 | 17.35         | 1.50             | 147.35                 | 309.04              | 155.60               |
enzymes in the range of 0 to 40 °C warming will increase soil enzyme activity in the range of C. As shown in Fig. 1, the enzyme activity is interrelated, and the cycle of carbon, nitrogen, and phosphorus needs to be improved.

As shown in Fig. 2, the effect of temperature on the average value of various enzymes in each region is consistent with the response of enzyme activity in a region to temperature, and the enzyme activity increases with the increase of temperature. The regression equation showed that the order of temperature response of each enzyme was as follows: CBH > NAG > BG > ACP > BX, and the rate constant \( K \) was 5.24 \( \times 10^{-2} \), 5.01 \( \times 10^{-2} \), 4.56 \( \times 10^{-2} \), 4.13 \( \times 10^{-2} \), and 4.10 \( \times 10^{-2} \).

Environmental measurement of soil enzyme activity may enable us to better understand the migration of nutrients containing carbon, nitrogen, and phosphorus and their relationships, as shown in Table 4.

Except for Hun, the ratio of Cenz:Nenz decreases with increasing temperature. As the temperature increased from 0 to 40 °C, the ratio of HLJ, XZ, LN, SX, and HN decreased by 7.55%, 10.46%, 18.72%, 12.03%, and 22.16%, respectively. Except for HN, the Cenz:Nenz ratio was greater than 1, indicating that microorganisms secreted more enzymes related to the carbon cycle to meet their own carbon needs. The Cenz:Nenz ratio of HN increases from 0 °C to 40 °C, indicating that microbial growth changed from carbon limitation to nitrogen limitation with the increase of temperature. With the temperature increasing from 7.34 to 22.99%, the ratio of Cenz:Nenz increases in all regions, and the ratio of Cenz:Nenz increases by 22.99% in the HN region. With the increase of temperature, the ratio of Cenz:Nenz increases from 1.53 to 11.37%, which is less than the increase of the Cenz:Nenz ratio.

**Analysis of soil enzyme dynamic characteristics in the mountainous area**

Figure 3 shows the change of \( K_m \) of enzymes related to the cycling of carbon, nitrogen, and phosphorus in soil with temperature, which depends on the temperature in different climatic regions. This indicates that \( K_m \) values range from 31.58 to 361.37 \( \mu \)mol g\(^{-1} \) h\(^{-1} \), and the \( K_m \) value is usually 0 °C which is the lowest; in the same soil, the response of soil enzymes to temperature is different in different \( K_m \). In short, the response of \( K_m \) to temperature is more complex. The main characteristics of \( K_m \) are as follows: decrease, increase, first increase, and then decrease, and it does not change with the increase of temperature. This is due to the different soil enzymes and sampling sites, as well as the differences of microorganisms to adapt to different environmental conditions.

Figure 4 shows that under different climatic conditions, the \( V_{max} \) of enzymes related to the cycling of carbon, nitrogen, and phosphorus in soil increases with the increase of temperature, and the \( V_{max} \) values range from 5.01 to 2581.44 nmol g\(^{-1} \) h\(^{-1} \). The \( V_{max} \) of BG, BX, and CBH were 606.19, 72.60, and 148.05 nmol g\(^{-1} \) h\(^{-1} \) in HLJ, 2583.44 nmol g\(^{-1} \) h\(^{-1} \) in VNmaxbx, and HLJ and HN in NAG, and the rest were less than this. The \( V_{max} \) of two sites (\( V_{max} \) of different soil enzymes) had different responses to temperature (0 °C to 40 °C). The increases of BG, BX, CBH, NAG, and ACP were 2.65–5.43, 3.68–6.03, 4.24–11.22, 2.72–4.14, and 1.32–8.36 times, respectively. Under different climatic conditions, the \( V_{max} \) of the enzyme had different reaction degrees to the same temperature. For example, \( V_{max} \) of HLJ, XZ, LN, SX, Hun, and HN of BG increased by 5.43, 4.62, 3.55, 3.77, 2.68, and 2.65, respectively. Under different climatic conditions, \( V_{max} \) of BG and \( V_{max} \) of BX, CBH, NAG, and ACP were HLJ, HLJ, HLJ, HN, and LN, respectively.

