CURRICULUM EVALUATION OF BACHELOR'S DEGREE IN NETWORK ENGINEERING AT SICHUAN UNIVERSITY OF SCIENCE & ENGEERING

NANYANG XIANG

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF MASTER OF EDUCATION
PROGRAM IN CURRICULUM DEVELOPMENT
AND INSTRUCTIONAL INNOVATION
FACULTY OF TECHNICAL EDUCATION
RAJAMANGALA UNIVERSITY OF TECHNOLOGY THANYABURI
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Program	Curriculum Development and Instructional Innovation
Thesis Advisor	Assistant Professor Rossarin Jermtaisong, Ph.D.
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ABSTRACT

This research aimed to evaluate the curriculum of the bachelor's degree in Network Engineering at Sichuan University of Science and Engineering by using the CIPPI model based on Stufflebeam's decision-making approach focusing on context, input, process, and outcome.

The research samples consisted of 353 people, selected by purposive sampling and divided into 5 groups: 19 administrators, 24 instructors, 230 students, 40 undergraduates, graduates, and 40 employers. The instruments used to collect data were questionnaires. Mean, standard deviation, and percentage were used for data analysis.

The findings were as follows: 1) The opinions of the administrators, instructors, students, graduates, and employers towards the curriculum of the bachelor's degree in Network Engineering at Sichuan University of Science and Engineering were at a high level in all aspects and were ranked from the highest mean as follows: process ($\bar{x} = 4.12$), input ($\bar{x} = 4.02$), product ($\bar{x} = 4.01$), and context ($\bar{x} = 3.97$). 2) When each aspect was examined, it was found that: (2.1) All aspects of the context were at a high level, ranked from the highest mean as follows: subject content, curriculum composition, curriculum construction, and curriculum objectives, respectively. (2.2) All input aspects were at a high level, ranked from the highest mean as follows: budget and facilities, administrators, learning materials, instructors, and curriculum objectives, respectively. (2.3) All process aspects were at a high level, ranked from the highest mean as follows: measurement, evaluation, and learning management, respectively. (2.4) All product aspects were at a high level, ranked from the highest mean as follows: knowledge, emotions, attitudes, values, and skills, respectively.

Keywords: CIPPI model, curriculum evaluation, decision-making approach

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Table of Contents

Page

Abstract (3)

Acknowledgement (4)

Table of Contents (5)

List of Tables (8)

List of Figures (10)

CHAPTER 1 INTRODUCTION 11

1.1 Background and Statement of the Problems 11

1.2 Research Question 13

1.3 Purpose of the Study 13

1.4 Scopes of the Study 14

1.5 Definition of Terms 15

1.6 Conceptual Framework 16

1.7 Benefits 16

CHAPTER 2 REVIEW OF THE LITERATURE 17

2.1 Overview of Curriculum Evaluation 17

2.2 CIPP Model 23

2.3 Curriculum of Bachelor's Degree in Network Engineering at Sichuan University of Science and Engineering 28

2.4 Relevant Research 30

CHAPTER 3 RESEARCH METHODOLOGY 34

3.1 Population and Sample 34

3.2 Research Instrument 34

3.3 Instrument Development 37

3.4 Data Collection 39

3.5 Data Analysis 40

3.6 Statistics used in Research 41

Table of Contents (Continued)

Page

CHAPTER 4 RESEARCH RESULT 43

4.1 The analysis results of personal information of the bachelor's degree in network engineering curriculum at Sichuan University of Science and Engineering 43

4.2 The analysis and results evaluate the curriculum of the bachelor's degree in network engineering at Sichuan University of Science and Engineering, focusing, on aspects of context 48

4.3 The analysis results evaluate the curriculum of the bachelor's degree in network engineering at Sichuan University of Science and Engineering, focusing, on aspects of input 58

4.4 The analysis results evaluate the curriculum of the bachelor's degree in network engineering at Sichuan University of Science and Engineering, focusing, on aspects of process 73

4.5 The analysis results evaluate the curriculum of the bachelor's degree in network engineering at Sichuan University of Science and Engineering, focusing, on aspects of product 88

4.6 The analysis results evaluate the curriculum of the bachelor's degree in network engineering, focusing, focusing on aspects of context, input, process, and product 98

CHAPTER 5 DISCUSSION AND RECOMMENDATION 102

5.1 Summary of Research Results 102

5.2 Discussion and Recommendation 104

5.3 Implication for Practice and Future Research 106

List of Bibliography 108

Table of Contents (Continued)

Page

Appendices 111

Appendix A 112

- List of Experts Reviewing Research Instruments 113
- Letter to Experts and Specialists for Research Instruments Validation 114

Appendix B 119

- Instrument of Research 120

Appendix C 165

- IOC 166

Biography 181

มหาวิทยาลัยเทคโนโลยีราชมงคลธัญบุรี

List of Tables

Page

Table 4.1 Number and percentage of personal information from the administrators. 44
Table 4.2 Number and percentage of personal information of the instructors 45
Table 4.3 Number and percentage of personal information of the students 46
Table 4.4 Number and percentage of personal information of the students graduate 46
Table 4.5 Number and percentage of personal information of the employers 47
Table 4.6 Mean and level of curriculum evaluation focusing on aspects of context 49
Table 4.7 Mean and standard deviation of context of the administrations 50
Table 4.8 Mean and standard deviation of context of the instructors 52
Table 4.9 Mean and standard deviation of context of the students 54
Table 4.10 Mean and standard deviation of context of the students undergraduate 56
Table 4.11 Mean and level of curriculum evaluation focusing on aspects of input 58
Table 4.12 Mean and standard deviation of input of the administrations 59
Table 4.13 Mean and standard deviation of input of the instructors 63
Table 4.14 Mean and standard deviation of input of the students 66
Table 4.15 Mean and standard deviation of input of the student undergraduate 69
Table 4.16 Mean and level of curriculum evaluation focusing on aspects of process 73
Table 4.17 Mean and standard deviation of process of the administrations 74
Table 4.18 Mean and standard deviation of process of the instructors 78
Table 4.19 Mean and standard deviation of process of the students 81
Table 4.20 Mean and standard deviation of process of the students undergraduate 84
Table 4.21 Mean and level of curriculum evaluation focusing on aspects of product 88
Table 4.22 Mean and standard deviation of product of the administrations 89
Table 4.23 Mean and standard deviation of product of the instructors 91
Table 4.24 Mean and standard deviation of product of the students 93
Table 4.25 Mean and standard deviation of product of the students undergraduate 95
Table 4.26 Mean and standard deviation of product of the employers 96

List of Tables (Continued)

Page

Table 4.27 Mean and level of curriculum evaluation focusing on aspects of context, input, process, and product 99

Table 4.28 Mean of curriculum evaluation focusing on aspects of context, input, process, and product 101

List of Figures

Page

Figure 1.1 Conceptual Research Framework 16

Figure 4.1 Mean of curriculum evaluation focusing on aspects of context, input, process, product 99

CHAPTER 1
INTRODUCTION

1.1 Background and Statement of the Problems

Network technology had emerged in the 1960s. After decades of rapid development, it had permeated every aspect of human life, having become a crucial technology that connected the entire world. It had been a driving force behind the progress of the information age and had shaped the future direction of development. Network engineering was among the most significant engineering disciplines that had emerged with the advancement of the new generation of information technology. This field integrated network design, network planning, network construction, and network application, offering substantial technical depth and promising application prospects. In 2012, the major of network engineering was included in the Catalogue of Undergraduate Majors of Colleges and Universities (2012) that had been issued by the Ministry of Education.

