Integration of urban-rural planning and human geography for online education under the impact of COVID-19

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Abstract. At present, the normal teaching is seriously disturbed by the epidemic situation. In order to ensure the smooth progress of teaching, online teaching is a necessary way. Based on the current situation, this paper discusses the integration of urban and rural planning and human geography teaching in university courses. Based on the full analysis of the advantages of the original curriculum, this paper adjusts the curriculum of urban and rural planning and human geography. The new system focuses on the characteristics of "broad foundation and clear main line", and follows the three main lines of "art, design and geography" to optimize the design. A questionnaire survey was conducted among 200 online students in our school and the data were processed by multidimensional BP neural network analysis. The experimental results show that the method proposed in this paper can improve the efficiency of online teaching.

Keywords: Epidemic situation, urban and rural planning and human geography, teaching integration, Information method of online education

1. Introduction

In order to actively respond to the new coronavirus epidemic, on January 27, 2020, the Ministry of Education issued the "Notice of the Ministry of Education on the Extension of the Spring Semester of 2020", proposing that schools at all levels should appropriately delay the start of the spring semester of 2020 [1, 2]. If approved, do not return to school early. This brings huge challenges to the teaching of spring 2020 [3]. In response to the teaching in the spring of 2020, the Ministry of Education issued a notice on January 29 [4–7], "Using the Internet platform and suspending classes without stopping classes", and various schools began to seriously start online teaching [8]. Under such circumstances, how to effectively use the network to carry out integrated teaching of urban and rural planning and the teaching of human geography is a question worthy of discussion.

2. Necessity of carrying out urban-rural planning and teaching of humanities and geography

The urban-rural planning discipline is a science with the urban-rural built environment as the research object. This discipline is a discipline with urban-rural land use and urban material spatial planning as the core of the discipline. The purpose of the establishment of urban and rural planning science is to train professionals who are adapted to the technical methods of social, economic and regional development

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[9]. From the perspective of urban and rural planning courses, urban and rural planning courses mainly cover the three major sections of art, architecture and planning and design. In terms of curriculum structure, the urban and rural planning disciplines are mainly composed of three modules: "theoretical courses are basic, skill courses are core, and direction courses are auxiliary". Among these three modules, planning and design skills courses account for the highest proportion of professional compulsory courses, such as urban master planning, detailed control planning, residential area planning and design, park planning and design, and rural planning and design. Therefore, practicality is a major feature in the teaching of urban and rural planning majors. Students need to have a certain artistic foundation when studying these professional courses, and mainly rely on independent creative design and professional guidance from teachers. However, due to the large number of disciplines involved, the professional research field is relatively broad and complex. Although this large and comprehensive curriculum system has the advantage of interdisciplinary, it is limited by the total hours of the teaching plan and the time the students are studying in the school. In practical teaching, only theoretical teaching can be emphasized, and many skill courses can only be offered as elective courses, which greatly affects the mastery of students' professional skills. This situation makes it difficult for students to fully grasp the professional knowledge of the subject.

Similar to urban and rural planning, geography is also a science of space research. This subject mainly explores the causality and spatial distribution between "people-land", analyzes its behavioral factors and propagation methods, and predicts future development trends.

Compared to the urban and rural planning that focuses on the subject characteristics of "using design to improve the living environment", human geography is better at "interpreting the living environment with data." Therefore, from the perspective of the nature and content of the disciplines, the two disciplines are highly complementary. Especially in the context of the "data revolution", people are increasingly emphasizing the integrated analysis of the content and form of data when formulating urban and rural planning. This makes the previous empiricism-led planning encounter more challenges. This change also brings urgent reform needs to the teaching of urban and rural planning. The trend of the integration of urban and rural planning teaching and
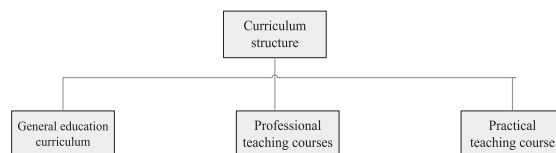

Fig. 1. Structure of professional courses in Colleges and universities in China.

human geography teaching has become increasingly obvious.