The correlation analysis shows that BmaxBG is only MAT, independent of other factors, and has power function relation with mat, which increases with the decrease of MAT (Table 5).

In addition, it was found that vmaxbx and CBH were not related to soil physical and chemical properties and climatic factors. The \( V_{max} \) of NAG was positively correlated with TN and AP. The \( V_{max} \) of ACP was positively correlated with SOC, TN, and AP, but not with other factors.

The variation of \( V_{max}/K_m \) with temperature is usually divided into two stages: \( V_{max}/K_m \) remains unchanged at

---

**Table 3** Substrate and concentration for different functional enzymes

| Enzyme       | Abbreviation | Enzyme function                     | Substrate                              | Substrate concentration |
|--------------|--------------|-------------------------------------|----------------------------------------|-------------------------|
| Beta-glucosidase | BG          | Breaks down cellulose into glucose  | 4-Methylumbelliferone-β-β-glucosidase  | 0–500 μM                |
| Xylanase     | BX          | Breaks down hemicellulose into xylose | 4-Methylumbelliferone-β-β-pyranose anhydride | 0–500 μM                |
| Cellobiohydrolase | CBH        | Breaks down cellulose into disaccharides | 4-Methylumbelliferone-N-acetyl-β-glucosidase | 0–500 μM                |
| N-Acetyl glucosidase | NAG    | Breaks down chitin into N-acetylglucosamine | β-β-Glucoside  | 0–500 μM                |
| Acid phosphatase | AcP        | Hydrolysis of organophosphorus to phosphate | 4-Methylumbelliferone-phosphate | 0–500 μM                |
low temperature, while $V_{\text{max}}/K_m$ increases or remains unchanged at high temperature. For example, when the ACP of sampling point LN is between 0 and 10 °C, the $V_{\text{max}}/K_m$ value remains unchanged between 20 and 40 °C. At C, it gradually increases. At low or high temperature, $V_{\text{max}}/K_m$ remained unchanged, indicating the ability of the enzyme to adapt to temperature. Except for BX at XZ, the $V_{\text{max}}/K_m$ values of soil enzymes relative to carbon, nitrogen, and phosphorus cycles were higher than $V_{\text{max}}/K_m$ values at high temperature stage. In addition, the $V_{\text{max}}/K_m$ response of different soil enzymes to temperature was also different. The $V_{\text{max}}/K_m$ of the enzymes related to the carbon, nitrogen, and phosphorus cycling in the studied soil ranged from 0.05 to 26.59 s$^{-1}$, and the $V_{\text{max}}/K_m$ value was the lowest when it was 0, as shown in Fig. 5. The maximum $V_{\text{max}}/K_m$ is determined by acphlj at 40 °C. The maximum increase of $V_{\text{max}}/K_m$ is nagsx, which is similar to 0 °C, 40 °C the value of $V_{\text{max}}/K_m$ increases by 12.02 times at C. For the same enzyme, the reaction of different $V_{\text{max}}/K_m$ points to temperature is different. For example, in NAG, the order of $V_{\text{max}}/K_m$ at different points is SX > HN > LN > XZ > HJ > HuN.

Figure 6 shows that there is a very significant linear correlation between $V_{\text{max}}/K_m$ and $V_{\text{max}}$, indicating that $V_{\text{max}}$ is the main control factor of $V_{\text{max}}/K_m$. $V_{\text{max}}/K_m$ and the consistency of the correlation between $V_{\text{max}}$ and soil physical and chemical properties and climatic factors can also be indirectly explained by $V_{\text{max}}/K_m$, which is closely related to $V_{\text{max}}$.