In 2018, to align the college closely with the national strategy and address a new wave of technological and industrial revolutions, along with the new opportunities to accelerate new engineering initiatives, and to enhance the quality of higher engineering education, the Ministry of Education, Ministry of Industry and Information Technology, and the Chinese Academy of Engineering jointly issued the "Implementation Opinion on Accelerating the Construction and Development of New Engineering and Cultivating Outstanding Engineers Plan 2.0". By 2020, the Sichuan Provincial Department of Education and the Department of Economy and Information Technology had decided to execute the Sichuan Provincial Excellent Engineer Education and Training Program 2.0.

The university undertook the task of new engineering construction as a pivotal endeavor, organizing the training of talents in strategic fields essential for the future. The aim was to expedite the development of high-quality engineering talents with robust innovation abilities, catering to the demands of economic and social progress, thereby advancing higher engineering education. This initiative aimed to propel the high-quality evolution of higher engineering education, bolstering China's industrial growth, national advancement, and Sichuan's ascension to new echelons.

The Sichuan Provincial Department of Education's Excellent Engineer Education Training Program focused on key disciplines, training adept individuals in computer science, network technology, fundamental theories of network engineering, network communication systems, network planning and design, network security, network programming, research and development of network communication technology, network system integration, commissioning, maintenance, management, application, and initial development of network applications. Additionally, the Sichuan Institute of Light Industry and Chemical Engineering introduced network engineering courses.

The trajectory of information construction was also gaining momentum. Computer network engineering seamlessly intertwined computer technology and communication technology to give rise to emerging fields, particularly in the contemporary rapid expansion of the Internet. Given the flourishing development of networks, network engineering technology had emerged as a key domain in information technology, finding widespread applications in the swiftly evolving landscape of the information society, ultimately evolving into a comprehensive discipline.

By 2021, more than 400 colleges and universities in China had opened network engineering majors, enrolling nearly 50,000 students. The network engineering program had nurtured numerous exceptional professionals for the country. Among these was the Network Engineering course at Sichuan Institute of Light Chemical Technology.

The curriculum stood as a pivotal element in talent development and bore the consequences of any educational or instructional reforms. It had to be effectively implemented within the course; otherwise, meaningful results wouldn't materialize. The quality of curriculum creation was instrumental in shaping the level of professional development, ultimately influencing the caliber of talent cultivation (Li, 2021). Taylor, a renowned American educator and curriculum theorist, often referred to as the "father of curriculum evaluation," asserted that evaluating a curriculum involved assessing the alignment between lesson plans and educational objectives. On a similar note, Bach argued that curriculum evaluation aimed to collect data for guiding judgments on instructional strategies and curriculum designs. Executing curriculum evaluation was integral to laying the foundation for curriculum reform or innovation, bringing forth the

strengths and weaknesses of curriculum programs or plans. Both educational theory and practice have accorded evaluation significant attention, as the complete educational process encompassed educational objectives, activities, and evaluation.

The CIPP Model, an evaluation framework, sought to appraise specific programs to enhance them, particularly those in education and human resources (Nikijuluw, 2020, pp.116-123). Developed by Stufflebeam (1971, pp.19-25), this model underscored that the primary aim of evaluation was to furnish valuable information for decision-making. The secondary purpose lay in comprehending the program's strategy. The model's approach was founded on two main assumptions: firstly, that evaluation played a pivotal role in inciting and planning changes, and secondly, that it complemented general institutional programs (James, W, 1993, pp.75-79). Consequently, the CIPP model emphasized adjustment and enhancement for evaluative purposes. Its objective was to enhance curriculum teaching quality, fostering shared growth among the curriculum, educators, and students. In this context, the study evaluated the bachelor's degree curriculum in network engineering at Sichuan University of Science and Engineering using the CIPP model.

The study focused on evaluating the Network Engineering course at Sichuan Institute of Light Chemical Technology, aiming to cultivate network technical talents with both theoretical and practical prowess, alongside innovative abilities. These talents were envisioned to be future-oriented, capable of adapting to and leading within the new economy.

1.2 Research Question

1.2.1 How the curriculum evaluation results of bachelor’s degree in network engineering at Sichuan University of Science and Engineering using CIPP model focusing on aspects of context input process product?

1.3 Purpose of the Study

1.3.1 To evaluate curriculum of bachelor’s degree in network engineering at Sichuan University of Science and Engineering using CIPP model focusing on aspects of context input process product.

1.4 Scopes of the Study

1.4.1 Population

The population in this study had comprised 5 groups, totaling 699 individuals, all possessing bachelor's degrees in network engineering from Sichuan University of Science and Engineering. Specifically, these groups included 20 administrators, 30 instructors, 533 students, 46 undergraduates, and 46 employers.

1.4.2 Sample

The sample in this study comprised 5 groups, encompassing a total of 353 individuals who had obtained bachelor's degrees in network engineering from Sichuan University of Science and Engineering. These groups consisted of 19 administrators, 24 instructors, 230 students, 40 undergraduates, and 40 employers. They were chosen through purposive sampling.

1.4.3 Scope of Contents

The evaluation of the curriculum for the bachelor's degree in network engineering at Sichuan University of Science and Engineering, using the CIPP model, focused on:

1.4.3.1 Context evaluation (C) involves evaluating the objectives or aims of the curriculum to ensure they align with the policy, curriculum philosophy, faculty, university, and the societal needs related to the curriculum.

1.4.3.2 Input evaluation (I) focuses on evaluating the factors that contribute to the teaching and learning process and assessing their appropriateness.

1.4.3.3 Process evaluation (P) entails evaluating the instructional process, teaching materials, measurements, and assessments to ensure the implementation adheres to the established plan.

1.4.3.4 Product evaluation (P) involves evaluating the curriculum outcomes in terms of effectiveness and identifying any instructional issues.

1.4.4 Scope of Time

The duration of the research project spanned from September 2022 to March 2023.

1.5 Definition of Terms

For ease of understanding, the following terms have been defined conceptually and operationally:

1.5.1 Curriculum evaluation held great importance in education. It involved researching and analyzing courses to determine their value and suitability. It had served as an integral part of educational work by collecting comprehensive information, employing scientific and objective analysis at each stage of the educational process, and making comparisons and judgments regarding their value and effectiveness. The objective had been to provide a scientific and objective basis for adjusting, improving, selecting, promoting, and enhancing the quality of education.

1.5.2 The CIPP model had been a decision-focused approach to evaluation that emphasized the systematic provision of information for curriculum management and operation. It had required evaluating the context, input, process, and product to judge the value of a curriculum.

1.5.3 Context had referred to the evaluation of various components such as curriculum objectives, curriculum structure, and course content.

1.5.4 Input had involved evaluating instructors, administrators, students, learning materials, buildings, and budgets.

1.5.5 Process had entailed evaluating curriculum management, learning management, measurement, and evaluation processes.

1.5.6 The product had referred to the evaluation of knowledge, skills, and emotional and attitudinal values.

1.5.7 The curriculum had referred to the curriculum for the bachelor's degree in network engineering at Sichuan University of Science and Engineering.

1.5.8 Administrators had been curriculum instructors for the bachelor's degree in network engineering at Sichuan University of Science and Engineering.

1.5.9 Instructors had been individuals who taught full-time in the bachelor's degree program in network engineering at Sichuan University of Science and Engineering.

1.5.10 Students had been individuals who had been studying in the bachelor's degree program in network engineering at Sichuan University of Science and Engineering.