The curriculum system is based on a certain educational value concept, according to the corresponding disciplinary logic and structural basis to arrange the various components of the curriculum. The curriculum system takes professional education as the core and uses a dynamic system to make the elements of the curriculum point to the realization of the curriculum objectives. The curriculum system is mainly composed of curriculum objectives, curriculum structure, teaching environment and curriculum evaluation [10]. The curriculum system is the core of the higher education curriculum system and the main manifestation of professional teaching features. It is a systematic series of courses formed by the division of labor and cooperation between courses set by a subject, and a bridge connecting educational theory and teaching practice [11].

From the perspective of course content, the curriculum system of colleges and universities in China is mainly reflected in the relationship of three major elements, namely, general education courses, professional teaching courses and practical teaching courses (as shown in Fig. 1).

3. Thoughts on the adjustment and integration of urban and rural planning curriculum system and human geography curriculum system

According to the characteristics of the two majors of urban and rural planning and human geography, and the adjustment ideas of the three major sections above, the curriculum system of urban and rural planning and human geography can be integrated. The overall idea for integration is: "Theoretical courses are compatible with skill courses, supplemented by direction courses".

3.1. Integration of theoretical courses

The professional theories of urban and rural planning and human geography have their own characteristics. The professional theoretical courses of urban and rural planning focus on the study of urban development and planning theory, while the professional basic courses of human geography focus on the teaching of basic geographical theories. However, as the comprehensiveness of urban planning research and the applicability of geography disciplines have gradually strengthened, the shortcomings of the two disciplines have become increasingly prominent.

The short board of urban planning is mainly expressed as follows: the existing basic planning courses are more biased towards the development of urban planning theory, art, engineering and other practical capabilities, but they ignore the essential foundation of the urban and rural environment, that is, the natural environment and Basic knowledge of human environment. The short board of human geography is mainly that the basic courses of human geography discontinuation are too extensive, but the basic theoretical courses of practice are relatively lacking.

Therefore, the basic courses of the two disciplines can be adjusted and fused to learn from each other: The specific plan is: urban and rural planning can be appropriately added with geographic basic courses such as geographic information systems, introduction to remote sensing, and cartography. The purpose of this adjustment is to increase the proportion of geography courses in professional basic courses and increase students ' Theoretical cognition, while, human geography can be added with design theory courses such as Introduction to Architecture and Introduction to Urban Design, which can improve students' professional knowledge and improve the quality of practical teaching.

3.2. Integration of direction courses

Urban and rural planning, as a comprehensive interdisciplinary discipline, has a growing span of professional knowledge and work content. From macro regional planning to micro local design, it runs through many aspects such as society, nature, culture, architecture, environment, etc.

At present, the major courses of urban and rural planning mainly include regional development and planning, urban planning, rural planning and

design, community development history and heritage protection planning, urban and rural planning and management, etc. the basic space form of urban and rural areas is adopted in the curriculum, so that students can take different types of space as the object of knowledge and deepen their understanding and understanding of urban planning and design.

However, the division method of the curriculum of human geography is macro. It mainly focuses on the political, economic, cultural and transportation aspects within a certain region, including regional development and urban-rural planning, environmental change and sustainable development, land and resources utilization and information management, resource development and utilization.

It can be seen from the above that although both of them are committed to space research, the scale is quite different and the research focus is different. Urban and rural planning mainly aims at different spatial types for practical design teaching, while the spatial scale of human geography course is mainly divided by spatial phenomena rather than specific spatial types, which is not conducive to the development of spatial practical teaching.

Therefore, on the basis of the existing macro spatial phenomena, human geography can be combined with specific spatial types to carry out practical teaching design, so as to better integrate with social applications; Similarly, in the direction of course setting, urban and rural planning can be integrated with the curriculum theory of geospatial phenomena in the specific space design practice, so that the basic development law of urban and rural space can be recognized from multiple dimensions, perspectives and levels.