In addition, $V_{\text{max}}/kmacp$ was the largest among the enzymes related to carbon, nitrogen, and phosphorus cycling, which was much higher than that of the other four enzymes, and there was no significant difference in $V_{\text{max}}/K_m$ between deaths. The other four enzymes are shown in Fig. 7. Through the linear approximation, it was found that the $V_{\text{max}}/K_m$ of each sampling point and the average $V_{\text{max}}/K_m$ of each sampling point had a very significant correlation with soil enzyme activity, which indicated that $V_{\text{max}}/K_m$ could well characterize the soil activity.
A ss h o w ni n F i g . 8, under different climatic conditions, the temperature sensitivity $V_{\text{max}}$ of enzymes related to carbon, nitrogen, and phosphorus cycling in soil ranged from 1.08 to 2.48, indicating that temperature increase would increase $V_{\text{max}}$ and the maximum value of $V_{\text{max}}$-$Q_{10}$ at the sampling point. The value of $V_{\text{max}}$-$Q_{10}$ decreases with the increase of temperature; for example, the CBH of XZ sampling point changes from 0 to 10 °C 2.37 down to 30–40 °C 1 19, reduced by 50%. The $V_{\text{max}}$-$Q_{10}$ of various soil enzymes also decreased with the increase of temperature.

| Enzyme ecometrics | Temperature (°C) | HLJ | XZ | LN | SX | HuN | HN |
|-------------------|-----------------|-----|----|----|----|-----|----|
| $C_{\text{caz}}:N_{\text{caz}}$ | 0 | 1.41 | 1.20 | 1.38 | 1.31 | 1.31 | 1.17 |
| 10 | 1.41 | 1.25 | 1.25 | 1.25 | 1.33 | 1.05 |
| 20 | 1.37 | 1.28 | 1.16 | 1.26 | 1.43 | 0.93 |
| 30 | 1.34 | 1.17 | 1.11 | 1.11 | 1.30 | 0.88 |
| 40 | 1.30 | 1.07 | 1.12 | 1.15 | 1.28 | 0.91 |
| $N_{\text{caz}}:P_{\text{caz}}$ | 0 | 0.57 | 1.13 | 0.56 | – | 0.50 | 0.43 |
| 10 | 0.61 | 1.02 | 0.63 | – | 0.49 | 0.56 |
| 20 | 0.67 | 1.07 | 0.69 | – | 0.52 | 0.65 |
| 30 | 0.68 | 1.13 | 0.71 | – | 0.58 | 0.71 |
| 40 | 0.68 | 1.29 | 0.71 | – | 0.60 | 0.70 |
| $C_{\text{caz}}:P_{\text{caz}}$ | 0 | 0.81 | 1.35 | 0.77 | – | 0.66 | 0.51 |
| 10 | 0.86 | 1.27 | 0.79 | – | 0.65 | 0.59 |
| 20 | 0.92 | 1.38 | 0.80 | – | 0.74 | 0.60 |
| 30 | 0.91 | 1.31 | 0.89 | – | 0.75 | 0.63 |
| 40 | 0.88 | 1.39 | 0.80 | – | 0.77 | 0.64 |

As shown in Fig. 8, under different climatic conditions, the temperature sensitivity $V_{\text{max}}$ of enzymes related to carbon, nitrogen, and phosphorus cycling in soil ranged from 1.08 to 2.48, indicating that temperature increase would increase $V_{\text{max}}$ and the maximum value of $V_{\text{max}}$-$Q_{10}$ at the sampling point. The value of $V_{\text{max}}$-$Q_{10}$ decreases with the increase of temperature; for example, the CBH of XZ sampling point changes from 0 to 10 °C 2.37 down to 30–40 °C 1 19, reduced by 50%. The $V_{\text{max}}$-$Q_{10}$ of various soil enzymes also decreased with the increase of temperature.

![Fig. 3](https://example.com/fig3.png) $K_m$ of enzymes related to carbon, nitrogen, and phosphorus cycling at different temperatures

© Springer
In order to meet the needs of open education and different groups of people to learn English, distance learning has re-formed the English curriculum from the beginning (Ashok and Saji 2007). Based on modern multimedia technology, an English course is a combination of online and offline teaching methods; that is, an online computer and the Internet provide the latest technology-driven offline course learning platform in the form of face-to-face training. However, there are still many problems in distance learning English, mainly in the following four aspects.

