Development and Practice of Teaching Platform for Construction Survey

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ABSTRACT

With the rapid development of new technology and new process, engineering construction, survey data processing process of measuring real-time rapid completion of engineering construction has become an inevitable requirement of engineering construction the calculation function of the use of program engineering calculator powerful flexible and rapid completion of surveying data processing has become a staff engineering survey specialty. Must have a core occupation ability. The construction of measurement data engineering construction measurement, calculator program design and development of teaching application platform, to cultivate engineering survey specialty construction measurement data processing core. Occupation ability and reform of teaching mode of "construction measurement data processing” course teaching of engineering has an important reference value.1

In recent years, new technology, new technology is widely used in production and construction, and on the professional competence engineering measurement technology professional positions should have put forward new demands, mainly in measuring, painting, considered to improve the professional capacity of the three. Industries and enterprises through employer surveys, showing that vocational students to test, draw the two professional competence easy to master, to "count" the ability to grasp is not enough, while students usually study also used to focus on the first two. Engineering calculator as handheld computing devices, specially adapted in real-time, flexible, mobile data processing engineering construction measurement, measurement of work in the construction site has outstanding advantages. Higher engineering measuring technology for students, the design and development capabilities in engineering construction survey calculator

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program is to improve the construction of measurement data processing professional competence necessary requirement.

In this paper, engineering measurement technology professional job of professional competence based on the requirements, analysis of engineering construction calculator measuring program "Teaching," demand for integrated teaching, building engineering calculator program design and development of teaching application platform, based on the completion of construction Measurement data processing process systematization of engineering calculators Construction Survey assemblies for students of engineering construction survey data processing professional competence has important practical value.

NECESSITY

Currently, there are many, but the culture of information about books calculator class engineering and existing procedures suited to vocational students' professional abilities. Higher starting point information books, the program is too complex, it has become an obstacle to student learning. The problem is not only based on a systematic process of construction surveying, design and development of a set of calculator program, and focuses on the development of vocational students formed adapt, improve calculator programmed a programming application platform. Meanwhile, according to the teaching content standards and curriculum standards, teaching characteristics to build a vocational "education do" integrated teaching practice platform, but also for the students to improve measurement data processing professional ability to provide a self-learning platform.

DEMAND ANALYSIS

Students with engineering measurement technology requirements for professional positions "Construction Survey Engineering Data Processing" core of professional competence as the basis, based on a systematic process of construction surveying, construction surveying engineering data processing integrated curriculum for engineering calculator construction measurement procedures, follow the teaching of law gradual, detailed design, "Teaching," Teaching Application Integration platform documentation system, divided into the following three parts:

(1) Basic calculator program.

Basic Methods calculator program written this part focuses Casio calculator use measurements in engineering measurement technology professional data processing universal program (e.g.: angle setting, trigonometric calculations, matrix calculations, coordinate calculation, the azimuth angle calculation, etc.) as an example to illustrate the method of programming the calculator.

For example: a matrix calculation section. Matrix calculation function is a new feature fx-5800P calculators, measuring majors in "Surveying
Adjustment” this course, you need a lot of use matrix calculations. When using the fx-5800P calculator to calculate the matrix, the matrix calculation as long as the rules are met, meet calculator input, you can quickly and simply get the result.

(2) The basic measurement data processing.
Includes four leveling survey calculation program, goniometer front (rear) intersection coordinate calculation program, 54 Beijing Coordinate System and 80 Xi'an Coordinate System Operator and the positive and negative exchange Gauss projection band program, round curve calculation program.
This section contains a comprehensive measurement and calculation of the case. The process to select a slightly larger, more typical, integrated data processing, in these cases, use a combination of order, conditions, circulation of these three statements can be achieved, and that is we do not have three languages programming based on students the difficulty lies. Select several cases this basically combines the typical process data "topography", "Engineering Survey", "Surveying Adjustment" and other basic courses in measurement processing.

(3) The control and construction measure.
The work program based in part on actual construction measure, select 1 to 3 practical engineering case analysis, construction survey to establish mathematical model, algorithm design program structure, then write code and detailed description of the procedures. Finally, the actual case for application presentation. This part is mainly want students after learning through classroom, in the company will be able to achieve direct docking. Able to respond to the actual production of complex engineering activities.

PLATFORM ARCHITECTURE

Based on progressive learning law, engineering calculator application platform construction measurement program is divided into the basic calculator programming method module, basic measurement data processing program modules and control and measurement program module construction. Calculator programming basic method is to study the calculator module mapping program design and preparation prior to the development of knowledge to help familiarize students with engineering calculator program design and development capabilities and program design basic operation method. Basic measurement data processing program module is in students master the basic foundation calculator programming method, based on the construction measure application examples, analysis of engineering construction survey work process measurement data processing requirements, Construction and Teaching Content in Schools project teaching tasks, through project-oriented, task-driven teaching mode, the gradual completion of the calculator program design and development of measurement required in instances of project construction. Control and construction measurement program module provides students with independent learning platform, the content of the module to corporate research is based on the measurement by
extracting practical examples for students to choose the measuring program design and development training process. This module will describe the process of preparing the entire program, students can follow the instructions step by step to complete the process design, through training to improve the level of programming examples, grasp the target measurement data processing capabilities.

