



# Exploring the Teaching Reform of “Traffic Planning” Course Under the Background of Modern Industrial College Construction Based on Computer Software Analysis - Taking Nanning University as an Example

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**Abstract.** Under the background of Internet + education, in order to implement the requirements of the General Office of the Ministry of Education, General Office of the Ministry of Industry and Information Technology on the construction guidelines of modern industrial colleges, and to cultivate high-quality applied, composite and innovative talents who can adapt to and lead the development of modern industries, the curriculum of universities needs to be reformed against the standards to meet the development of society. The article takes the reform of the traffic planning curriculum of the College of Transportation of Nanning University in Guangxi Zhuang Autonomous Region as the research object. According to the actual situation of economic development within Guangxi, through investigating the demand for transportation graduates from transportation-related enterprises within Guangxi, and combining with computer software analysis, the article carries out benchmarking reform of the traffic planning curriculum, one is to differentiate teaching for students according to employment intentions; the other is to conduct in-depth research on design class companies and professional transportation planning companies; thirdly, inviting enterprise tutors for joint teaching; fourthly, establishing a course resource library and adopting a combination of online and offline courses; fifthly, establishing a course evaluation data information processing model to understand students' learning situation and other perspectives.

**Keywords:** Computer software analysis · traffic planning · teaching · reform

## 1 Introduction

According to the notice of General Office of the Ministry of Education, General Office of the Ministry of Industry and Information Technology on the issuance of “Guide for the Construction of Modern Industrial Colleges (for Trial Implementation)” Education High Office Letter [2020] No. 16, cultivating high-quality applied, compound and innovative talents who adapt to and lead the development of modern industries is an inevitable requirement for higher education to support high-quality economic development and

an important measure to promote the development of classification and characteristics of colleges and universities. The construction of modern industrial colleges in colleges and universities with distinctive features and close ties with industries, which are jointly built and managed and shared with local governments, industrial enterprises and other multi-bodies, can effectively promote the development of local economy. Under the background of Internet + education, this paper uses computer software to analyse the teaching reform demand of “traffic planning” course under the background of the construction of modern industrial colleges, combine the orientation of Nanning University, the development orientation of transportation majors and the graduation requirements of students, and investigate the employment demand of enterprises for transportation graduates in Guangxi, so as to To carry out effective teaching reform for the course of traffic planning, so as to promote the development of the economy in Guangxi [1].

## 2 Current Status of Traffic Planning Courses

Nanning University is actively exploring the way of running a university of applied technology, implementing the philosophy of “application-oriented, open and new experience”, with the theme of “quality development, characteristic development and innovative development”, focusing on talent training, professional and curriculum construction, and the integration of industry and education for collaborative education. With the theme of “Quality Development, Characteristic Development and Innovative Development”, Nanning University focuses on talent cultivation, professional and curriculum construction, and collaborative education with industry-education integration, casting the soul of application-oriented characteristics, establishing the root of serving local development and strengthening the foundation of industry-education integration, and striving to cultivate high-quality applied talents for the regional economic and social development in the new era.

The Transport Planning course is positioned for students to be able to investigate urban transport phenomena based on the current situation and characteristics of a particular transport system, to grasp the laws of urban transport development, to be skilled in using scientific methods to forecast the development trends and requirements of transport demand, and to develop teamwork skills to develop plans for transport supply construction tasks and construction scale options for a specific period. Students will be able to illustrate basic transport planning theory, explain the four-stage approach to transport planning, explain commonly used transport planning software, and explain planning methods for urban road networks, urban parking, public transport, and pedestrian transport. Students will have the ability to develop transport planning schemes and complete simple transport planning schemes. Students will develop a pioneering vision and thinking in terms of literacy and have basic transport planning skills.

The current course content is mainly taught by Wang Wei, and Chen Xuewu The course mainly covers traffic demand forecasting, traffic network analysis, comprehensive urban traffic planning, urban road network planning, parking facilities planning, urban traffic management planning, highway network planning, and comprehensive evaluation methods of traffic planning. The teaching method is mainly based on the case study method, but most of the cases used are those provided by the textbook, and there are

not many cases of practical work application. The course assessment consists of regular assignments and a final examination. The regular assignments are mainly assigned according to the classroom content, and the final examination is mainly to assess the students' mastery of the content learned in the course.