The traditional teaching concept is solidified, and “emphasizing teaching and neglecting learning” is dominant

It is difficult for part-time students to go to school as well as full-time students. In addition, students’ poor English level will lead to low attendance rates of classroom courses. Because teachers and students are actually separated, it is difficult to control the learning process of students and teachers lack research on students’ specific

### Table 5  Correlation of $V_{\text{max}}$ with soil physical and chemical properties and climatic factors

| Soil enzyme | $\text{pH}$ | Organic carbon | Total nitrogen | Alkali hydrolyzed nitrogen | Available phosphorus | C/N ratio | Clay particle | Average annual temperature | Annual rainfall |
|-------------|--------------|----------------|----------------|----------------------------|----------------------|-----------|---------------|---------------------------|----------------|
| BG          | 0.429        | 0.314          | 0.371          | 0.086                      | 0.314                | 0.429     | −0.771        | −0.886*                   | −0.771         |
| BX          | −0.371       | 0.600          | 0.657          | 0.543                      | 0.543                | −0.771    | 0.143         | −0.029                    | 0.143          |
| CBH         | −0.257       | 0.371          | 0.543          | 0.200                      | 0.314                | −0.600    | −0.257        | −0.371                    | −0.257         |
| NAG         | −0.200       | 0.771          | 0.829*         | 0.714                      | 0.886*               | −0.257    | −0.200        | −0.371                    | −0.200         |
| AcP         | −0.600       | 0.900          | 0.900          | 1.000*                     | 0.900*               | −0.500    | 0.600         | 0.300                     | 0.600          |

Fig. 4 $V_{\text{max}}$ of enzymes related to carbon, nitrogen, and phosphorus cycling at different temperatures
learning situation, and it is difficult to ensure the quality of teaching. In addition, most teachers consolidate their teaching ideas and continue to follow the traditional teaching mode, emphasizing the definition of curriculum content and curriculum plan and teaching content in limited classrooms, and lack of attention makes them solve the problem, which makes the students bored and makes them lose interest in learning English, which seriously affects the students’ learning enthusiasm (Almeida et al. 2016).

Lack of high-quality teaching resources and low teaching efficiency

Although distance learning provides a platform for e-learning, there are few excellent resources and their utilization rate is relatively low. Subject teachers lack the ability to recognize and accumulate resources, so...
curriculum resources are not updated frequently, which leads to the shortage of curriculum resources. The exchange of meaning is not the main problem (Bal and Bose 2010). As far as English teaching resources are concerned, most of them are used for basic English, professional, and special purposes. The lack of English resources makes it difficult to meet students’ multi-level and multi-dimensional learning needs (Das and Goswami 2003). In addition, a large number of schools’ classroom layout is backward, and some teachers’ use of information technology is also very poor. The shortage of teaching staff means that a large number of responsible teachers are also responsible for curriculum design. Online Q & A and classroom learning make responsible teachers tired of tedious work. On the one hand, it leads to the lack of a large number of online learning resources. On the other hand, teachers can only cope with teaching, which greatly affects teaching.

Lack of cohesion inside and outside the classroom, lack of interaction between teachers and students

Because teachers and students are separated in time and space, English distance learning is mainly based on online courses, supplemented by face-to-face guidance. Students acquire knowledge by combining online and offline learning. In distance learning, the concepts of class and classroom are actually vague, and traditional teaching is difficult to conduct face to face (Deka et al. 2013). Teachers create relevant classroom resources, so that students can learn through the network learning platform, and communicate and interact with students. Students’ mechanical acquisition of knowledge, lack of systematic teaching, lack of interaction between teachers and students outside the classroom, and lack of teaching cohesion inside and outside the classroom will lead to adult students’ lack of sense of belonging and motivation.

Hardware facilities lag behind, flipped classroom becomes a mere formality

In the Internet-plus era, the establishment and deployment of inverted classrooms for remote learning require basic hardware as a guarantee, including multimedia teaching equipment, multimedia classrooms, network learning platforms, campus wireless networks, etc. (Dhar and Nandargi 2000). These problems include, firstly, unbalanced distribution of educational resources; secondly, English teachers’ information literacy is low; and thirdly, there is a lack of political support. Colleges and universities have no guidelines and systems for mirror class learning, and teachers and students have little interest in developing flipped classroom learning. Although some schools also actively create and implement
classroom English reverse teaching, the model is relatively simple.