1.5.11 Employers had been individuals, companies, or organizations that had employed graduates from the bachelor's degree program in network engineering at Sichuan University of Science and Engineering.

1.6 Conceptual Framework

As this research paper employed an experimental research design, the following framework served as the researcher's guide during the study's execution:

The evaluate curriculum of bachelor's degree in network engineering at Sichuan University of Science and Engineering using CIPP model			
Context evaluation (C)	Input evaluation (I)	Process evaluation (P)	Product evaluation (P)
- component curriculum - curriculum objectives - curriculum structure - course content	- qualifications of administrators - qualifications of instructors - qualifications of student - learning materials - building and budget	- curriculum management - learning management - measurement and evaluation	- knowledge - skills - emotional attitudinal value aspects

Figure 1.1 Conceptual Research Framework

1.7 Benefits

1.7.1 It had enabled them to comprehend the curriculum's characteristics, encompassing its strengths and weaknesses, thereby serving as a guideline to enhance curriculum efficiency.

1.7.2 The fundamental information derived from curriculum evaluation could have been utilized as a guide to enhance and evolve teaching methods, with the aim of attaining higher quality and effectiveness.

CHAPTER 2
REVIEW OF THE LITERATURE

This chapter focused on reviewing previous studies relevant to the specific areas that are pertinent to this research.

2.1 Overview of Curriculum Evaluation

2.1.1 Definition of curriculum evaluation

2.1.2 The aims of curriculum evaluation

2.1.3 Model of curriculum evaluation

2.1.4 Course evaluation process

2.2 CIPP Model

2.2.1 Definition of CIPP Model

2.2.2 Types of CIPP Model

2.3 Curriculum of Bachelor's Degree in Network Engineering at Sichuan University of Science and Engineering

2.3.1 History of bachelor's degree in network engineering at Sichuan University of Science and Engineering

2.3.2 The current situation of bachelor's degree in network engineering at Sichuan University of Science and Engineering

2.4 Relevant Research

2.4.1 Domestic research

2.4.2 Foreign research

2.1 Overview of Curriculum Evaluation

2.1.1 Definition of curriculum evaluation

The role of evaluation in education had been recognized for a significant period. In ancient China, the imperial examination system had served as a relatively formal evaluation practice. However, it was during the 20th century that education evaluation, particularly curriculum evaluation, had begun to be systematically studied as an independent field of research.

The "eight-year study" undertaken by the American Progressive Education Association from 1934 to 1942 had marked a pivotal moment in the evolution of curriculum evaluation. Following that, the field of curriculum evaluation had undergone rapid expansion, leading to a clearer comprehension of its significance.

The definition of curriculum evaluation had been contingent on the definition of curriculum itself. In 1950, Taylor, in his book "Basic Principles of Curriculum and Teaching", had proposed that curriculum evaluation aimed to determine the actual changes in students. This approach represented a goal-oriented evaluation model that viewed education as a behavioral transformation. Similar and more prevalent perspectives had been presented by scholars like Ekbanonk; Stuffebeam, D. L., and MacDonald. They had argued that curriculum evaluation was a process of gathering and presenting information for curriculum decision-making. This definition regarded evaluation as an integral part of curriculum development rather than a mere addition. It also reflected the purpose and methodology of curriculum evaluation, highlighting its increasingly prominent role in shaping curriculum development.

Chinese scholars had also contributed to defining the concept of curriculum evaluation. As early as 1996, Zhang Tingkai had emphasized that "all components of the curriculum system must undergo examination under the evaluation microscope". At the very least, curriculum evaluation encompassed the evaluation of curriculum design, implementation, student learning, and the overall curriculum system. In 2007, scholar Feng Shengyao had introduced his perspective on the definition of curriculum evaluation, asserting that "curriculum evaluation involves collecting data and rendering value judgments on all or certain ongoing curriculum activities and their various process links using specific methods".

By examining the definitions of curriculum evaluation, certain commonalities in conceptualization could be discerned. Firstly, the definition of curriculum evaluation evolved in parallel with the understanding of the concept of curriculum. Secondly, curriculum evaluation was a dynamic process of assessment. Thirdly, as an essential constituent of curriculum development, curriculum evaluation had a substantial impact on multiple facets of curriculum activities. Drawing on these shared elements, this study

proposed that curriculum evaluation was a dynamic evaluation process encompassing the diverse constituent elements and process links of curriculum activities.

2.1.2 The Aims of Curriculum Evaluation

The primary aims of curriculum evaluation could be summarized as follows:

1) Determining the outcomes of a program.

2) Assisting in the decision-making process of accepting or rejecting a program.

3) Assessing the need for revising course content.

4) Aiding in the continuous improvement of curriculum materials.

Hence, thorough evaluation should have identified strengths and weaknesses in the curriculum, enabling necessary changes to be incorporated into the instructional program.

As per Wolf; Hill and Evers (2006, pp.54), curriculum assessment had served multiple purposes, including:

1) Identifying effective and ineffective aspects of a curriculum.

2) Evaluating the efficacy of implemented changes.

3) Demonstrating the effectiveness of a curriculum, component, or program.

4) Meeting regular program or curriculum review criteria.

5) Fulfilling professional accreditation standards.

In conclusion, meticulous evaluation should have pinpointed the strengths and weaknesses within the curriculum, facilitating the integration of necessary changes into the instructional program.

2.1.3 Model of curriculum evaluation

How the value and worth of such curriculum aspects could be determined had been a question. Evaluation experts had proposed a range of models, examining which could have provided valuable context for the process presented in this work.

2.1.3.1 Tyler's Objectives-Centered Model

One of the earliest curriculum evaluation models that continued to influence many assessment projects was proposed by Ralph Tyler (1950, pp.105-127)

in his monograph Basic Principles of Curriculum and Instruction. As explained in this work and utilized in numerous large-scale assessment efforts, the Tyler approach moved rationally and systematically through several related steps:

1) Begin with the behavioral objectives that were previously determined. These objectives should have specified both the content of learning and the expected student behavior, such as "Demonstrating familiarity with dependable sources of information on questions relating to nutrition".

2) Identify the situations that provided students with opportunities to demonstrate the behavior described in the objectives and that encouraged or prompted such behavior. For instance, if assessing oral language use, identify situations that prompted oral language expression.

3) Select, modify, or create appropriate evaluation instruments, and ensure that these instruments are objective, reliable, and valid.

4) Utilize the instruments to obtain summarized or evaluated results.

5) Compare the results obtained from multiple instruments before and after specific time periods to estimate the amount of change that occurred.

6) Analyze the results to determine the strengths and weaknesses of the curriculum and to identify possible explanations for the observed patterns of strengths and weaknesses.

7) Utilize the results to make the necessary modifications to the curriculum. As cited in (Glatthorn, 1987, pp.19-37).

2.1.3.2 Stufflebeam's Context, Input, Process, Product Model

The glaring weaknesses in the Tyler model were targeted by several evaluation experts in the late 1960s and early 1970s, who offered their own alternatives. The alternative that had the most significant impact was developed by a Phi Delta Kappa committee chaired by Stufflebeam (1971, pp.19-25). This model appealed to educational leaders due to its emphasis on generating evaluative data for decision-making purposes. In fact, decision-making was the sole rationale for evaluation, according to the Phi Delta Kappa committee. To cater to the needs of decision-makers, the Stufflebeam model provides a framework for generating data related to four stages of

program operation: context evaluation, which continuously assesses needs and issues in the context to aid decision-makers in determining goals and objectives; input evaluation, which assesses different approaches for achieving those goals to assist decision-makers in selecting the most optimal approach; process evaluation, which monitors the implementation of the chosen approach and makes necessary modifications; and product evaluation, which compares the actual outcomes with the intended outcomes and leads to a series of decisions regarding adjustments.

