THE DEVELOPMENT OF INSTRUCTIONAL MODEL FOR IMPROVING THE INFORMATION LITERACY OF UNIVERSITY STUDENTS IN GUANGXI PROVINCE

[1]Yang Yi, [2]Areewan Iamsa-ard, [3]Wapee Kong-in and [4]Suriya Phankosol

Bansomdejchaophaya Rajabhat University, Bangkok, Thailand

[1] yangyi.bsru@hotmail.com

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Abstract

The Objective of this research were: 1) To examine the factors affecting information literacy of the undergraduate students in Guangxi Province, 2) To develop instructional models of Project-Based-Learning **(**PBL**)** and Conceive-Design-Implement-Operate **(**CDIO**)** to improve the information literacy of undergraduate students at Guangxi University of Science and Technology, 3)To study the result of Project-Based-Learning (PBL) and Conceive-Design-Implement-Operate **(**CDIO**)** instructional models to improve the information literacy of undergraduate students at Guangxi University of Science and Technology. 70 Design major students , 2 classes enroll in Computational Thinking course in the semester 1st , academic year 2023 at Guangxi University of Science and Technology. The instrument of the research used to collect data was the 5 rating-scale the questionnaire for students and the interview for the teachers. Research process to do the questionnaire for students. Data Analysis by Descriptive Statistics i.e., Frequency, mean, Standard Deviation.

The results of this research were found results are 1) The internal factors are Personal information awareness, Personal information capability, Personal information ethics level, Personal learning motivation, and Psychology and External factors are in terms of national policies, Curriculum setting, Teaching environment, Teaching methods, Comprehensive quality of teachers, and Teaching evaluation. 2) Analysis results serving research objective 2- To develop instructional models of Project-Based-Learning (PBL) and Conceive-Design-Implement-Operate (CDIO) to improve the information literacy of undergraduate students at Guangxi University of Science and Technology. To serve objective 2, the collected data of confirming the appropriateness of 6 components of instructional model are analyzed in 4 areas, i.e., utility, feasibility, propriety, and accuracy and presented by frequency and percentage of the specialists and 3) Analysis results serving research objective 3- To study the result of Project-Based-Learning (PBL) and Conceive-Design-Implement-Operate (CDIO) instructional models to improve the information literacy of undergraduate students at Guangxi University of Science and Technology it was found that 30% students whose information literacy ability regarding works at Excellent level and other 80% at good level.

K**eywords:** development, instructional model, improving, information literacy

[1]Student in Curriculum and Instruction Program, Bansomdejchaophaya Rajabhat University, Bangkok, Thailand

[2]Associate Professor, Dr., in Curriculum and Instruction Program, Bansomdejchaophaya Rajabhat University, Bangkok, Thailand

[3]Assistance Professor, Dr., in Curriculum and Instruction Program, Bansomdejchaophaya Rajabhat University, Bangkok, Thailand

[4]Associate Professor, Dr., in Curriculum and Instruction Program, Bansomdejchaophaya Rajabhat University, Bangkok, Thailand

Introduction

In 1974, Paul Zurkowski, chairman of the American Information Industry Association)IIA(, took the lead in proposing a new concept of information literacy in the report of the American Library and Information Science Council（Eisenberg，2004：1），and initially defined information literacy. The skill of using information in making a question answerable using a wide range of information tools and primary information sources. After the concept of information literacy was put forward, it was widely disseminated and used. Research institutions around the world have carried out extensive exploration and in-depth research on how to improve information literacy.In September 2019, UNESCO pointed out: Media and Information Literacy)MIL(for citizens in universities and mass media needs to be strengthened; in November 2019, the American Association of College and Research Libraries)ACRL(launched The Information Literacy Framework for Higher Education)Framework for Information Literacy for Higher Education,(， The cultivation of information literacy of college students has become an important topic in the education circle at home and abroad.The ultimate goal of information literacy is to cultivate the ability of lifelong learning. Information literacy ability and lifelong learning ability will become the necessary survival skills for people to live in the 21st century.