In the basic method of programming the calculator module, basic measurement data processing program modules and control and project construction program module for each measurement construction measurement procedures, but also contains mathematical model and program structure of the algorithm, program instructions, program code, program case four aspects. Program Description and procedures alternately, a short program every input, next to it in detail. Get rid of the previous description of the procedures and the program code out of line problems, to adapt teaching vocational students learn to do the integration of law, improve student learning calculator program written in confidence and interest. Assembly case are based on the requirements of the program prepared by the decomposition of the integrated program, the program has a detailed description of each segment, from easy to difficult and gradually mastered the calculator program design methods to improve students interest, to improve students’ learning ability. Documentation also contains the complete source code.

Overall system architecture of the program is shown in Figure 1.

![System Architecture diagram.](image)

**REALIZATION**

The teaching platform running interface as shown in Figure 2, students enter a user name and password directly into construction measurement program platform. Figure 3 is running interface construction survey program.
In the menu bar, a list of all the programs included in the teaching platform, students need to know to select the program, click to enter to get seven aspects of the assembly: functional description, a list of mathematical models, flowcharts, variables, listing calculation case, the program step. Figure 3 students choose coordinates in the menu bar is a positive operator, then click the button to display the flowchart interface.

It is to coordinate the development process being considered as an example of the assembly:

First flowchart coordinate Traverse functional description and analysis of mathematical models, and then calculate the coordinates being plotted explained. Coordinate Traverse flow chart as shown in Fig. 4, a flowchart illustrating, then the program manifest lists. Listing as shown in Table 1, the last case and attach the calculation procedure prompts.

![Figure 2. Platforms.](image1)

![Figure 3. The program's interface.](image2)

![Figure 4. Coordinate calculation.](image3)

**PRACTICAL APPLICATION**

Course "Measurement Engineering Construction Data Processing" is the engineering measurement technology professional core courses, students mainly work in the construction process of mapping the measurement data processing capabilities, adapt to the work site mapping data processing requirements engineering measure, to meet the needs of the project construction of the building. Because of the real-time measurement data processing needs of construction, it requires engineering measurement technology professionals with real-time processing of data mapping
capabilities, to train engineering students measuring technology mapping data processing capability presents new challenges. Conventional teaching model cannot meet the "Construction Survey Engineering Data Processing" course teaching needs, we will "Project Calculator Construction Survey program design and development of teaching platform" used in teaching practice, our hospital 13 Engineering Survey Specialty in "Construction Survey Engineering Data Processing" course to promote the trial, at the same time with this course but not used engineering measurements and supervision of students of the platform comparison and analysis "measuring program engineering calculator construction design and development of teaching platform" to improve Student survey data processing advantages occupational capacity. Judging from classroom discipline, so that the interactive teaching and learning, improve student interest; from the teaching point of view, during final exams, engineering survey of the course students.

### Table I. Coordinate Traverse Listing.

<table>
<thead>
<tr>
<th>Line number</th>
<th>Program code</th>
<th>Explanatory Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Clrmemory:Fix 3</td>
<td>Clear variables, set number of decimal places</td>
</tr>
<tr>
<td>2</td>
<td>Lbl1 1</td>
<td>Program tags</td>
</tr>
<tr>
<td>3</td>
<td>“X0”? →M:”Y0”? →N:”X1” ?→X:”Y1” →Y</td>
<td>Enter the original data</td>
</tr>
<tr>
<td>4</td>
<td>X-M→G:Y-N→H</td>
<td>The X increment assigned to G, Y increment assigned to H</td>
</tr>
<tr>
<td>4</td>
<td>“D=”:sqr(G^2+H^2)</td>
<td>Display distance value</td>
</tr>
<tr>
<td>5</td>
<td>Arttan(G/H)→E</td>
<td>Pseudo-azimuth calculation</td>
</tr>
<tr>
<td>6</td>
<td>IF G&gt;0 :then if H&gt;0 : then E→F :else E+360→F Ifend : else E+180→F</td>
<td>According to determine the azimuth angle quadrant</td>
</tr>
<tr>
<td>7</td>
<td>“FEJ=”:F</td>
<td>Output azimuth value</td>
</tr>
<tr>
<td>8</td>
<td>Goto 1</td>
<td>Program jump</td>
</tr>
</tbody>
</table>

The pass rate reached 90 percent, while the engineering survey and supervision of students through rate significantly lower. From the excellent rate, the engineering survey students also significantly greater than the students' engineering measurement and supervision.

**CONCLUSIONS**

In this paper, measurement technology students training project "Construction Survey Engineering Data Processing" professional ability to construct a calculator program based engineering design and development of interactive learning platform. Its main function to measure the actual construction project example, based on engineering construction survey data processing process systematization, from simple to complex program design program design, from general program to special programs, design and
development of the formation of a group of construction measuring program code set and program instructions, construction engineering majors measuring data processing capability and reform "project construction survey data processing" teaching methods course has important practical significance for the training of engineering measurement techniques.

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REFERENCES