The context, input, process, product (CIPP) model, as it was commonly referred to, possessed several appealing features for individuals who were interested in curriculum evaluation. Its emphasis on decision-making had aligned well with the needs of administrators who were striving to improve curricula. Its consideration of the formative aspects of evaluation had addressed a significant drawback in the Tyler model. Lastly, the committee had developed comprehensive guidelines and forms that had offered users step-by-step guidance.

2.1.3.3 Scriven's Goal-Free Model

Michael Scriven (1972, pp.1-4), had been the first to raise doubts about the assumption that goals or objectives were essential in the evaluation process. After participating in several evaluation projects where unintended consequences had appeared to be more significant than the original objectives, Scriven had begun questioning the seemingly arbitrary distinction between intended and unintended effects. His goal-free model had emerged as a result of this dissatisfaction. When conducting a goal-free evaluation, the evaluator had assumed the role of an impartial observer who had started by creating a profile of the needs for the group benefiting from a specific program (Scriven had provided limited details on how this needs profile was derived). Then, employing primarily qualitative methods, the evaluator had assessed the actual impacts of the program. If a program had demonstrated an effect that had addressed one of the identified needs, it had been deemed useful.

2.1.3.4 Stake's Responsive Model

Robert Stake (1975, pp.16-18), had made a substantial contribution to curriculum evaluation through his formulation of the responsive model. This model had explicitly recognized that the concerns of the stakeholders, those for whom the

evaluation was conducted, should have held the utmost importance in determining the evaluation issues. Stake had expressed this viewpoint by stating, "To emphasize evaluation issues that are important for each particular program, I recommend the responsive evaluation approach. It is an approach that sacrifices some measurement precision in order to enhance the utility of the findings for individuals involved in and connected to the program". An educational evaluation had been deemed responsive when it had focused more directly on program activities rather than program intentions, responded to the information requirements of the intended audience, and taken into account diverse value perspectives when reporting the program's successes and failures. Stake had advocated for an interactive and iterative evaluation process that had encompassed these steps:

1) The evaluator met with clients, staff, and audiences to gain an understanding of their perspectives and intentions regarding the evaluation.

2) The evaluator drew upon these discussions and analyzed relevant documents to determine the scope of the evaluation project.

3) The evaluator closely observed the program to gain insights into its operation and to identify any unintended deviations from the stated intentions.

4) The evaluator uncovered both the stated and actual purposes of the project, as well as the concerns expressed by different audiences about both the project and the evaluation process.

5) The evaluator identified the specific issues and problems that needed to be addressed in the evaluation. For each issue and problem, the evaluator developed an evaluation design, outlining the types of data that would be necessary.

6) The evaluator selected the appropriate methods to collect the desired data, often relying on human observers or judges.

7) The evaluator carried out the data collection procedures as planned.

8) The evaluator organized the gathered information into coherent themes and prepared "portrayals" that effectively conveyed the thematic reports. These portrayals could take the form of videotapes, artifacts, case studies, or other faithful representations.”

9) Taking into consideration the concerns of the stakeholders, the evaluator determined which audiences required specific reports and selected the most appropriate formats for each audience.

2.1.3.5 Course evaluation process

Course evaluation process have four processes.

1) Background evaluation involved determining the organizational background of the course plan implementation, defining the evaluation object and its needs, identifying opportunities to fulfill those needs, diagnosing fundamental issues, and assessing whether the objectives aligned with those needs. The emphasis in background evaluation was on evaluating curriculum objectives in relation to the needs of the evaluation objects to determine their consistency.

2) Input evaluation served the main purpose of assisting decision-makers in selecting the most effective means to achieve their goals and evaluating various optional course plans.

3) Process evaluation primarily focused on describing the actual process to identify or predict issues within the curriculum plan itself or its implementation process. This information was then used to provide decision-makers with effective insights on how to revise the curriculum plan.

4) Achievement evaluation aimed to measure, explain, and assess the outcomes of the course plan. It involved collecting diverse descriptions and judgments related to the results, connecting them with the objectives, background, input, and process information, and elucidating their value and advantages.

2.2 CIPP MODEL

2.2.1 Definition of CIPP Model

The CIPP evaluation model had been developed by Stufflebeam (1971, pp.19-25) with the intention of obtaining valuable information for decision-making purposes. Additionally, the model had sought to foster an understanding of the program's strategy. The approach of this model had been based on two key assumptions. The first assumption had been that evaluation played a vital role in stimulating and planning

changes, while the second assumption had complemented general programs within institutions (James, W., 1993, pp.75-79).

The CIPP Model had been an evaluation model designed to assess specific programs, particularly those related to education and human resources, to enhance their effectiveness. This model had served as a framework for evaluating and improving such programs (Nikijuluw, 2020, pp.116-123).

The CIPP model had been characterized by diversity and flexibility as an evaluation model. It had emphasized systematic and comparative analysis and had promoted the utilization of various evaluation methods, such as surveys and literature reviews. Through both quantitative and qualitative evaluations, it had enabled evaluators to accurately and flexibly assess each phase of physical education curriculum implementation, considering curriculum goals, content, and execution. This approach had maximized the impact of evaluations on physical education teaching quality. The primary focus of the CIPP model had been adjustment and improvement, with the ultimate goal of enhancing the teaching quality of the curriculum and fostering the collective development of the curriculum, teachers, and students. On one hand, it had gone beyond a simplistic pursuit of teaching objectives and had considered the sports teaching environment, overall effectiveness, and continuous monitoring to identify potential issues, supervise implementation, and address problems promptly. On the other hand, it had surpassed previous teaching evaluation models that had primarily emphasized outcomes and had overlooked the process. The CIPP model had incorporated comprehensive factors such as teachers' participation in teaching activities and students' learning status into the evaluation scope.

In conclusion, the CIPP evaluation model had expanded the scope and content of curriculum evaluation throughout the entire process, emphasizing its developmental function. It had ensured the relevance, improvement, and sustainability of the curriculum evaluation system through collaborative construction and multiple stages.

2.2.2 Types of CIPP Model

The background evaluation was conducted to determine the organization's background that had implemented the curriculum plan, identify the evaluation object and its needs, identify opportunities to fulfill those needs, diagnose

fundamental problems associated with the needs, and assess whether the goals adequately reflected those needs.

1) Input evaluation primarily served to assist decision-makers in selecting the most effective means to achieve the desired goals. It had involved evaluating various alternative curriculum plans.

2) Process evaluation primarily involved describing the actual process to identify or predict any problems that might have arisen within the curriculum plan itself or during the implementation process. It had required ongoing monitoring of plan implementation.

3) Achievement evaluation aimed to measure, interpret, and judge the success of the curriculum plan. It had involved gathering descriptions and judgments about the outcomes achieved, relating them to the goals and incorporating information about the context, inputs, and processes. The evaluation had explained the value and significance of these outcomes.

The CIPP assessment model considered various factors that impacted the curriculum plan, which could compensate for the limitations of other assessment models and was relatively comprehensive. However, due to its complex operational process, mastering CIPP could be challenging for ordinary individuals.

The advantages of the CIPP evaluation model were as follows:

1) CIPP considered the actual needs and societal requirements, ensuring that the evaluation target was selected and rationalized in a way that aligned with social needs and reality. This had overcome the limitations of the objective evaluation model.