In general, the teaching of the current state of transport planning is biased towards traditional teaching, with the teaching content based on the textbook, and although cases are cited in the teaching process, they do not highlight practical work applications [2, 3].

### 3 Conduct Research on Transport-Related Companies and Use Computer Software to Analyse the Demand for Graduates from Relevant Companies

In order to make the curriculum reform of transport planning relevant to students' work reality and to meet the current and future needs of employers, research and analysis of the current employment companies and possible future employment companies of transport planning students is needed.

After a survey on the employment situation of transportation students in Nanning University in recent years, the main employment companies of students are summarized in Table 1.

In addition to the above major employment units for transportation graduates, companies in Guangxi that are highly relevant to transportation employment are listed in Table 2. Under the current employment pressure, the school can train excellent graduates to be delivered to these companies according to the needs of the following companies.

By summarising the employment requirements of the above companies for transport graduates and using computer software to analyse them, we can outline that companies have different requirements for transport planning courses. Companies in the traffic testing, traffic maintenance, transport investment groups, transportation and logistics categories require students to have an overall understanding of the content of traffic planning.

**Table 1.** Nanning University Transportation Student Employment Company Fact Shee

Serial number	Employment Companies	Business	Employment demand for transport students
1	Hualan Design (Group) Limited	Research and planning, engineering consultancy, urban and rural planning, engineering design in the process of urban and rural construction	Transport Planning and Management, Traffic Engineering

*(continued)*

**Table 1.** (continued)

Serial number	Employment Companies	Business	Employment demand for transport students
2	Guangxi Traffic Engineering Testing Co., Ltd	Undertake construction engineering inspection and testing and technology research and development services for highway, water transport, municipal, railway, construction and underground engineering, research and development of engineering equipment and materials, machinery and equipment, car rental, etc.	Roads and urban roads and other related disciplines
3	Guangxi Transportation Science And Technology Group Co., Ltd	Transportation infrastructure construction, provision of technology research and development, survey and design, consulting and testing, engineering supervision, project analysis (traffic planning and technology research, environmental impact assessment on construction projects, etc.), as well as the development of intelligent transportation hardware and software products, operation and maintenance services and traffic safety construction and other whole industry chain services	Road engineering and other related disciplines

(continued)

**Table 1.** (continued)

Serial number	Employment Companies	Business	Employment demand for transport students
4	Guangdong Zhenye Uctrl Technology Corp.Ltd	Urban road traffic signal optimization, traffic organization design optimization, road signage design, traffic safety accident analysis, traffic safety hazard identification, traffic simulation evaluation and analysis, traffic operation evaluation, traffic opinion management, intersection ledger management, etc.	Transport and other related disciplines
5	Guangxi Beitou Transportation Maintenance Technology Group Co., Ltd	A diversified national high-tech enterprise integrating traffic maintenance operations, monitoring, testing and consulting, research and development, production and sales of materials and equipment	Road engineering and other related disciplines
6	Shenzhen Shilian International Freight Forwarding Co., Ltd	Air, sea and land international freight forwarding business, logistics information services, etc.	Transport and logistics and other related disciplines
7	Shenzhen Traffic Control Technology Co.	Research and development, integration, production, sales, consulting and technical services of railway safety systems and equipment and development and sales of related software and hardware products, etc.	Railways and other related disciplines

(continued)

**Table 1.** (continued)

Serial number	Employment Companies	Business	Employment demand for transport students
8	China Railway Express Company Limited	Providing customers with a range of services such as high-speed rail express, general cargo express, cargo express and general parcel forwarding	Transport and other related disciplines
9	Guangxi Traffic control Technology Development Co.	Technical services, technology development, technology consulting, technology exchange, technology transfer, technology promotion, sales of special equipment for rail transportation, key systems and components, repair of special equipment, etc.	Railways and other related disciplines
10	Guangxi Qinzhou Taihe Transportation Group Co., Ltd	Road passenger transport operation, road passenger transport station operation, road cargo transport, insurance agency business, urban public transport, network booking taxi operation service, construction work construction, etc.	Transport and other related disciplines
11	Guangxi Institute Of Occupational Technology	Private full-time general higher education schools	Rail-related disciplines
12	GuangXi Vocational College of Performing Arts	Full-time general tertiary institutions	Competent in high speed rail and rail courses