3.3. Integration of skill courses

Urban and rural planning is a practical major. We should not only learn the professional skills required by the course, but also learn the computer drawing technology including CAD, Photoshop, etc. In addition, in view of the era of big data, the amount of spatial data required for urban and rural spatial planning is increasing. At the same time, the mixed complexity of different data types is also increasing. Therefore, in urban and rural planning, we need to learn from the new achievements of modern geographic information technology such as satellite remote sensing and geographic information system. In particular, geographic information system (GIS), as a centralized digital platform of multiple data,

has powerful spatial data function and topological structure method, which is a necessary skill course.

In the field of geography research, the rich and far research methods of geography itself are also the key contents of the teaching of human geography. In addition to space science and positivism as the main paradigm of geography research, quantitative analysis methods such as behavior matrix, principal component analysis, factor analysis and regression analysis can also be applied in the research of geography science.

It can be seen from this that urban and rural planning and human geography majors can learn from each other in terms of skill curriculum, that is, the design methods of art design, architectural design and planning design of urban and rural planning can be combined with GIS design and application of geography, GPS principle and application, real estate evaluation, quantitative geography, human geography methods and other application courses.

In a word, it can effectively promote the scientific development of urban and rural planning by using diversified geographical methodology to guide the spatial practice of urban and rural planning. At the same time, this kind of integration is also conducive to enhancing the comprehensive thinking ability of students, so as to strengthen the understanding of the geographical spatial pattern, process and change, and apply it to the planning practice process.

4. Online teaching methods of courses during the epidemic

4.1. Data processing algorithm

In order to better solve the above specific problems. From the perspective of multi-dimensional information and knowledge network, this paper recommends an online education system resource method. This method can sort the resources according to the resource unit, distinguish the hot resources and non-hot resources, improve the user experience, and reduce the construction and operation and maintenance costs of online learning system. It includes the following algorithm (As shown in Fig. 2):

- Accurate online education system; design knowledge network management engine. The information feed-forward transfer. the formula is as follows [12–15]:
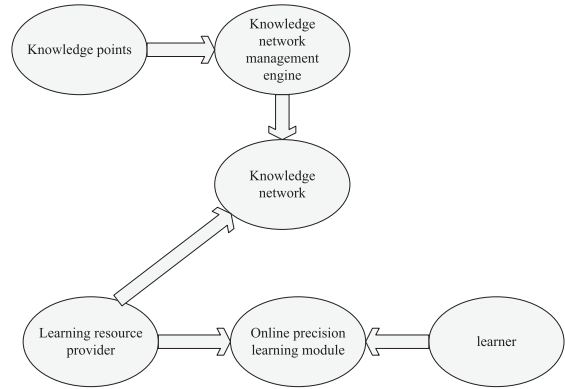

Fig. 2. Algorithm model diagram.

$$E_P = \frac{1}{2} \sum_{j=0}^{n-1} \left(t_{pj} - T_{pj}^{(2)} \right)^2 \qquad (1)$$

- Build knowledge network based on knowledge network management engine. the formula is as follows:

$$X(t) = \sum_{i=1}^{n} C(t) + r_n(t) \qquad (2)$$

- Relying on the knowledge network, taking the knowledge element as the unit, constructing the resource base through multiple channels. the formula is as follows:

$$X(t) = \{x(t), x(t-T), ..., x(t-(m-1)T)\} \qquad (3)$$

- The resource base supports the resource unit stored in the unit of knowledge element. the formula is as follows:

$$MSPE = \frac{1}{n} \sqrt{\sum_{t-1}^{n} \left(\frac{\left(y_t - y_t' \right)^2}{y_t} \right)^2} \qquad (4)$$

- Quantify the quality of resource unit according to the feature of resource unit and the statistical feature of user usage, and obtain the quality quantitative feature of resource unit;
- Obtain the quantitative characteristics of resource unit availability;
- The recommendation index of resource unit is calculated according to the quantitative characteristics of quality and availability of resource unit;

– According to the different focus of learners, the dynamic adjustment of resource unit sequencing is carried out.