2) Evaluation was integrated throughout the entire educational process, serving as a tool to enhance work and improve the overall quality of education.

3) The evaluation content had encompassed various stages and aspects of the education process, starting with a needs survey and including needs assessment, problem identification, objective setting, conditions evaluation, planning evaluation, implementation evaluation, results evaluation, and the effects of the educational process. The evaluation had fulfilled different roles, such as diagnostic, formative, and summative, providing a comprehensive assessment of the educational process. These three roles had been fully demonstrated in the evaluation's content.

The CIPP model also had some drawbacks:

1) Both background evaluation, input evaluation, process evaluation, and outcome evaluation catered to the needs of decision-makers. Process evaluation primarily focused on ensuring that activity outcomes aligned with the intended goals. However, this goal-centric approach could impose limitations on participants' creativity during activities to some extent.

2) The model had necessitated cooperation from various information sources, sufficient financial resources, and the use of professional analytical methods. These requirements had somewhat limited the model's applicability and usage.

CIPP had been an evaluation model that had served as a tool to facilitate the development of customized programs for the benefit of an organization's stakeholders. The model had encompassed four distinct areas of assessment, namely contextual evaluation, input evaluation, product evaluation, and process evaluation. These areas had enabled the comprehensive evaluation of a program. The selection of a specific evaluation area had depended on the goals and objectives of the program.

1) Context Evaluation: This type of evaluation had focused on assessing the needs and opportunities within a specific context or environment. The primary objective had been to identify, define, and address the needs of the target population. Various methods and approaches had been utilized in contextual evaluation, including surveys, data analysis, interviews, and document reviews (Toosi et al., 2021). Context evaluation had sought to answer the following questions:

Q1. Did the school have substantial aims?

Q2. Were the objectives derived from the aims?

Q3. Were the courses being taught aligned with the aims?

Q4. Was the school capable of fulfilling the social needs?

2) Input Evaluation: The input evaluation had centered on the content and issues related to textbook evaluation. Stufflebeam, D. and Shinkfield, A. (2007, pp.81-94) had stated that input evaluation had helped identify and address project needs. The primary approach had involved assessing the current capabilities of the existing system and suggesting appropriate alternative strategies. Input evaluation had aided researchers in making planning decisions, identifying available resources, exploring

alternative approaches, devising strategies to achieve objectives, and designing implementation procedures. Warr et al. had described input evaluation as overseeing resource utilization for program implementation. Its objective had been to facilitate the smooth execution of the planned program established during the contextual evaluation stage. Additionally, it had focused on specific resources, including financial resources, human resources, policies, educational strategies, limitations, and challenges within the education system (Saif, 2019, pp.59-73).

3) Process Evaluation: Process evaluation had concentrated on the teaching method and had examined the interaction between the instructor and the instructional process. It had involved observing the program implementation to create a primary reference list for ongoing monitoring. The purpose of this evaluation had been to gather feedback on the progress and execution of the program, as well as to monitor and address any issues that had arisen. Worthen and Sanders had explained that process evaluation had emphasized three objectives: identifying or predicting the program's design or execution process at the implementation level, providing information about program outcomes, and maintaining records of the implementation process.

Process evaluation had encompassed the collection of data that had been planned and implemented during the program execution. Its ultimate goal had been to measure progress and identify specific components that had required focused attention. Process evaluation had involved identifying or estimating performance issues that had arisen during educational activities and assessing the effectiveness of the implementation process. This evaluation had examined the impact of the educational program on learners (Saif, 2019, pp.59-73).

4) Product Evaluation: Product evaluation involved assessing the outcomes achieved through the planned implementation of a program. Its aim had been to identify and evaluate the results of the program to determine its success. The objective of product evaluation had been to measure, interpret, and assess the outcomes objectively. It had examined whether the program had fulfilled the intended goals or required further improvement (Stufflebeam, D., and Shinkfield, A., 2007, pp.19-25). Stufflebeam (2008, pp.1386-1400) had explained that product evaluation had provided project directors or teachers with an opportunity to make decisions about specific programs. It had offered

valuable information to educators or administrators for assessing the effectiveness of the implemented program and making informed decisions. Farida (2000, pp.33-40) had mentioned that product evaluation could aid in decision-making regarding obtained outcomes and long-term planning.

In conclusion, the CIPP model had encompassed four distinct areas of assessment: contextual evaluation, input evaluation, product evaluation, and process evaluation. By utilizing these four areas, program evaluation could be conducted efficiently and comprehensively.

2.3 Curriculum of Bachelor's Degree in Network Engineering at Sichuan University of Science & Engineering

2.3.1 History of bachelor's degree in network engineering at Sichuan University of Science and Engineering

The undergraduate program of Network Engineering received recognition and accreditation in various levels of excellence. It was listed as the university-level "Excellent Engineer Education and Training Plan" in 2011, the Sichuan-level "Excellent Engineer Education and Training Plan" in 2012, and the national "Excellent Engineer Education and Training Plan" in 2013.

The college boasts a highly educated and experienced teaching staff comprising 117 faculty members, including 98 full-time teachers. Among them are 10 professors, 34 associate professors, and 90 professors with Master's and Doctoral degrees. Additionally, seven teachers have acquired degrees and pursued studies abroad. There is one candidate for the academic and technological leadership position in Sichuan Province, two innovative talents recognized by Zigong City, 1 Doctoral supervisor, and 10 Master supervisors. To further enrich the teaching staff, the college has also enlisted the expertise of nine part-time professors with high levels of scientific research and practical experience from cooperative units.

Creating a conducive environment for teaching and research, the college is equipped with advanced teaching laboratory equipment. It houses the workstation of Sichuan Academician (Expert) for "Integrated Perception and Application of Ecological Environment in River Basin", the key laboratory of Sichuan University for "Enterprise

Informatization and Measurement and Control Technology of the Internet of Things," the key research base of Sichuan Province for "Smart Tourism", and the High-Performance Science and Engineering Computing Center. Over the years, the college's teachers have successfully undertaken and completed more than 20 national, provincial, and ministerial projects, over 40 municipal projects, and more than 100 projects commissioned by enterprises and public institutions. Their contributions extend to the publication of over 200 academic papers, as well as the authorization of 40 invention patents and software copyrights.

2.3.2 The current situation of bachelor’s degree in network engineering at Sichuan University of Science and Engineering

The Ministry of Education has announced the list of national and provincial first-class undergraduate program construction sites for 2021, and the network engineering major offered by the School of Computer Science and Engineering has been selected as a national first-class undergraduate program construction site for 2021.

The network engineering major was established in 2005 at the School of Computer Science and Engineering. It has achieved consecutive selections as an "Excellent Engineer Education and Training Program" major at the university, provincial, and national levels from 2011 to 2013. In 2019, it was chosen as one of the initial first-class undergraduate major construction sites in Sichuan Province. In recent years, the network engineering program has focused on training in the field of industrial Internet information security, establishing a top-class network engineering major with a specialization in information security. Leveraging the regional and institutional characteristics, the program aims to cultivate top talents in network security.

Regarding the "20,000 Yuan Plan" for the Construction of First-class Undergraduate Majors, the Ministry of Education initiated this plan in April 2019. It aims to promote the development of new engineering, medicine, agricultural science, and liberal arts disciplines, strengthen first-class undergraduate programs, establish exemplary majors, train high-quality talents, revitalize undergraduate education comprehensively, enhance the training capabilities of universities and colleges, and achieve well-rounded development in higher education. According to the Ministry of Education's notice on the implementation of the "20,000 Yuan Plan" for the Construction of First-class

Undergraduate Programs, approximately 10,000 national first-class undergraduate programs and 10,000 provincial first-class undergraduate programs were established between 2019 and 2021.