In recent years, relevant government departments, research associations and the public have successively formulated or proposed some policies, initiatives or countermeasures related to information literacy education. In January 2017, the State Council issued the "Thirteenth Five-Year Plan for the Development of National Education", which proposed the full use of various social science and technology education resources, the combination of science and technology education activities inside and outside the school, and the scientific quality, information literacy and innovation ability of students. The focus of training and other strategies ([EB/OL]. [2020-12-01]). In 2018, the Ministry of Education issued the "Education Informatization 2.0 Action Plan", which proposed the construction of the evaluation index system of students' information literacy, the improvement of teachers' information literacy and the cultivation of students' information literacy and other goals ([EB/OL]. [2020-12-01]). In August 2019, the Chinese Library Society, Wuhan University School of Information Management and other units launched the "my country Citizens' Information Literacy Education Promotion Initiative", which aims to publicize and promote citizen information literacy education, and promote the popularization and development of information literacy education ([EB/OL]. [2020-12-01]). In May 2020, Zhou Hongyu, vice president of the Chinese Society of Education, proposed to carry out information literacy promotion activities for teachers and principals in the 2020 two-session proposal to strengthen the cultivation of students' information literacy ([EB/OL]. [2020-12-16]). Information literacy education is not only to teach the public information technology knowledge, but also to cultivate the public's ability to use various information skills to solve practical problems spontaneously and scientifically, and to shape their correct emotions, attitudes and values ([EB/OJ] 2014-06-22).

In the era of high -speed development of information, simple knowledge shallow learning can no longer meet the requirements of talent training in the new era, and universities need to reform the traditional teaching model. Information literacy education has become one of the focuses of academic and industrial attention. Information literacy as an important professional literacy in universities education is imperative. In information literacy education, the cultivation of students' information literacy ability can be obtained through general education. The disadvantage is that the knowledge practice application of information disciplines is not enough to penetrate relevant professional disciplines and require further deepening research. Universities have begun to recognize the possibility and necessity of information literacy educators cooperating with teachers of various majors, and recognizing that multi -party cooperation can further deepen and improve students' phenomenon. The school began to explore the integration of information literacy into professional courses.

On the basis of general education courses, information literacy education (Course-Integrated-Instruction, referred to as integrated education or integration teaching) provided course integration to better realize university Information literacy Education goals.

Objectives

1. To examine the factors affecting information literacy of the undergraduate students in Guangxi Province.

2. To develop instructional models of Project-Based-Learning (PBL) and Conceive-Design-Implement-Operate (CDIO) to improve the information literacy of undergraduate students at Guangxi University of Science and Technology.

3. To study the result of Project-Based-Learning (PBL) and Conceive-Design-Implement-Operate (CDIO) instructional models to improve the information literacy of undergraduate students at Guangxi University of Science and Technology.

Material and Method

In the study of "The developing of instructional model for improvement the information literacy of university students in Guangxi Province", In order to construct the theoretical framework for this research, the researcher studied the literatures and researches documents concerning related to this study.

Literature review

The condition of teaching and learning management of Computer Thinking course in Guangxi Province University

Principle

In the context of the era of high -speed development of information technology in the 21st century, information literacy is an important skill that adapts to the future of society and artificial intelligence. Information literacy is not only the professional literacy of information science majors, but also the need for complex issues in different professional work fields. A set of thinking skills and methods can solve the problems of their respective professional fields with information literacy. Both the definition of information literacy and the teaching and training experience can be clear. The study of a computer course content is not exactly equal to the cultivation of information literacy, but the learning of computer courses in the effective teaching mode has become an effective way to cultivate information literacy training One, this study uses computing thinking courses as a research experimental course for development teaching models. Through the analysis of on -site surveys and related literature in Guangxi colleges, researchers, 38 undergraduate institutions in Guangxi Province, 47 colleges and universities, inspected the development history, development status, and type of school running in each school. Colleges and universities are promoting the development of information literacy teaching reform. Choose the three schools of Guangxi University, Guangxi Academy of Arts, and Guangxi University of Science and Technology as the key investigation objects. The teaching plan of Guangxi university stipulates that undergraduate students in various majors take at least two information courses. Although these three schools are set up in the information literacy education system There is a "computing thinking" course. In order to better carry out research on information literacy issues, through investigations on the on -site investigation of the information literacy of undergraduate students in Guangxi, many students still fail to meet the market's requirements for information talent after graduation. The source of information is mainly from the classroom. Some students do not use the computer network to obtain information at the spare time. (2) Instead of information literacy, the content of information literacy education is too simple. Students passive learning

is only to obtain credits. Information literacy and professional disciplines have no in -depth integration in their respective fields. Few students can combine information knowledge with professionalism. (3) Poor information processing ability, most students cannot effectively use information tools to solve problems encountered in professional learning. (4) Information ethics and security awareness are weak. Students can basically understand the immorality and illegal behavior in the Internet correctly, but it is difficult to maintain the security of network information dissemination. Sometimes during the use of the Internet, sometimes inadvertently harm the interests of others, but they are unknown. Especially on the issue of intellectual property rights, students will not indicate the source when quoting the copyright information of others, and need to further strengthen the students' awareness of copyright laws and regulations.