4.2. Connotation and types of network teaching

Network teaching is to make use of the hardware environment such as computer and broadband network.

At present, the main means of network teaching are: video broadcasting, web teaching materials, video conference, multimedia courseware, BBS forum, chat room, e-mail, etc. network teaching breaks the traditional limitation of time and space, which creates convenient conditions for teachers and students to interact across time and space, and is very suitable for on-the-job learning.· in some teaching institutions, network teaching is the main means. Before the Ministry of Education issued the notice of "using the network platform and closing classes without stopping school", the teaching mode of each university was mainly face-to-face classroom teaching between teachers and students. The network teaching was only used as an auxiliary means, and its related MOOC was studied as the course construction, which accounted for a small proportion in the whole teaching process. This emergency large-scale use of online teaching network, on the one hand, shows the great advantages of online teaching, but on the other hand also exposed the need for further improvement and improvement of online teaching.

4.3. Network teaching practice

Since the Ministry of Education issued the "use of network platform, no suspension of classes", a leading group for undergraduate teaching during the epidemic prevention and control period has been established to actively prepare for the "no suspension of classes", and organize the implementation of the second semester of 2019–2020 academic year (spring summer period) undergraduate teaching program in accordance with the original training program and teaching plan. According to statistics, the overall situation of teaching development and practice in the first week is as follows: there are 2648 courses to be opened, 2614 courses to be opened, and the actual opening rate is 98.7%. There are 2434 online teachers, 157129 online students and 97% of students. The use of online teaching platforms is shown in Table 1, the use of live broadcast tools in the course of teaching is shown in Table 2, and the statistics of online teaching data is shown in Table 3.

Table 1 shows the proportion of online teaching platforms. The data shows that Chao-xing Fanya, China University MOOC and Yuclassroom are in the top three. They are mainly used online teaching platforms and recommended teaching platforms in the early stage of the University. The number of users is large, accounting for 72.01% of the total teaching platform.

Table 2 shows the usage of live broadcast tools. It can be seen from the chart that Tencent's QQ group live broadcast, Tencent classroom and Tencent conference are most used. Teachers have good feedback on the platform, which is mainly due to its powerful network function. During the use of this function, there are few cases of stuttering and server crash.

Table 3 shows that although the teaching method has been transferred from conventional classroom teaching to online teaching, the opening rate of the given teaching tasks is still very high, all of which are over 98%. The attendance rate of students has also reached over 97%. The reason why the teacher's

Table 1
Use of online teaching platform

Platform name	Chaoxing-Fanya	C-U MOOC	Rain class	U Campus	Other platforms	Unused teaching platform
Usage ratio (%)	38.26	19.63	13.63	11.13	13.13	3.75

Table 2
Use of live broadcast tools in the course of teaching

Date	Courses Required	Courses offered	Courses offered ratio (%)	Number of Teachers	Number of students	Number of online learners	Attendance rate
2.24	597	586	98.2	580	——	34121	——
2.25	524	519	99	516	——	32870	——
2.26	557	548	98.4	431	33272	32375	97.3
2.27	514	509	99	457	32347	31254	96.6
2.28	466	452	99.1	450	27288	26507	97.1

Table 3
Data statistics of the first week of online teaching in a school

Date	Courses Required	Courses offered	Courses offered ratio (%)	Number of Teachers	Number of students	Number of online learners	Attendance rate
2.24	597	586	98.2	580	——	34121	——
2.25	524	519	99	516	——	32870	——
2.26	557	548	98.4	431	33272	32375	97.3
2.27	514	509	99	457	32347	31254	96.6
2.28	466	452	99.1	450	27288	26507	97.1

Table 4
Data statistics of the first week of online teaching in College of Construction Science

Date	2.24	2.25	2.26	2.27	2.28
Required courses	16	15	8	16	11
Courses offered ratio (%)	100	100	100	100	100
Number of Teachers	18	11	6	12	13
Number of students selecting courses	——	1186	546	1215	1304
Number of online learners	1656	1123	515	1188	1280
Attendance rate	——	94.7	94.3	97.8	98.2
Online teaching time	——	29.8	16	32.3	20

opening rate does not reach 100% is that the environment of individual teachers is not allowed or the nature of courses is not suitable for online teaching. The reason why the students' attendance rate is not 100% is also because of the limited network environment and hardware conditions of individual students. The above data reflect the teaching situation of the whole school, but not the specific teaching situation. In order to study the practical situation of online teaching, this paper makes statistics and analysis of online teaching in our college.