2.4 Related Research,

2.4.1 Domestic research

Zhao, H. (2010) conducted a study on course evaluation and found that its purpose was not determined. As Stufflebeam had stated, evaluation was not meant for validation but for improvement. Course evaluation should not have only focused on obtaining quantitative data from the results but also on effectively adjusting and enhancing the course based on those results to achieve qualitative progress. Unfortunately, many colleges and universities had failed to grasp the objectives of curriculum evaluation and had overlooked its two main goals: students' learning and teachers' teaching. Firstly, curriculum evaluation should have reflected students' learning status and facilitated their learning progress. Secondly, through course evaluation, teachers could have identified their teaching deficiencies, enhanced their instructional design and implementation, and improved teaching quality. However, in actual course evaluations, teachers had often prioritized grading and score allocation rather than identifying learning problems, resulting in a lack of targeted learning plans for students.

Han Meirong (2018) had explored the comprehensiveness of course evaluation content and found that colleges and universities had frequently equated classroom teaching evaluation with course evaluation. Firstly, the focus of curriculum evaluation had revolved around the preparation, organization, and implementation of classroom teaching. Secondly, teachers' classroom teaching ability and instructional level should have been considered as integral components of curriculum evaluation. While curriculum teaching evaluation was undoubtedly part of curriculum evaluation, it did not have encompassed the entirety of it. Most universities had neglected to emphasize curriculum innovation in their evaluations, and teachers had tended to follow the curriculum outline without much deviation. Student evaluation in course evaluations had primarily revolved around the knowledge imparted by teachers and the content recorded by students. As long as students had reviewed their notes thoroughly, their grades were

likely to have been satisfactory. Such an evaluation approach had been limited to assessing curriculum content and had overlooked the holistic development of both students and teachers. Lastly, curriculum evaluation had failed to prioritize curriculum reform. While colleges and universities had employed terminal evaluation methods that heavily impacted course evaluation, such as organizing students for academic performance assessments, this approach had remained narrow. Although teachers may have used formative evaluation during the course implementation process, it had often become a mere formality.

2.4.2 Foreign research

Khalid Salim et al. (2012) conducted a study on the development of a framework for curriculum evaluation in Oman. Curriculum evaluation was a crucial aspect of the educational process, requiring continuous development and ongoing research. The study had specifically focused on curriculum evaluation in Oman, exploring various evaluation procedures, methods, and instruments used in the country. The research had emphasized the necessity of establishing a framework for curriculum evaluation. To develop the framework, a comprehensive and transparent process had been followed, involving selected experts from different organizations such as the Ministry of Education, national universities, colleges, and institutes. These experts had possessed extensive knowledge of both the English teaching context and curriculum development and evaluation in Oman. The research had resulted in the creation of a framework that could serve as a solid foundation for future frameworks in the Omani context, as well as potentially in other educational contexts.

Warju Warju (2016) had conducted a study on educational program evaluation using the CIPP Model. Various evaluation models had existed to assess programs, but one of the most commonly used models had been the Context, Input, Process, and Product (CIPP) evaluation model. The CIPP evaluation model had been developed by Stufflebeam and Shinkfield in 1985. The evaluation process had begun with the Context evaluation, which had provided a rationale for selecting and implementing a particular program or curriculum. It had involved evaluating the program's objectives, alignment with the institution's vision and mission, relevant policies, and the identification of specific needs, opportunities, and problems through a comprehensive diagnosis. The Input evaluation had focused on gathering information about the resources

required to achieve program objectives. It had helped in finding problem-solving strategies, planning, and designing programs effectively. Process evaluation had aimed to provide feedback and accountability for program or curriculum activities. It had involved monitoring potential sources of failure, providing preliminary information for planning decisions, and explaining the actual processes that had taken place. Product evaluation had measured and interpreted the achievement of goals. It had assessed the impact, effectiveness, sustainability, and transferability of the program. Product evaluation had been conducted both during and after the program. To make informed decisions, the findings and facts from the evaluations of context, input, process, and product had been compared against predetermined standards or criteria. The CIPP Model had provided a comprehensive framework for evaluating educational programs, considering various aspects and stages of the program.

Ahmad Bashri et al. (2020) had conducted a study on the use of the CIPP model for curriculum evaluation in the Biology Education Study Program. The objective of this study had been to describe the findings of evaluating the curriculum implementation in the program. The research had followed an observational approach, focusing on Biology Education courses. The CIPP model, which had encompassed Context, Input, Process, and Product, had been utilized. Data collection had involved document analysis and observations, using appropriate instruments based on the components of the CIPP model. These instruments had included survey/observation tools, interview guides, questionnaires, curriculum document review sheets, and learning support materials. Additionally, Focus Group Discussions (FGDs) had been conducted. The trend analysis technique had been employed for nominal data, beginning with frequency distribution analysis as depicted in the diagram. The response questionnaires had undergone various analyses, including frequency distribution and dependency analysis. The results of direct observations had been subjected to quantitative descriptive analysis, while data from interviews and FGDs had been analyzed by interpreting their meanings and making interpretations. The research findings based on the evaluation of the Biology Education study program curriculum using the CIPP model had indicated effectiveness in terms of context, input, process, and product. The planning process, leading up to the curriculum product, had successfully produced graduates aligned with

the study program's profile. Achieving international standards had been identified as a future goal to strive for.

Shamsa Aziz et al. (2018) had conducted a study on the implementation of the CIPP model for quality evaluation at the school level, focusing on a specific case study. Evaluation had served the purpose of monitoring progress towards desired goals and objectives. The aim of that study had been to assess the educational quality of schools using Stufflebeam's CIPP evaluation model (1983). The study had been conducted in a Welfare School System located in Rawalpindi, involving the principal, heads of each wing, and teachers from various branches as the population. Data had been collected using the CIPP evaluation checklist (2002), along with semi-structured interviews, document analysis, and observations. Content and thematic analysis techniques had been applied to analyze the collected data.

Nooshin Mohebbi et al. (2011) had conducted a study on the application of the CIPP model for evaluating the Medical Records Education Course at the Master of Science level in Iranian medical sciences universities. The research had collected data to determine the acceptability level of the context, inputs, processes, and outputs of the course. Questionnaires, developed by the researcher based on the CIPP evaluation model, had been utilized for data collection. The findings of the study had revealed that all aspects of context, inputs, processes, and outputs had been categorized as relatively acceptable. The continuous evaluation and planning of medical records education had resulted in a better understanding of the strengths and weaknesses of the course, ultimately leading to improvements in its quality.

By studying the conceptual theories and research related to curriculum evaluation and the CIPP model, researchers had gained insights into the characteristics of the curriculum, including its strengths and weaknesses. This knowledge had served as a guide for enhancing the curriculum's efficiency. Furthermore, the information obtained from curriculum evaluation had been utilized as a guideline for improving and developing teaching practices to enhance their quality and effectiveness. Based on this rationale, the researcher had expressed interest in studying the curriculum evaluation of the Bachelor's degree program in Network Engineering at Sichuan University of Science and Engineering.