Reconstruction strategy of Internet English teaching concept based on flipped classroom

Theoretical basis

Blended learning theory is the center of modern educational technology research. In recent years, it is gradually popular in the field of education at home and abroad. Scientists in the field of educational technology at home and abroad have done some research on this. Blended learning theory is based on the advantages of traditional learning and online learning (Goswami et al. 2006). Through the combination of online and offline, it can not only reflect the leading role of teachers, but also reflect the dominant position of students. It can also improve students’ learning efficiency, which can be said to kill two birds with one stone. This is consistent with the idea of “learning before teaching” advocated by the flipped classroom. This paper can say that the flipped classroom is an important technology in blended learning theory. The flipped classroom model permeates the concept of collaborative learning. The three stages of pre-class, in class, and after class provide students with opportunities for collaborative learning and communication. Group learning is carried out before class, so that students can build their own knowledge. In class, they can communicate through an online platform or face to face and discuss problems to deepen their understanding of knowledge (Guhathakurta and Rajeevan 2008). Look at the after-class group as a whole to get feedback and ratings from students. The online collaborative community between teachers and students can enable students to participate in the whole learning process, thus greatly improving classroom participation and classroom efficiency.

The necessity of reconstructing the concept of distance English teaching based on flipped classroom

Rebuilding the role of teachers and students In the opposite teaching mode, the status of teachers is changed first. Teachers turn from imparting knowledge to teaching advocates and guiding students to learn. Secondly, the status of students has also changed, from passive students to active knowledge creators. They can develop students’ self-thinking ability, form good learning habits, and make them become the masters of English learning. Third, the relationship between teachers and students is no longer isolated (Hosseinizadeh et al. 2015). Reverse learning creates a cohesive learning community, which helps to eliminate the loneliness of adult students and improve their sense of belonging and academic performance.

Reconstruction of teaching mode English distance learning based on flipped classroom can realize the switching of teaching mode. Teachers can display teaching videos before class, arrange learning tasks, adopt the mode of teaching before teaching, and guide students to learn by themselves, which can fully mobilize students’ educational enthusiasm and deepen the process of learning English knowledge and thinking. In the classroom, guide students to acquire knowledge according to their own questions, and allow students to express their views on what they have learned, and answer students’ questions respectively (Jain et al. 2012). With proper answers and guidance, students can internalize their English skills, fully understand the cultural connotation of learning English, and use the knowledge they have learned.

Redesign the teaching evaluation method Through distance learning in the flipped classroom, the establishment of an online learning community between teachers and students can create a new way of classroom evaluation and feedback, and provide a good channel for communication between teachers and students (Jhajharia and Singh 2010). During and after class, a feedback channel for comprehensive evaluation is created based on the flipped classroom model, which means that students’ leadership and teachers’ guidance, and more attention is paid to the realization of educational goals. It not only provides a communication environment for the interaction between teachers and students, but also stimulates students’ learning enthusiasm and understands the conditions for students to learn English, so that they can make appropriate judgment on the classroom.

Reconstruction strategy of distance English teaching concept based on flipped classroom

Change the concept of teaching and establish the teaching mode of “teaching before teaching.” Based on the flipped classroom model, teachers must first change their teaching ideas. Secondly, teachers must shape a student-centered way of thinking. Thirdly, training links need to be improved. The main purpose of learning English is to exchange and use the knowledge learned. Before class, according to the English movies and the artificial intelligence provided by MOOC, the voice dialogue can be watched online. According to the students’ English learning situation, a quite realistic English learning scene is created.

Optimize learning resources and create an open learning system. First of all, this paper must pay attention to the interaction between learning materials and online learning resources. Secondly, this paper needs to pay attention to the length of the teaching video to reflect the interest. Third, we must pay attention to the quality control of training videos and share high-quality resources. Finally, we should pay attention to the guarantee of technical support. The establishment of an
open learning system based on the flipped classroom model needs enough network support to realize the interoperability of distance learning English resources, meet the learning needs of different levels of adult students, share different types of high-quality courses, and create a common distance learning environment (Kiros et al. 2016).