At present, most researchers believe that the connotation of information literacy should include at least four dimensions: information awareness, information knowledge, information ability, and information morality, which together constitute a unamplified unified whole. Information awareness is the pioneer, information knowledge is the foundation, information ability is the core, and information morality is guarantee. (Zhou, 2006: 133).

This thesis studied the Information literacy refers to the ability of students to have at least 3 dimensions，Reference from the American Library Association (ALA) and the American Association for Educational Communications and Technology (AECT) published "Information Competence: Creating Learning Partners" in 1998, and formulated "Student Learning Information Literacy Standards", from information literacy, The three dimensions of independent learning and social responsibility propose nine information literacy standards for students to learn.

Objectives

The goal of this course is to allow students to cultivate information literacy from computing problems. With the help of computer solving the problem, use computer to solve problems and express their solutions. Can be able to effectively use these methods and skills to effectively solve other problems. Through learning, we will learn to solve the framework of computing thinking and information literacy structures, abstract and model problems, and convert mathematical or physical models into models that can be automatically executed. The construction of this course is based on the computing discipline cognitive model, and uses the content of computer science as the background. It is guided from the disciplinary thinking and method levels to guide students to understand the essence and thinking of information disciplines. The learning of professional courses provides necessary help. Calculating thinking and information literacy are not only essential for computer science. It can also solve the problem of interdisciplinary disciplines.

Knowledge goal: Understand the exposition of information in the computer, computer hardware system and software system foundation, mastering common operations such as Windows, Word, Excel, PowerPoint, etc. And master the foundation of cutting -edge artificial intelligence algorithms.

Capability goals: Cultivate students 'phenomenon, computer scientific literacy and computing thinking ability, and improve students' computer application level and computer problems solving ability.

Curriculum Structure

There are 8 units, 48 house in computational thinking count course. The elements, methods of thinking, the incorporation of problems and actual project cases, analyze from the problem, emphasize the cultivation of computing thinking and information literacy, promote students 'awareness of actively using computers to solve problems, thereby improving students' information literacy.

Development of Instructional Model

Researchers review the development theory of PBL and CDIO teaching models through literature research. Taking computing thinking courses as research objects, a hybrid teaching mode guided by problems and projects as a carrier is established. Five educational experts in different professional fields were invited to discuss and analyze the key elements of teaching models through cross -disciplinary cooperation, such as teaching strategies, evaluation methods and technical tools, and repeatedly modified and improved a hybrid teaching model. After IOC Experts confirm that the teaching model aims to optimize teaching experience and improve learners' satisfaction and results. Specifically, all the contents that need to be learned and mastered by all the courses are based on problems or engineering projects, and problem solutions are set according to the project cycle module. The problem, the entire teaching and learning process formed an organic connection as a whole. In the development of project practice teaching, improving undergraduate information literacy, improving the teaching effect of information curriculum teaching, cultivating students' independent exploration, active learning awareness, and being opposite to each other. Information literacy ability.

The important of PBL model

PBL (Project/Problem Based Learning) is based on problems, which originated from the University of McMaster University in the United States. PBL emphasizes that project/problem is guided as a guide. In this teaching mode, teachers help students analyze and understand problems, guide students to solve problems, and do not help students solve problems. Through students' independent inquiry and cooperation solving the problem, students can improve the problem solving the problem to solve the problem, Analyze the ability of the problem, PBL refers to the inquiry based on real problems, and students finally get the process of project works by formulating plans and implementing project tasks. The process of this teaching model generally includes selection projects, formulation planning, activity inquiry, work production, results exchange and activity evaluation. Over the years, the teaching and learning of PBL methods in education has been used in various disciplines for many years. This is an effective best teaching method that can improve the quality of teaching and learning activities. In the past ten years, many teachers work in their PBL methods. Most teachers insist that the PBL method significantly affects the progress of students' learning. This study reviews the relatively mature PBL methods of teaching and learning activities related to this study. PBL refers to the process of exploration based on real problems, and students finally get project works by formulating plans and implementation project tasks. The process of this teaching model generally includes selection projects, formulation planning, activity inquiry, work production, results exchange and activity evaluation. The teaching and learning about PBL approach in education have been utilized for many years in various disciplines was the best teaching method effective to enhance the quality of teaching and learning activities In the last decade many teachers have worked with PBL approach in their teaching projects Most teachers insisted that PBL approach significantly affects the progress of the student learning this study has reviewed some PBL approaches on the teaching and learning activities related to this study.

The important of CDIO model

The engineering education model CDIO began in the 1990s and was founded by four world -renowned universities (including the Massachusetts Institute of Technology and the Royal Swedish School of Technology). It is based on the abstraction and universal work process of "from product development to product development". CDIO is the English: CONCEIVE, Design, Implement (Implement), and Opera. Abbreviations, let students take the initiative, practical, comprehensive, cooperative, organic way of learning between the curriculum, and pay more attention to the integrity of the student's practical process and

engineering learning initiative to cultivate independent learning ability, Engineering practice professional ability, team cooperation ability, communication expression ability, innovation awareness, etc., and realize the improvement of students' personal ability.