Table 4 shows that, the opening rate of 100% for 5 consecutive days shows that the theoretical courses of the College of building equipment science and engineering are taught online. The slight fluctuation of online class arrival rate is caused by the course setting and the network environment and hardware conditions of individual students. The average time of each course exceeds the normal time of classroom teaching, which to a certain extent reflects the teachers' high enthusiasm for entering the online classroom and the better interaction between teachers and students. For the teaching methods adopted by teachers, statistics show that Tencent classroom is the only single way, and most of the courses use more than two ways. Therefore, the reliability of the two teaching methods is more guaranteed. According to the feedback of the teachers, there are two ways in the actual online teaching: one is that when a platform or software network and server fail, the other is used as a backup; the other is that the two ways can complement each other and the teaching effect is better.

The sudden attack of new coronavirus has seriously affected the normal teaching order. In order to implement the training program normally, the network teaching platform is widely used. For the large-scale development of network teaching, some research also mentioned the relevant disadvantages.

Although network teaching is convenient and time-saving. But its shortcomings cannot be ignored: for example, the teaching is not comprehensive, and there is a lack of communication between teachers and students in the process of teaching. In the aspect of design, network teaching still lacks complete and effective network construction scheme. The resources of online learning are not rich and diverse, and the construction of resource base needs to be developed and improved. In the process of network teaching, there is no necessary way of online communication; the network teaching mode of network teaching innovation needs to be improved. The network teaching lacks the objective condition of characteristic school running. Internet lacks emotional communication and may harm mental health. In the process of operation, there are hidden dangers in business, which are easy to cause curriculum interruption; students may not be able to adapt to the high-quality requirements of online lectures. The education function of network teaching is narrow, the environment is not perfect, and the information literacy of teachers is not very high. We need to focus on the above problems and improve the measures as follows:

All schools should actively respond to the "use of network platform, non-stop classes" and actively

carry out network teaching. However, at present, the quality of network teaching in Colleges and universities has not been tested and revised, and it is difficult to achieve in the short term. How to ensure the substantial equivalence between online teaching and offline classroom teaching needs further study. It is suggested that the teachers should increase the proportion of online test in the early stage of online class to strengthen and consolidate the knowledge.

Use sentence case in the title and headings. The data shows that the rate of students' online teaching to class is very high. However, for the management of online teaching, the supervision of students' learning state needs to be strengthened. On the one hand, some online courses have a large number of students, some have more than more than 100 students in the classroom, or even three or four hundred students in individual courses, which has brought challenges to the teaching teachers to control the classroom order. On the other hand, there is a big difference between students' self-conscious listening and learning at the other end of the network and classroom listening. In addition to normal classroom check-in, it is suggested that teachers optimize teaching materials to attract students in a better teaching state. Meanwhile, it is suggested that students can improve their understanding and conduct online classroom learning with a higher enthusiasm and initiative.

Although before the network teaching, the school invited platform technicians to conduct skills training for teachers, but many teachers reflected that in the teaching process, due to the problems of network speed limitation, server crash and so on, they often had to change the teaching method, even use 3-4 kinds of software at the same time, which to a certain extent affected the teaching effect. It is suggested to improve the network environment and increase the server capacity.

5. Educational information processing technology

5.1. Technical characteristics

The online education system resource recommendation method based on multi-dimensional information and knowledge network is characterized by the following:

– Knowledge network management engine is established to add, delete and modify knowledge points; label knowledge elements; set up the storage of knowledge points and knowledge elements; build the relationship between resource units and knowledge elements;
– Build knowledge network based on knowledge network management engine;
– Relying on knowledge network and knowledge element as a unit, multi-channel construction of resource base.
– The quality of resource unit is quantified according to the characteristics of resource unit and the statistical characteristics of users' use.
– The availability quantification feature of resource unit is obtained.
– According to the quantitative characteristics of quality and availability of resource units, the recommendation index of resource units is calculated.
– According to the different focus of learners, the system dynamically adjusts the resource unit order.