Seek one-to-one learning and build a learning community between teachers and students. First of all, divide the students into groups before class. Before class, students are divided into groups according to their differences and levels. English teachers will ask difficult questions and use relevant videos to help students prepare lessons. Second, follow the instructions and practice before class. Use first-class communication tools to understand the preview of students and answer their questions in real time. Third, real-time interaction in the classroom. Finally, early feedback will be received after class. After class, we need to know the students’ feedback and their work. At the same time, they should establish a forum to encourage communication and interaction with students after class, and carry out students’ learning. Answer questions online and learn from students according to the dynamic of English teaching.

Implementation measures of classroom teaching evaluation of Internet English teaching

Pre-class evaluation

Before class, teachers can submit some teaching materials through the platform. Course PPT, micro course video, and course plan can be uploaded to the network platform for students to preview. In the preparation stage, different levels of students may have different requirements, so they can distinguish their content before starting the training, and the evaluation process is more fair and reasonable. By previewing and discussing students before class, teachers can understand students’ understanding of knowledge, take the targeted teaching plan as the goal, and make appropriate adjustments to the classroom content and plan, so that they can better understand the important learning points.

In-class evaluation

Check-in function Attendance rate is a very important indicator to evaluate students. In traditional English courses, teachers use the appeal method to determine whether students are present, which not only wastes time, but also some students may respond on behalf of other students. The registration function of the online platform can effectively save the time of calling by name, more accurately count the attendance, which is very convenient and fast, so that students can quickly enter the class state (Kothawale et al. 2007).

Classroom performance function Classroom teaching is a very important part; student evaluation is also very important. In the classroom, students’ performance is evaluated in each class record, and students’ performance in the regular classroom is recorded. It is not only a very important reference for students’ evaluation but also an important reference for teachers to evaluate their own learning situation.

After-class evaluation

After-class authentication is a very important aspect of the network platform. We can use the test function of the platform to create appropriate test questions for students and monitor the difficulty of the test questions. Teachers can also customize surveys and questionnaires on the online platform to help understand classroom design, teaching methods, teaching content, etc. After learning knowledge, the questionnaire also includes students’ attitude towards learning, cooperative spirit, and English proficiency. Through students’ understanding and feedback questionnaire, teachers can better understand students’ needs and suggestions, so as to make appropriate adjustments to their own curriculum plan, especially to enhance students’ ability. When students study through the online platform, they should be monitored and managed to prevent students from using mobile phones and computers for entertainment, and encourage students to improve their learning outcomes. When testing students, choose more objective questions, so that teachers can more effectively review, and do not spend too much time to review subjective questions. When using the web-based learning platform, the requirements of teachers are also higher. Teachers should be able to use the online platform to deliver courses, and create videos, materials, and schedules needed for online courses to meet teachers’ higher classroom preparation requirements. We must have a better command of the network platform, be familiar with the various functions of the network platform, so as to establish specific learning links and formulate more effective learning strategies.

Problems in the process of classroom teaching evaluation of Internet English Teaching

In the process of college English teaching, big data network learning and network platform learning are the inevitable trend of the development of network and information technology, as well as the expression of modern education to achieve a variety of learning modes. Using the web-based platform, we can implement a variety of student assessments in the learning process, in order to obtain a more complete and in-depth assessment of the learning impact of students and teachers. However, when teaching on the network platform, we should also avoid the negative impact of information technology on the classroom (Kwarteng et al. 2009).
First of all, it is necessary to carry out artificial intervention when marking test papers through artificial intelligence. It should be based on a long-term mining foundation, coupled with manual peer review, in order to correct inappropriate or incorrect paragraphs in time, so as to ensure that students get enough grades. Secondly, teachers’ information literacy should be continuously improved, and big data should be used in the classroom to integrate classroom resources and classroom activities. Therefore, teachers must have the ability and quality of data processing. Third, in the process of learning, this paper should not only pay attention to some connections reflected in big data, but also pay attention to the causal relationship in the classroom. Finally, when using the web-based platform to evaluate college English teaching, the data is identified and selected, and the laws contained in the data are evaluated and revised. Big data needs some unexplained information, and analyzes the rules and information reflected in the data in order to make reasonable prediction and estimation.