PBL+CDIO blended learning Model

Hybrid learning refers to the student's learning model. In this mode, learners can gain knowledge through the combination of traditional classroom learning and online learning. So as to overcome the time and space restrictions of traditional learning, thereby reducing teaching costs and increasing teaching income. When the PBL and CDIO education model is introduced into the course, it will face the contradiction between large capacity and system of engineering teaching content with limited classroom teaching time and resources. Mixed learning combines traditional classroom learning with online learning and optimizes it. Distribution of teaching resources.

Through combing the key concepts related to this study, the PBL+CDIO hybrid learning mode is initially constructed based on this study, guided by the CDIO mode-design-implementation-operation-operations With optimization, at the same time, the CDIO teaching outline and standards are integrated into project -style learning, and the advantages of the CDIO model are fully designed, so as to better design and select the theme of PBL project -style learning themes and formulate related plans, highlighting the advantages of the two teaching models Essence As shown in Figure 1

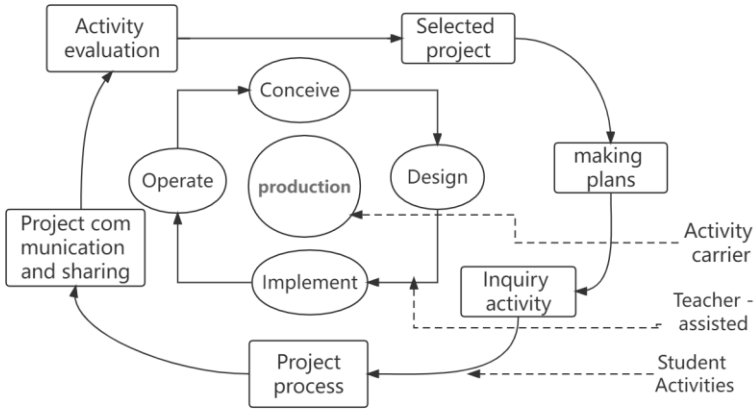

Figure 1 PBL+CDIO blended learning Model

Figure 1 shows the construction idea of the CDIO-PBL teaching mode: P is the product of the center of the center, which is the core and project-style learning carrier of the entire teaching mode; C (idea), D (design), i (implementation), and O (run), this cycle is also the product development cycle pointed to the CDIO model, using this mode to recycling the design and generating cycle The main path of iteration continuously; the most outer circles in the figure include six links of project -based learning: selection of projects, formulating plans, activity research, student project work production, results exchange and activity evaluation. To learn the core link of middle school students' activities, students will gradually complete the product production according to the project task under the overall background of the CDIO model. Get relevant complete system knowledge in the learning process, and then internalize to form a high -level information literacy ability.

Evaluation of Instructional Model

Effectively supervising and teaching evaluation in the implementation of the teaching

process can be grasped and evaluated in a timely manner for the learning status of students, which is of great significance to the teaching improvement of teachers. Through behavioral observation tables, exploring PBL and CDIO -integrated diverse three-dimensional teaching Mode effective monitoring and evaluation. This study adopts a combination of formation and summary evaluation in teaching evaluation. The formation evaluation mainly analyzes the data generated by the students in the learning process. Therefore, it is necessary to record the performance of students' learning behavior. As the collaborators, the collaborations formulate evaluation standards and set up reasonable evaluation indicators and weights. After each project is completed, they organize students to evaluate, so that students can clearly clarify their shortcomings and further efforts in a timely manner. Summary evaluation is to test the learning effect of students for a semester after the course, and comprehensively evaluate the learning situation through three ways of conducting the behavior observation table, interview, and information quality standard review questionnaire survey through the student's completion case project.

The results of the research show that PBL teaching emphasizes the problem of problems and solve the problem through the self -exploring and cooperation of learners; and CDIO teaching focuses on process practice, allowing students to learn engineering in active, practical, and organic connections between courses. The organic combination and integration of the two models will help cultivate students' ability to learn and solve complex engineering problems independently

Material and Method

The method of this research is to study the characteristics of PBL and CDIO teaching model, and develop a blended learning model to improve the information literacy ability of Guangxi university students. This research used blended Method of Research. This research is divided into 3 phases.

Phase 1 was conducted to answer research objective 1: To examine the factors affecting information literacy of the undergraduate students in Guangxi Province.