CHAPTER 3
RESEARCH METHODOLOGY

The research on curriculum evaluation of the bachelor's degree in network engineering at Sichuan University of Science and Engineering had utilized both quantitative and qualitative methods. The research methodology had been described in detail as follows:

3.1 Population and Sample

3.2 Research Instrument

3.3 Instrument Development

3.4 Data Collection

3.5 Data Analysis

3.6 Statistics used in Research

3.1 Population and Sample

3.1.1 Population

The population in this study consisted of 5 groups, totaling 699 individuals with bachelor's degrees in network engineering from Sichuan University of Science and Engineering. The groups included 20 administrators, 30 instructors, 533 students, 46 undergraduates, and 46 employers.

3.1.2 Sample

The sample in this study consisted of 5 groups, totaling 353 individuals with bachelor's degrees in network engineering from Sichuan University of Science and Engineering. The groups included 19 administrators, 24 instructors, 230 students, 40 undergraduates, and 40 employers. The sample was selected using purposive sampling.

3.2 Research Instrument

The research instruments used for the curriculum evaluation of the bachelor's degree in network engineering at Sichuan University of Science and Engineering were categorized according to their types. The details are as follows:

3.2.2 Questionnaire for administrators in the curriculum of the bachelor's degree in network engineering at Sichuan University of Science and Engineering was developed using the CIPP model, focusing on the aspects of context, input, process, and product. The questionnaire consisted of five parts: Part 1-5 utilized a rating scale, divided into five grades ranging from the lowest to the highest, along with open-ended questions for suggestions. The questionnaire was divided into the following parts:

Part 1: General personal information of administrators, consisting of a checklist with four items: gender, work experience, age, and education level.

Part 2: Information on the context, comprising four parts: part 1-component curriculum, part 2-curriculum objectives, part 3-curriculum structure, and part 4-course content.

Part 3: Information on inputs, consisting of five parts: part 1-qualifications of administrators, part 2-qualifications of instructors, part 3-qualifications of students, part 4-learning materials, and part 5-budget and infrastructure.

Part 4: Information on the process, consisting of three parts: part 1-curriculum management, part 2-learning management, and part 3-measurement and evaluation.

Part 5: Information on the product consisted of three parts: part 1-knowledge, part 2-skills, and part 3-emotional attitudinal value aspects.

Likewise, a questionnaire was developed for instructors in the curriculum of the bachelor's degree in network engineering at Sichuan University of Science and Engineering. The questionnaire utilized the CIPP model and focused on the aspects of context, input, process, and product. It was divided into five parts, including a rating scale (Part 1-5) and open-ended questions for suggestions. The questionnaire was structured as follows:

Part 1: General personal information of instructors, including a checklist with four items: gender, work experience, age, and education level.

Part 2: Information on the context, which comprised four parts: part 1-component curriculum, part 2-curriculum objectives, part 3-curriculum structure, and part 4-course content.

Part 3: Information on inputs, consisting of five parts: part 1-qualifications of administrators, part 2-qualifications of instructors, part 3-qualifications of students, part 4-learning materials, and part 5-budget and infrastructure.

Part 4: Information on the process, which consisted of three parts: part 1-curriculum management, part 2-learning management, and part 3-measurement and evaluation.

Part 5: Information on the product, divided into three parts: part 1-knowledge, part 2-skills, and part 3-emotional attitudinal value aspects.

3.2.3 A questionnaire was administered to students pursuing a bachelor's degree in network engineering at Sichuan University of Science and Engineering, employing the CIPP model and focusing on the aspects of context, input, process, and product. The questionnaire consisted of five parts, using a rating scale (Part 1-5) and including open-ended questions for suggestions. The questionnaire was structured as follows:

Part 1: General personal information of students, consisting of a checklist with four items: gender, age, and education level.

Part 2: Information on the context, comprising four parts: part 1-component curriculum, part 2-curriculum objectives, part 3-curriculum structure, and part 4-course content.

Part 3: Information on inputs, consisting of five parts: part 1-qualifications of administrators, part 2-qualifications of instructors, part 3-qualifications of students, part 4-learning materials, and part 5-budget and infrastructure.

Part 4: Information on the process, consisting of three parts: part 1-learning management and part 2-measurement and evaluation.

Part 5: Information on the product, divided into three parts: part 1-knowledge, part 2-skills, and part 3-emotional attitudinal value aspects.

3.2.4 A questionnaire was also administered to undergraduates of the bachelor's degree program in network engineering at Sichuan University of Science and Engineering, utilizing the CIPP model and focusing on the aspects of context, input, process, and product. The questionnaire included five parts, utilizing a rating scale

(Part 1-5) and incorporating open-ended questions for suggestions. The questionnaire was structured as follows:

Part 1: General personal information of undergraduates, consisting of a checklist with four items: gender, age, occupation, and work experience.

Part 2: Information on the context, comprising four parts: part 1-component curriculum, part 2-curriculum objectives, part 3-curriculum structure, and part 4-course content.

Part 3: Information on inputs, consisting of five parts: part 1-qualifications of administrators, part 2-qualifications of instructors, part 3-qualifications of students, part 4-learning materials, and part 5-budget and infrastructure.

Part 4: Information on the process, consisting of two parts: part 1-learning management and part 2-measurement and evaluation.

Part 5: Information on the product, divided into three parts: part 1-knowledge, part 2-skills, and part 3-emotional attitudinal value aspects.

3.2.5 Questionnaire for employers of the bachelor's degree program in network engineering at Sichuan University of Science and Engineering was developed using the CIPP model, focusing on the aspects of product. The questionnaire consisted of five parts (Part 1-5) utilizing a rating scale, which was divided into five grades from the lowest to the highest, along with open-ended questions for suggestions. The questionnaire was structured as follows:

Part 1: General personal information of employers, consisting of a checklist with four items: gender, work experience, age, and education.

Part 5: Information on the product, divided into three parts: part 1-knowledge, part 2-skills, and part 3-emotional attitudinal value aspects.

3.3 Instrument Development

According to the curriculum evaluation questionnaire of the bachelor's degree program in network engineering at Sichuan University of Science and Engineering, the steps involved in instrument development are as follows:

3.3.1 Questionnaire for administrators, instructors, students, undergraduates, and employers of the bachelor's degree program in network engineering at Sichuan

University of Science and Engineering was developed using the CIPP model, focusing on the aspects of context, input, process, and product. The steps involved in instrument development were as follows:

3.3.1.1 Studying and analyzing relevant documents related to curriculum evaluation, the curriculum of the bachelor's degree program in network engineering at Sichuan University of Science and Engineering, the CIPP model, and establishing the curriculum evaluation research framework.

3.3.1.2 Creating the questionnaire for administrators, instructors, students, undergraduates, and employers of the bachelor's degree program in network engineering at Sichuan University of Science and Engineering.

3.3.1.3 Proposing the draft questionnaire for administrators, instructors, students, undergraduates, and employers of the bachelor's degree program in network engineering at Sichuan University of Science and Engineering to the thesis advisor to verify the validity of the content and provide suggestions. Then, revising the questionnaire based on the suggestions received.

3.3.1.4 Proposing the questionnaire for administrators, instructors, students, undergraduates, and employers of the bachelor's degree program in network engineering at Sichuan University of Science and Engineering to 5 experts, including 3 curriculum and instructional experts and 2 experts in measurement and evaluation education. The experts checked the consistency of the items and provided comments, using the following scoring criteria:

Score 1: When it was certain that the item of the questionnaire was consistent.

Score 0: When unsure if the item of the questionnaire was consistent.

Score -1: When it was certain that the item of the questionnaire was not consistent.