Conclusion

In order to solve the problems of uneven distribution and short network life, this paper proposes a clustering algorithm to optimize the cluster head to reduce power consumption and prolong network life. When collecting and transmitting data, this method uses two receivers to reduce the power consumption of the node by moving the receiver, and uses adaptive weighted data fusion technology to extract effective information from the data collected by the node. Experimental results show that the method described in this paper can provide the best results in the number of active nodes, overcapacity, average overcapacity, and total power consumption. Although the delivery time increases slightly, it can significantly extend the service life and reduce energy consumption. In this work, the soil of cultivable ecosystems in different climatic zones was used as the target. An indoor cultivation method was used to study the characteristics of soil enzyme reaction and decomposition of organic carbon into heat, and the relationship between them. The effects of soil warming on soil enzymes were studied by using kinetics and thermodynamics. The reaction mechanism of soil organic carbon and various carbon pools to soil warming was systematically studied by using a high-performance sequencing technology and solid-state method. In addition, the relationship between soil enzymes and organic carbon degradation was discussed from the perspective of microbial resource allocation theory. With the continuous development of information technology and network technology, education activities through online education platform has become a new model, and is also being promoted. Therefore, when using the network learning platform, teachers should actively use the network resources to increase students’ interest in learning, so that students are ready to participate in classroom learning, so that students can stand out from passive learning to active learning. When teaching English to students, we can use the network platform to stimulate students’ learning enthusiasm, so as to more fully evaluate students’ learning situation. In the process of modern education, all major subjects attach great importance to English teaching. In recent years, with the continuous reform of colleges and universities in the field of education, the most striking of all the reforms is the English teaching mode of online learning platform. This kind of learning mode is born under the background of modern Internet. For all English teaching, this more flexible teaching method is a very big technological breakthrough. It can not only stimulate students’ interest in learning English, but also enrich the content of learning English, so that students can learn online anytime and anywhere. Based on the content of the online English learning platform, this paper analyzes the advantages and disadvantages of this learning method, and puts forward some measures to improve its teaching methods, in order to support the whole college English teaching environment in China.

Acknowledgements

Research on Big Data Industry in Hebei Province from the Angle of Ecological Civilization, Hebei Association for Science and Technology, Grant No. HBKX2020C19.

Declarations

Conflict of interest

The authors declare that they have no competing interests.

References

Almeida CT, Oliveira-Júnior JF, Delgado RC, Cubo P, Ramos MC (2016) Spatiotemporal rainfall and temperature trends throughout the Brazilian Legal Amazon, 1973-2013. Int J Climatol 37:2013–2026. https://doi.org/10.1002/joc.4831

Ashok K, Saji NH (2007) On the impacts of ENSO and Indian Ocean dipole events on sub-regional Indian summer monsoon rainfall. Nat Hazards 42:273–285. https://doi.org/10.1007/s11069-006-9091-0

Bal S, Bose M (2010) A climatological study of the relations among solar activity, galactic cosmic ray and precipitation on various regions over the globe. J Earth Syst Sci 119:201–209. https://doi.org/10.1007/s12040-010-0015-8

Das PJ, Goswami DC (2003) Long-term variability of rainfall over north-east India. Ind J Land Sys Ecol Stud 26(1):1–20

Deka RL, Mahanta C, Pathak H, Nath KK, Das S (2013) Trends and fluctuations of rainfall regime in the Brahmaputra and Barak basins of Assam. Theor Appl Climatol 114:61–71. https://doi.org/10.1007/s00704-012-0820-x

Dhar ON, Nandargi S (2000) A study of floods in the Brahmaputra Basin in India. Int J Climatol 20(7):771–781. https://doi.org/10.1002/1097-0088(20000615)20:7<771::AID-JOC518>3.0.CO;2-Z

Goswami BN, Venugopal V, Sengupta D, Madhusoodanan MS, Xavier PK (2006) Increasing trend of extreme rain events over India in a warming environment. Science 314(5804):1442–1445. https://doi.org/10.1126/science.1132027

Springer