5.2. System design and Implementation

Interactive information is stored in the interactive community, question answering, teaching evaluation and resource evaluation of online platform, and there are many versions of online teaching platform. According to the design principle of simplification, this research adopts two ways to extract the interactive information: one is to use the customized web crawler to grab the text data of the information page, after removing the irrelevant characters and HTML control characters, to organize and form the standard text; the other is to read the text information directly from the database table. After extracting the text information, the system is further divided into smaller sentence units. At the same time, according to the situation of real words and named entities, it filters out irrelevant function word information or text information with no actual meaning. All processed information retention time, sender ID, object ID, keyword or subject text ID, emotional value are saved in the form of numerical quintuple. Because the five tuples are all data type, the storage space of the original information is greatly compressed. In the actual test, the system reads more than 180000 interactive text data in the online learning system, and the final formed five tuple data can achieve nearly 99.6% compression of the original data. From this point of view, it can fully meet the efficiency requirements of interactive information big data mining. For

topic information extraction, this study chooses unsupervised extraction method to improve efficiency. In the design of specific topic mining algorithm, the optimized clustering method based on multiple phrases and data flow is adopted [6]. The theme emotion extraction mainly adopts unsupervised learning method, which divides the emotion tendency of the text into three types: positive emotion, negative emotion or neutral emotion.

Considering the diverse needs of query, the system designed a single ID number or combination ID number query function based on interactive theme, and also designed a single course and multiple courses combination query function based on courses. In order to meet the needs of embedding other network teaching platform applications, the system also designed a flexible calling mode with link and ID number to realize the real-time calling of analysis results page and auxiliary learning page.

Visual design is composed of three parts: theme mining analysis, social relationship mining analysis and interaction behavior mining analysis.

- Theme clustering cloud view design. In order to realize the visual analysis of the theme information, this research designs a multi-color theme clustering cloud view. According to the interactive space and time range selected by the user, the frequency of the theme can be ranked from high to low, and the font can be displayed in different colors from large to small.
- Theme clustering and sentiment analysis view design. According to the proportion of the subject words after clustering calculation, they are displayed in the form of circular pie chart. In the outer circle, the top 20 topics were clustered, and in the inner circle, the pie chart showed the distribution proportion of three kinds of emotional tendencies.
- Topic timing and interaction analysis view design. In order to achieve a more comprehensive analysis of the theme, the system also calculates the time span of the theme, which is a horizontal axis and displayed in a two-dimensional horizontal column chart. In addition, the system also constructs interaction diagrams among themes, and displays them in two ways: force oriented layout and chord diagram. Force oriented layout can show the clustering situation that the same topic is mentioned by the same person successively. If multiple topics are connected, it means that these

topics are mentioned by multiple people, and the time sequence of mentioning is the same. The chord chart is displayed in a circular way. Click a single dot to filter the connected topics. For all subject information, this study also uses named entity computing of network knowledge base to optimize, and obtains entities by computing connectivity

- Social network structure analysis view design. Based on the statistics and calculation of the interaction among members, two display models are designed: one is data list, which shows the connection value between each two interactive members; the other is the graphic display of force oriented layout and chord diagram, which shows the interaction relationship between the selected interactive information personnel, and the connection line indicates that there is a direct interaction relationship between them. When a single member is clicked, the connected lines and points are displayed in color.
- Social network interaction quantitative analysis list design. In order to facilitate the quantitative study of various interactive relationships among interactive members, the system designs a statistical table for interactive data, and displays the number of nodes, connectivity, network density, node average and reciprocity of interactive information within the selected range. Through the observation of quantitative values, teachers can objectively analyze the effect of interaction.
- In order to mine interactive information from time dimension, the functions of statistics by time, week, day and month are designed, and displayed by data table, broken line view and column view. The number of interactions is the vertical axis and the time is the horizontal axis. The interaction information between learners and teachers is distinguished by different colors.