**Table 2.** Traffic and transport majors available for employment in Guangxi

Serial number	Employment Companies	Business	Employment demand for transport students
1	Guangxi Transportation Investment Group Co.	Transport construction and operation, as well as maintenance of transport facilities, toll collection, finance, logistics, resource development, transport and energy construction management, and international economic and technical cooperation	Road engineering and other related disciplines
2	Guangxi Beibu Gulf Investment Group	Transportation infrastructure investment, construction and operation, logistics, trade, water affairs, environmental protection investment, transportation finance, etc.	Road engineering and other related disciplines
3	Nanning Jiaotong Investment Group	The construction and management of transport infrastructure and the only main body of water infrastructure construction in Nanning, undertaking the construction and investment of all public transport network facilities in Nanning except rail transport	Urban public transport and other related disciplines
4	Nanning Rail Transit Group Limited Liability Company	Responsible for the investment and financing, construction and operation management of rail transit projects, and for the development and operation of primary and secondary land along and around rail transit lines	Railways and other related disciplines

*(continued)*

**Table 2.** (continued)

Serial number	Employment Companies	Business	Employment demand for transport students
5	Guilin, Liuzhou and other cities in the Jiaotong Group	For the corresponding urban transport infrastructure construction management subject	Urban public transport and other related disciplines

## 4 Analysis of the Problems of Building a Transport Planning Course Aligned to the Needs of Companies

According to the demand of enterprises for traffic planning courses, analysis with computer software shows that the enterprises with great demand for traffic planning courses are mainly design companies and professional traffic planning companies, other transportation companies' demand for traffic planning is mainly reflected in the overall framework of students having traffic planning, because the construction of traffic engineering is based on traffic planning, so traffic planning courses for road The course is a precursor to these courses for courses such as road engineering and rail transport.

The current teaching content and approach can meet the needs of transport companies for students to master transport planning, but it cannot meet the requirements of design and transport planning companies for students, mainly in the following areas.

### 4.1 Broad Teaching Content

The teacher's choice of teaching content is broad, and due to the limited class time of the course, students do not have enough in-depth knowledge of what they are learning. For example, in the process of teaching the chapter on integrated urban transport planning, teachers are only able to explain the content according to the textbook, and are unable to teach case studies of actual projects for integrated transport planning, taking the integrated transport planning of a city within Guangxi in Fig. 1 as an example [4, 5].

According to the catalogue, the case requires at least 10 classroom hours to present and learn from students, and with a total of 48 classroom hours for the whole course, if too much classroom time is spent on one part of the content, the rest of the content will need to be completed by students on their own, which is not guaranteed and makes it difficult to achieve the objectives set for the course.

### 4.2 Lack of Relevance in the Teaching and Learning Process

Teachers do not differentiate the teaching process according to students' employment intentions and other specific situations. At present, there are six classes in the transport major, and classes are taught in small groups according to the classes, and teachers choose the same content and depth of teaching, resulting in the course not being relevant



Chapter 1	Overview.....	3
1.1	Planning Background.....	3
1.2	Planning horizon and year.....	5
1.3	Planning basis.....	5
1.4	Planning content.....	7
1.5	Main research ideas and technical lines.....	8
Chapter 2	"Achievements and Problems in the 13th Five-Year Plan .....	9
2.1	"Major achievements in transport development in the 13th Five-Year Plan.....	9
2.2	Problems with transport development.....	17
Chapter 3	Interpretation of the plan .....	32
3.1	Integrated Transport Planning.....	32
3.2	Transport-specific planning.....	42
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4.1	Trend Research.....	60
4.2	Demand studies.....	67
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**Fig. 1.** Catalogue of integrated transport planning projects in a city within Guangxi

in the teaching process. However, during classroom teaching, students only learn the traffic demand forecasting part, and the use of other modules is not covered, Fig. 2 shows an example of student results using the software.

Some students who are employed in the field of road testing and maintenance need a more comprehensive study of traffic planning, which requires a wider range of content than the current one, but not very in-depth.

### 4.3 Lack of Comprehensive Guidance for Students in the Learning Process

The uniformity of the course throughout the semester for students has led to a lack of comprehensive guidance on the learning process and a lack of teaching content and teaching resources for some students who want to study in depth. The current library



Fig. 2. Example of Transcad software student use results

of teaching resources for transport planning has been constructed, see Fig. 3, but it is limited to the content of the textbook and is still not comprehensive enough, for example, the video resources are limited.