1**.** Research Design: The Descriptive Research will be used**.**

2. The Population / The Sample Group

1） The Population

Group 1: The former student's year 1 of Computational Thinking course, semester 1 on academic year 2022 from 3 universities in Guangxi Province

2）The Sample Group

Group 1: The former student's year 1 of Computational Thinking course, semester 1 on academic year 2022 from 3 universities in Guangxi Province by Krejcie & Morgan set the proportion of the population 0.5, tolerance level 5 % and confidence level 95%

Group 2: The lectures who teach Computational Thinking course, semester 1 on academic year 2023 from 3 universities in Guangxi Province

The population who teaches Computational Thinking course from former students from 3 universities in Guangxi Province

Research instrument

The questionnaire for students

Research process to do the questionnaire for students.

1. Study Computational Thinking course and factors affecting Information Literacy ability of undergraduate students.

2. Design a questionnaire on factors to improve Information Literacy ability for the students at Guangxi University of Science and Technology.

3. Present the draft of questionnaire to the advisors for checking correctness and completion.

4. Assess the validity of questionnaire on factors to improve Information Literacy ability for the students at Guangxi University of Science and Technology by 5 experts through Index of Item-Objective Congruence (IOC)

5. Design Likert 5-point rating scale questionnaire on the following score rating criteria.

Quality Validation

Using IOC by 5 experts to test the quality of questionnaire.

Data Collection

1. Ask for permission for data collection

2. Collect data from the assigned students using the developed questionnaire.

Data Analysis

The factors affecting Information Literacy ability obtained from the students are interpreted using mean interpretation criteria proposed

Descriptive statistics, frequency, mean **(p)** standard deviation (o)

Population

Group 2: The lecturers who are teaching Computational Thinking course from 3 colleges in Guilin City.

1. Lecturer from Guangxi University

2. Lecturer from Guangxi Arts Institute University

3. Lecturer from Guangxi University of Science and Technology

Research Process

1. Study literature on Information Literacy ability, and factors affecting Information Literacy ability of undergraduate students.

2. Design the draft of open-ended interview on factors affecting Information Literacy ability.

3. Present the draft of open-ended interview to the advisors for checking correctness and completion.

4. Assess the validity of open-end interview on factors affecting Information Literacy ability for the students at Guangxi University of Science and Technology by 5 experts

5. Do the open-end interview in three local College in Guangxi. The open-end interview type can only be answered by the lecturers.

Quality Validation

Using IOC by 5 experts

Data Collection

1. Ask for permission for data collection.

2. Collect data from the assigned lecturers using the developed interview.

Data Analysis

Content analysis

Expected Output Phase 1

Obtain important information that is used as a basis for examine the internal factors and external factors to promote Information Literacy ability for undergraduate students from the former students and lecturers. And take the result to do blended Learning Technology Instructional Model

Phase 2 was conducted to answer research objective 2: To develop instructional models of Project-Based-Learning (PBL) and Conceive-Design-Implement-Operate (CDIO) to improve the information literacy of undergraduate students at Guangxi University of Science and Technology.

Designing instrument (the questionnaire for IOC)

Study related concepts, principles, process about developing instructional model, including results in terms of factors affecting Information Literacy ability from research objective1.

1. Design the development of blended learning model to be the handout which

consists of the stable teaching activities and procedures. Such a developed instructional model with 5 components: 1) Principle & Rationale, 2) Objectives, 3) Contents, 4) Methods of teaching & Materials and 5) Evaluation, is in 4 aspects: 1) Utility Standard, 2) Feasibility Standard, 3) Propriety Standard and 4) Accuracy Standard

Assess the validity of the questionnaire of the appropriateness of the instructional model by 5 experts

Research instrument

Conformity assessment form of blended learning model in terms of accuracy standard, propriety standard, feasibility standard, and utility standard.

Designing instrument about the questionnaire on confirming the instructional

1. Design a questionnaire on confirming the appropriateness of the instructional model in terms of accuracy standard, propriety standard, feasibility standard, and utility standard.

2. Present the draft of open-ended interview to the advisors for checking correctness and completion.

3. Assess the validity of the questionnaire on confirming the appropriateness of the instructional model by 5 experts

Data Collection

1**.** Ask for permission of data collection

2. Collect appropriateness of the instructional model in terms of accuracy standard, propriety standard, feasibility standard, and utility standard from the 5 experts using the developed conformity assessment form of blended learning technology model.

Data Analysis

Descriptive analysis i.e., frequency and percentage. The acceptable items must not be less than 100%.

Expected Output Phase 2

Blended learning model the appropriateness of which is confirmed by experts for further implementation.