6. Conclusions

The design of the learning analysis system of interactive information fully embodies the basic concept of personalized teaching, and enables complex online education to use "data talking, data decision-making, data management and data innovation" to really promote the progress of management mode, and help teaching and support learning from the perspective of data analysis. The development of the system makes

up for the lack of interactive information analysis in the current learning analysis tools, and makes a new attempt to deepen the learning analysis from the theoretical and practical level.

References

[1] J.M. Schectman, N. Kanwal, W.S. Schroth, et al., The Effect of an Education and Feedback Intervention on Group-Model and Network-Model Health Maintenance Organization Physician Prescribing Behavior, *Medical Care* **33**(2) (1995), 139–144.

[2] G.X. Ma, Y. Tan, J.I. Toubbeh, et al., Asian Tobacco Education and Cancer Awareness Research Special Population Network: A Model for Reducing Asian American Cancer Health Disparities, *Cancer* **107**(Supplement 8) (2006), 1995–2005.

[3] R. Cifelli, N. Doesken, P. Kennedy, et al., The Community Collaborative Rain, Hail, and Snow Network: Informal Education for Scientists and Citizens, *Bulletin of the American Meteorological Society* **86**(8) (2005), 1069–1077.

[4] C. Snow, J.M. Pullen and P. Mcandrews, Network Education Ware: an open-source web-based system for synchronous distance education, *IEEE Transactions on Education* **48**(4) (2005), 705–712.

[5] A.B. Temu, P.G. Rudebjer and I. Zoungrana, Networking educational institutions for change: the experience of ANAFE (African Network for Agroforesty Education), *Astronomy & Astrophysics* **415**(2) (2001), 739–746.

[6] J.M. Eisenberg, D. Freund and H. Glick, Clinical economics education in the International Clinical Epidemiology Network, INCLEN Economics Faculty, *Journal of Clinical Epidemiology* **42**(7) (1989), 689–695.

[7] C.R. Baquet, K.M. Mack and S.I. Mishra, et al., Maryland's Special Populations Network - A model for cancer disparities research, *Education and Training Cancer* **107**(8 Suppl) (2006), 2061–2070.

[8] M. Lowman, C. D'Avanzo and C. Brewer, A National Ecological Network For Research And Education, *Science* **323**(5918) (2009), 1172–1173.

[9] S. Yoshida, H. Kimura, Y. Inoue, et al., Interactive multimedia communication systems for next-generation education using asymmetrical satellite and terrestrial networks, *IEEE Communications Magazine* **37**(3) (1999), 101–106.

[10] L. Hu, X. Cao and Z. Li, Reliability analysis of discrete time redundant system with imperfect switch and random uncertain lifetime, *Journal of Intelligent and Fuzzy Systems* **37**(1) (2019), 1–12.

[11] T.S. Valovic, Conflict or cooperation? NREN and US telecom policy - National Research and Education Network, *Human Mutation* **32**(12) (2011), 1371–1375.

[12] M. Sormad, A model of environmental education network for the development of school curriculum regading local-related content in Thailand, *Chemistry - A European Journal* **18**(18) (2011), 9714–9721.

[13] S. Mac Quarrie and F. Lyon, Seeking teachers' views regarding literacy resources in Gaelic medium education. Final Report, Soillse research network, *Journal of Cardiovascular Pharmacology* **25**(2) (2015), 240–251.

[14] R.G. Stevens, D.J.A. Lewis and R.D. Sewell, Controlling a Multimedia CAL Network in Undergraduate Pharmacy Education Using a Courseware Management System, *American Journal of Pharmaceutical Education* **63**(2) (2008), 174–178.

[15] G. Xiao, K. Li, M. Li, et al., Editorial Message: Special Issue on Advances in Parallel and Distributed Computing for Fuzzy Systems, *International Journal of Fuzzy Systems* **21**(6) (2019), 1868–1869.