The screenshot shows a web-based teaching resource library interface. The main title is 'Transport planning' by 'Main Teacher: Lanfang Zhang'. Below the title, there are 'Edit' and 'Settings' buttons, and a 'Course Evaluation' section showing a 5.0 rating with five stars and '(1 comments)'. The course details include: College: Nanning University; Faculty: School of Transport and Communications; Major: Transportation; Curriculum: Transportation; person in charge: Lanfang Zhang; English Name: Traffic Planning; Serial No.: 11549; Credit: 3; Period: 48. A 'Contents' section lists 'Course Description' and 'Teaching methods'. On the right side, there are two numbered sections: '1 Unit 1 Introduction to the Course' with sub-points 1.1 Welcome Message, 1.2 Course Description, 1.3 Course design, 1.4 Pre-requisite knowledge and essential skills, and 1.5 Study groupings; and '2 Module 2 Introduction to Transport Planning' with sub-points 2.1 Learning Objectives, 2.2 Definition, classification and hierarchy of transport planning, 2.3 Purpose and mission of transport planning, 2.4 Overall design of the transport plan, and 2.5 Teaching PPT.

Fig. 3. Screenshot of the Current Transport Planning Teaching Resource Library

## **5 Teaching Reform Programme for Transport Planning Courses in the Context of Modern Industrial Colleges**

At present, all counties in Guangxi are connected to motorways, the Pinglu Canal, the backbone project of the new western land and sea corridor, officially started construction on August 28, 2022, the Baise Water Conservancy Hub Navigation Facilities Project will start construction in 2021, the Nanning-Chongzuo Railway, the Nanning International Airport Comprehensive Transportation Hub Project (GTC) will soon be put into operation, and the Beibu Gulf International Gateway Port is among the top ten ports in China.

Combining the current situation of the development of transport in Guangxi and the problems of the current traffic planning course, the teaching reform plan of the traffic planning course in the context of modern industrial college is proposed according to the analysis of computer software.

### **5.1 Differentiated Teaching of Students According to Employment Intentions**

As there are currently over 200 students in the Transport course, students have a wide range of career paths after graduation. In order to teach in a more targeted way, we can conduct research on students' career intentions in advance during the first semester of the third year of the course, and teach according to their career intentions instead of following administrative classes. Students' career intentions can be divided into transport design, experimental testing, traffic optimisation, domestic and international logistics, transport civil servants, teachers and others. Taking the Class of 2020 students as an example, their employment intentions are shown in Fig. 4. Teachers develop different teaching contents and teaching programmes according to the students' employment intentions to facilitate effective teaching.

### **5.2 In-Depth Research into Design Firms and Specialist Transport Planning Firms**

According to the current employment situation of students, teachers need to go to design companies and professional transport planning companies to conduct research, to understand the company's employment needs for graduates, teachers according to the needs of enterprises to develop course content, and in the case selection directly choose the company's project cases for teaching, so that students have the ability to quickly adapt to the work of the company after learning the course [6, 7].

### **5.3 Invite Corporate Mentors for Co-teaching**

In order to make the teaching more relevant, the school can conduct joint teaching with long-term cooperation enterprises. As the enterprise instructors have their own work to deal with, they cannot carry out the whole teaching process, so when the selection of course content and case selection, they can discuss with the enterprise instructors to determine, and in addition, when the case teaching is carried out, the enterprise instructors