Phase 3 was conducted to answer research objective 3: To study the result of Project-Based-Learning (PBL) and Conceive-Design-Implement-Operate (CDIO) instructional models to improve the information literacy of undergraduate students at Guangxi University of Science and Technology.

Population

The total of 59 freshmen from 2 classes of students with different levels of proficiency — beginner, intermediate, and advanced, who enroll in Computational Thinking Course at Guangxi University of Science and Technology in semester 1 academic year 2023. Those sections involve the following.

30 students in class A

29 students in class B

The Sample Group

The 30 students who enroll in Computational Thinking Course from class section A are obtained by simple random sampling.

Research instruments

1. Lesson plans using Blended learning model

2. Rubric scoring

Designing instrument 1

Study contents, objectives, methods of teaching, materials, evaluation.

1. Design lesson plans by format given.

2. Present the lesson plan to the advisors for checking correctness, completion and improvement.

3. Assess the validity of the designed lesson plans by 5 experts through Item-Objective Congruence (IOC)

4. Conduct a try-out of the developed lessons plans with another group of samples for further improvements and implementation with the sample group.

Designing instrument 2

Scoring rubric form

1. Study the rubric scoring criteria aligned with Blended learning model.

2. Design rubric scoring criteria in 5 level

3. Present the developed rubric scoring criteria to the advisors for checking correctness, completion and improvement.

4. Assess the validity of the designed rubric scoring criteria by 5 experts

Data Collection

1. Ask for permission of data collection

2. Collect students' performance by the lecturers who teach this course and other lecturer assessment.

Data Analysis

Categorize students' performance according to rubric scoring criteria into their levels descriptor

Expected Output Phase 3

After implementing learning through the instructional model based on blended learning technology, students' score of Information literacy ability will be overall improved at 80% (Good Level).

Results

In the study of "Development of instructional model for improving the information literacy of university students in Guangxi province", the researcher studied the documents concerning the following.

Data Analysis Results

Part 1: Analysis results serving research objective1- To examine the factors affecting information literacy of the undergraduate students in Guangxi Province. There are 3 parts to present analysis results serving objective 1 using table and description as well as MEAN, standard deviation, interpretation (Level of Attitude), and ranking of all factors in overview. After that, items of all factors are presented likewise

The Common data of the respondent in overall (N=224)

The common data of the respondent in overall shows that most of the respondents are female, representing 58.48% of the total participants. The male respondents make up 41.52% of the total. The age distribution is relatively concentrated, 18 years old is the most common,69.64% of the respondents belong to this category.

The result of questionnaire from students in overview

The indicates that internal factors affecting the information literacy ability for undergraduate students are found to be at a high level overall (p = 3.174). Considering each item individually, it was found that No.7 Students always attend class on time except for accidental cases have the highest mean (p=3.531), followed by No.3 Students feel that this subject can improve their knowledge of the contents increasingly (p = 3.379). and the lowest mean is No.27 Viral communication about getting high grade easily from the senior students persuades many students to enroll in this subject (p = 2.813).

For external factors affecting the information literacy ability for undergraduate students, the overall level is also found to be at a high level (p = 2.919). Considering each item individually, it was found that No.16 Students can understand content clearly through this teaching model has the highest mean (p = 3.160). followed by No.26 Students notice that there are constant students are absent in this classroom (p =3.036). and the lowest mean is No.27 Viral communication about getting high grade easily from the senior students persuades many students to enroll in this subject (p = 2.813).

The Common data of the respondent majoring in industrial design from Guangxi University (N=63)

The common data of the respondent in overall shows that most of the respondents are female, representing 60.3% of the total participants. The male respondents make up 39.7% of the total. The age distribution is relatively concentrated, 18 years old is the most common,57.1% of the respondents belong to this category.

The result of questionnaire from students majoring in industrial design from Guangxi University(N=63)

The indicates that internal factors affecting the information literacy ability for undergraduate students who is majoring in industrial design from Guangxi University are found to be at a high level overall (μ = 3.171). Considering each item individually, it was found that No.7 Students always attend class on time except for accidental cases have the highest mean (μ= 3.529)., followed by No.3 Students feel that this subject can improve their knowledge of the contents increasingly (μ = 3.376) and the lowest mean is No.15 Students feel unsure that this subject can apply in their daily life (μ =2.819).

For external factors affecting the information literacy ability for undergraduate students who is majoring in industrial design from Guangxi University, the overall level is also found to be at a high level (μ = 2.913). Considering each item individually, it was found that No.16 Students can understand content clearly through this teaching model has the highest mean (μ = 3.158), followed by No.26 Students notice that there are constant students are absent in this classroom (μ= 3.036), and the lowest mean is No.20 Fixed learning places affect learning interest (μ = 2.801).