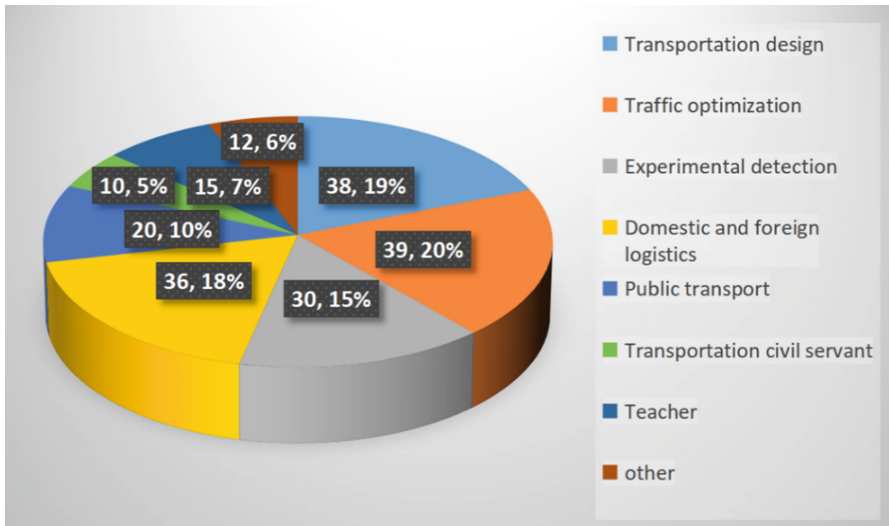


Fig. 4. Student Employment Intentions Survey Form

can be invited to conduct on-site teaching and impart work experience in order to achieve good The course content and case selection can be determined in consultation with the company tutors.

#### 5.4 Under the Internet + education Model, Establish an Online Course Resource Library and Use a Combination of Online and Offline Courses

As the traffic planning course involves more content, and the course hours are only 48 h, according to the characteristics of Nanning University students, students enter the school with a basic foundation of about 20 points above the undergraduate line, the learning base is weak, at the same time, students in the previous learning has not yet formed the ability to learn independently, need the teacher’s guidance to enter the learning state, so the teacher to establish a complete library of teaching resources, and in the learning process to The assignment of tasks is very important. The current teaching resources are mainly those of the textbook, supplemented by a selection of case studies. In the context of a modern industrial college, the transport planning course library needs to be upgraded, firstly for the cognitive part, which students can complete through online video learning and tests [8, 9]. For content that needs to be understood, teachers need to provide guidance in the classroom and assign post-course work to consolidate it. For the application part of the content, teachers need to introduce actual cases from enterprises for teaching, and assign actual project cases for students to practice after class. In view of this, teachers need to establish a library of video courses and case teaching courses on transport planning, and need to prepare the course content in depth in order to promote effective teaching in the classroom [10, 11].

**Table 3.** Traffic Planning Course Evaluation Data Information Model Framework Fact Sheet

Serial number	Course Objectives	Evaluation methodology
1	Can state basic knowledge of transport planning	Related content tests
2	Ability to independently conduct data collection and prepare traffic survey plans	Actual project case study plan prepared and uploaded to the system, evaluation form prepared and evaluated by teachers
3	Ability to perform simple calculations for the four-stage method of traffic demand forecasting and to use Transcad software for simple traffic demand forecasting	Calculation of cases and forecasting of actual projects using Transcad software, teacher preparation of evaluation forms and evaluation
4	Ability to perform road traffic network analysis	Analysis of road traffic networks for practical projects, preparation of evaluation forms by teachers and evaluation
5	Able to carry out simple road traffic system planning	Planning of road traffic systems for practical projects, preparation of evaluation forms by teachers and evaluation
6	Ability to carry out a comprehensive evaluation of basic transport planning	Comprehensive evaluation of road traffic planning for practical projects, preparation of evaluation forms by teachers and evaluation

### 5.5 Building an Information Model of Course Assessment Data to Understand Student Learning

In order to have a comprehensive understanding of students' mastery of knowledge, teachers can establish a course evaluation data information model based on the course objectives derived from surveys and computer software analysis to understand students' mastery of various aspects of knowledge, Table 3 provides a framework fact sheet for the Transportation Planning Course Evaluation Data Information Model.

Teachers are guided by the course assessment data and information model to provide tailored tutorials to students to ensure their mastery of knowledge.

## 6 Conclusion

This paper analyses the methods of reforming the transport planning curriculum in the context of the construction of a modern industrial college through computer software, which has important implications for the future teaching of the curriculum. As a university serving the local community, Nanning University should conduct research on local

industries and enterprises and analyse them with computer software, so as to clarify the employment needs of enterprises for graduates, and arrange the course content and teaching methods with the main objective of serving the local industry when constructing and reforming the curriculum. The curriculum is set up with the students’ employment in mind, so that the students trained by the school can best meet the development requirements of the enterprises; the school is run in collaboration with the enterprises, so that the enterprise instructors can come into the school and teach together; and the data and information model for the evaluation of the curriculum is set up to understand the students’ learning situation and to check the gaps. This will enable the school to truly connect education with the needs of society, to develop students’ practical application skills, and for teachers to link theory with practice in their teaching, so as to take the path of a modern industrial college and train excellent talents for the country.

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