The Common data of the respondent majoring in industrial design from Guangxi Arts Institute University (N=55)

The common data of the respondent in overall shows that most of the respondents are female, representing 58.48% of the total participants. The male respondents make up 41.52% of the total. The age distribution is relatively concentrated, 18 years old is the most common,69.64% of the respondents belong to this category

The result of questionnaire from students in overview

The indicates that internal factors affecting the information literacy ability for undergraduate students who is majoring in industrial design from Guangxi University are found to be at a high level overall (μ = 3.171). Considering each item individually, it was found that No.7 Students always attend class on time except for accidental cases have the highest mean (μ= 3.529)., followed by No.3 Students feel that this subject can improve their knowledge of the contents increasingly (μ = 3.376) and the lowest mean is No.15 Students feel unsure that this subject can apply in their daily life (μ =2.819).

For external factors affecting the information literacy ability for undergraduate students who is majoring in industrial design from Guangxi University, the overall level is also found to be at a high level (μ = 2.913). Considering each item individually, it was found that No.16 Students can understand content clearly through this teaching model has the highest mean (μ = 3.158), followed by No.26 Students notice that there are constant students are absent in this classroom (μ= 3.036), and the lowest mean is No.20 Fixed learning places affect learning interest (μ = 2.801).

The Common data of the respondent majoring in Environmental Design from Guangxi University of Science and Technology (N=106)

The common data of the respondent in overall shows that most of the respondents are female, representing 58.5% of the total participants. The male respondents make up 41.5% of the total. The age distribution is relatively concentrated, 18 years old is the most common,86.8% of the respondents belong to this category

The result of questionnaire from students in overview

The indicates that internal factors affecting the information literacy ability for undergraduate students who is majoring in Environmental Design from Guangxi University of

Science and Technology are found to be at a high level overall (μ = 3.174). Considering each item individually, it was found that No.7 Students always attend class on time except for accidental cases have the highest mean (μ= 3.523)., followed by No.3 Students feel that this subject can improve their knowledge of the contents increasingly (μ = 3.377) and the lowest mean is No.15 Students feel unsure that this subject can apply in their daily life (μ =2.836).

The Lecturers Interview analysis results

Present the results of the questionnaire and interviews

After questionnaire and interviews with 6 lecturers, the factors that affect the information literacy ability for undergraduate students are summarized as follows.

The internal factors that affect the cultivation of college students' information literacy, the emergence, development and extinction of things are the result of the joint action of internal and external factors. They are not only caused by their inherent internal factors, but also closely related to certain external conditions. However, the status and role of the two in the development of things are different. External factors are the conditions for change, while internal factors are the basis for change. External factors work through internal factors.

1. Internal factors

1) Personal information awareness: Awareness is a kind of understanding and a kind of cultivation. Thought is the forerunner of action, and awareness has a positive reaction to behavior. Information awareness refers specifically to the reflection in the human brain, that is, people's conscious psychological reaction to various information, reflecting people's understanding, attitude, value trend and certain needs of information in the process of information activities. Information awareness is mainly reflected in the importance of information, information needs, information sensitivity, and observation ability. Existing college students lack information needs, lack motivation for information needs, sensitivity and insight into information, and acquire information. In a passive position, low efficiency and other issues.

2) Personal information capability: Information capability refers to the process of creating new information and new knowledge through the collection, sorting, utilization and evaluation of information. Information capabilities mainly include the ability to use information systems, the skills to acquire information, the ability to understand information, the ability to process information, and the ability to express information. In the era of information explosion, how to extract the essence from the acquired information and discard the dross has become a reality that college students must face. Reasonable, the higher the probability of creating new information.

3) Personal information ethics level: Information ethics refers to the code of conduct that regulates the relationship between information creators, service providers, and users throughout information activities. Information morality is the soul of college students' information literacy, which is manifested in the fact that college students abide by the law and discipline when carrying out relevant information activities, and do not touch the moral bottom line. The level of information morality directly determines the performance of college students in information behavior. Today's relevant laws and systems for information network management have yet to be improved, and the role of information ethics is not enough to establish a good information network environment.

4) Personal learning motivation: The more individuals have an active learning attitude, the stronger the self-efficacy and the stronger the learning motivation. In the increasingly fierce competition in the information society, learning is constantly encouraged to develop the ability of independent learning and to obtain high-efficiency learning through the Internet. Therefore, talents in the new century must choose to learn, re-learn, practice, and practice this cyclic learning process.

5) Psychology: The analysis found that among the factors affecting the ability of information literacy, the attitude of students to actively participate in the problem is an important factor. Give full play to the subjective initiative of individual students. Throughout

the learning process, students are required to use various methods such as inquiry and discussion to actively construct teaching knowledge in their minds. In the process of knowledge construction, students' analytical, problem-solving and creative thinking abilities are cultivated. The learning process of college students is often a constructive learning process. In the teaching of the blended learning technology teaching model, each lecturer emphasizes the active participation of students. Let students maintain a certain interest in learning, because interest is always the primary factor in students' awareness of autonomous learning.

2. External factors

1) In terms of national policies: Chapter 19 of the "National Medium- and Long-term Educational Reform and Development Plan (2010-2020)" clearly stated "accelerating the process of educational informatization" and "accelerating the construction of educational information infrastructure", etc. It shows the country's emphasis on informatization education and clarifies the direction of my country's education planning and specific implementation in the future. The formulation of information education policies in higher education policies is directly related to the basic guarantee of hardware and software facilities required for the cultivation of college students' information literacy. Clarifying education policies can cause colleges and universities to pay enough attention when formulating their own education plans, and then issue detailed implementation plans. Ultimately, it will generally improve the comprehensive quality of college students' information literacy and enhance the core competitiveness of college students in our country. Each university should scientifically formulate information literacy training standards and curriculum systems according to national policies and its own characteristics.

2) Curriculum setting: The information literacy curriculum understood from a broad perspective is the general term for all activities that help improve college students' information literacy capabilities. The scientific and reasonable establishment of information literacy courses in colleges and universities is helpful to cultivate the four core elements of college students' information awareness, information knowledge, information ethics and information ability. The most important thing is to help college students build a systematic information knowledge system through a series of information literacy education courses for college students, improve information moral standards and information ability building, and lay a solid foundation for entering the society in the future. Therefore, the information literacy curriculum is an important aspect that affects the external factors of college students' information literacy training, and it is also an aspect that needs to be reformed. How to seek a scientific construction of college students' information literacy education curriculum system has also become a topic of great concern in the academic circles.

3) Teaching environment: In the course of implementing the blended learning model, teachers need to use the internal and external environment to create an independent learning environment to improve undergraduate information literacy. Lecturer A emphasized the impact of the external environment on student learning. For example, in a noisy environment, students are easily affected by the external environment and cannot concentrate on thinking. The lecturer of school A also emphasized the creation of classroom environment. In the teaching process, the lecturer's creation of the classroom atmosphere will also affect the students' information literacy ability. The lecturer of school B also emphasized the influence of the environment created by the activity project on the students' information literacy ability.

4) Teaching methods: All the lecturers believe that appropriate teaching methods can stimulate students' interest in information courses, and stimulating students' learning initiative is an important purpose of using teaching methods. The teacher of School A suggested that in the blended learning course, various unique teaching methods and channels can be integrated, and various teaching methods such as online + offline, cooperative learning, micro-classes, and online live classrooms can be constructed to meet the needs of students' learning, knowledge acquisition. Internalization and skills training needs. The lecturers at School C

suggested that students be encouraged to make full use of network resources, such as micro-classes and MOOCs, to break the limitations of time and space, and use fragmented time to gradually improve students' information literacy.

5) Comprehensive quality of teachers: Teachers are the direct external influencing factors of college students' information literacy training. In teaching activities, teachers are not only the imparters of knowledge but also the guides to promote students' independent learning. Their information literacy level will subtly affect the students make a big difference. Therefore, teachers can use information resources to maximize utility, enhance their own information capabilities and information ethics, participate in information literacy-related training or self-study information skills, participate in information technology exchange meetings and special lectures, and embed information literacy capabilities into professional courses. Infiltrate students' information literacy education into professional courses, teach students how to quickly and accurately find professional information, and improve information literacy.

6) Teaching evaluation: In terms of evaluation, each lecturer emphasized the role and status of evaluation. According to the evaluation results during the teaching process, teachers constantly reflect on and improve the teaching mode, analyze the teaching effect of different teaching methods in teaching information course content, and clarify the precautions in the application of the blended learning mode.

Part 2: Analysis results serving research objective 2- To develop instructional models of Project-Based-Learning (PBL) and Conceive-Design-Implement-Operate (CDIO) to improve the information literacy of undergraduate students at Guangxi University of Science and Technology.

To serve objective 2, the collected data of confirming the appropriateness of 6 components of instructional model are analyzed in 4 areas, i.e., utility, feasibility, propriety, and accuracy and presented by frequency and percentage of the specialists

Part 3: Analysis results serving research objective 3- To study the result of Project-Based-Learning (PBL) and Conceive-Design-Implement-Operate (CDIO) instructional models to improve the information literacy of undergraduate students at Guangxi University of Science and Technology it was found that 30% students whose information literacy ability regarding works at Excellent level and other 80% at good level.

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