3.3.1.5 Analyzing the validity of the questionnaire by examining the item-objective consistency (IOC) and selecting items with a score of 0.05 or higher. The questionnaire was revised based on expert suggestions before conducting the try-out. The analysis results showed that the IOC value was equal to 1.00.

3.3.1.6 Conducting a try-out of the questionnaire with administrators, instructors, students, undergraduates, and employers of the bachelor's degree program in network engineering at Sichuan University of Science and Engineering who were not part of the sample group.

3.3.1.7 Improving the questionnaire for administrators, instructors, students, undergraduates, and employers of the bachelor's degree program in network engineering at Sichuan University of Science and Engineering before collecting data.

3.3.1.8 Administering the revised questionnaire to survey administrators, instructors, students, undergraduates, and employers who were not part of the sample group.

3.3.1.9 The results were analyzed to determine the overall reliability using Cronbach's alpha coefficient (α). The analysis results indicated that the total reliability value of the test was 0.862.

3.3.1.10 Collecting data using the questionnaire from executives, instructors, curriculum instructors, student undergraduates, and employers of the bachelor's degree program in network engineering at Sichuan University of Science and Engineering.

3.4 Data Collection

The research data was used to evaluate the professional curriculum of preschool education. The researchers carried out the following tasks:

3.4.1 Contacting the graduate official at the Faculty of Technical Education, Rajamangala University of Technology Thanyaburi, to request permission for data collection from the sample.

3.4.2 Contacting the Dean, Head of the department, and Head of the bachelor's degree program in network engineering at Sichuan University of Science and Engineering to seek assistance and cooperation in collecting data from the sample.

3.4.3 After determining the appropriate time, the researcher collected questionnaires from the sample group.

3.4.4 The researcher performed statistical analysis and summarized the findings.

3.5 Data Analysis

3.5.1 Analysis of instrument quality

3.5.1.1 The Index of Item Objective Congruence (IOC) was used to analyze the effectiveness of the curriculum evaluation, which consisted of questionnaires and interview forms.

3.5.1.2 The Cronbach's Alpha Coefficient (α) formula was used to determine the reliability confidence value (Reliability) of the questionnaires and interview forms, with the alpha coefficient providing a measure of reliability.

3.5.2 Analysis used in hypothesis testing

3.5.2.1 Assessment criteria estimation scale questionnaire. There were assessment criteria as follows:

5 means having the highest level of opinion.

4 means having a high level of opinion.

3 means having a moderate level of opinion.

2 means having a low level of opinion.

1 means having the lowest level of opinion.

3.5.2.2 Interpretation of the results was based on the average score based on the midpoint of the score interval as follows:

Average score 4.21 – 5.00	means	having the highest level of opinion.
Average score 3.41 – 4.20	means	having a high level of opinion.
Average score 2.61 - 3.40	means	having a moderate level of opinion.
Average score 1.81 – 2.60	means	having a low level of opinion.
Average score 1.00 – 1.80	means	having the lowest level of opinion.

3.6 Statistics used in Research.

3.6.1 Basic statistics

The descriptive statistics such as mean and standard deviation will be used by the researcher to primarily analyze the data gathered from the questionnaire and interview form.

3.6.1.1 Mean

$$\bar{x} = \frac{\sum x}{N}$$

$\bar{x}$ = refers to the mean

$\sum x$ = was the summation of all observations.

N = was the number of observations.

3.7.1.2 Standard Deviation

$$\bar{x} = \frac{\sum (x-\bar{x})^2}{n-1}$$

$x - \bar{x}$ = was the difference between the observation (score) and the mean of the distribution

$(x-\bar{x})2$ = was the squared deviation of the scores from the mean

$n - 1$ = was the number of observations minus the 1

3.6.2 Statistics used in quality inspection of tools.

3.6.2.1 Index of item Objective Congruence (IOC)

$$IOC = \frac{\sum R}{N}$$

IOC = was the Item Objective Congruence Index

$\sum R$ = was the summation of 1 in all raters

N = was the number of items

3.6.2.2 Reliability (Cronbach Alpha Coefficient)

$$\propto = \frac{k}{k-1}\left[1-\frac{\sum s_i^2}{s_i^2}\right]$$

$\propto$ = was the Cronbach alpha coefficient

k = was the number of items

$\sum s_i^2$ = was the sum of the variances of each item

s_i^2 = was the variance of the total column

3.6.3 Statistics used in hypothesis testing.

3.6.1.1 Mean

$$\bar{x} = \frac{\sum x}{N}$$

$\bar{x}$ = refers to the mean

$\sum x$ = Was the summation of all observations.

N = Was the number of observations.

3.6.1.2 Standard Deviation

$$\bar{x} = \frac{\sum (x\text{-}x)^2}{n-1}$$

$x - \bar{x}$ = was the difference between the observation (score) and the mean of the distribution

$(x\text{-}x)2$ = was the squared deviation of the scores from the mean

$n - 1$ = was the number of observations minus the 1

CHAPTER 4
RESEARCH RESULT

This research focused on the curriculum evaluation of the bachelor's degree program in network engineering at Sichuan University of Science and Engineering. The objectives were to evaluate the curriculum using the CIPP model, with a particular focus on the aspects of context, input, process, and product. Additionally, this section will present the following:

4.1 The analysis results of personal information of the bachelor's degree in network engineering curriculum at Sichuan University of Science and Engineering.

4.2 The analysis and results evaluate the curriculum of the bachelor's degree in network engineering at Sichuan University of Science and Engineering, focusing, on aspects of context.

4.3 The analysis results evaluate the curriculum of the bachelor's degree in network engineering at Sichuan University of Science and Engineering, focusing, on aspects of input.

4.4 The analysis results evaluate the curriculum of the bachelor's degree in network engineering at Sichuan University of Science and Engineering, focusing, on aspects of process.

4.5 The analysis results evaluate the curriculum of the bachelor's degree in network engineering at Sichuan University of Science and Engineering, focusing, on aspects of product.

4.6 The analysis results evaluate the curriculum of the bachelor's degree in network engineering, focusing, focusing on aspects of context, input, process, and product.

4.1 The analysis results of personal information of the bachelor's degree in network engineering curriculum at Sichuan University of Science and Engineering.

The analysis results of personal information pertaining to the bachelor's degree program in Network Engineering curriculum were classified according to administrators, instructors, students, undergraduates, and employers. Tables 4.1 - 4.5 are presented to provide a detailed overview of the findings.

Table 4.1 Number and percentage of personal information from the administrators.

Personal information	Number	Percentage
1. Gender		
1.1 Male	10	52.63
1.2 Female	9	47.37
Total	19	100
2. Age		
2.1 20 - 30	5	26.32
2.2 31 - 40	9	47.37
2.3 41 - 50	4	21.05
2.4 51 - 60	1	5.26
2.5 Others.....	0	0.00
Total	19	100
3. Work experience		
3.1 Under 5 years	2	10.53
3.2 5 – 10 years	8	42.11
3.3 11 – 15 years	8	42.11
3.4 More than 15 years	1	5.26
Total	19	100
4. Education		
4.1 Bachelor's Degree	11	57.89
4.2 Master's Degree	8	42.11
4.3 Doctor's Degree	0	0.00
4.4 Other.....	0	0.00
Total	19	100

From table 4.1, there were 10 male (52.63%), 10 have aged 31-40 (47.37%), 8 have work experience 5 – 10 years and 11 – 15 years (42.11%), and 11 undergraduate with Bachelor's Degree (57.89%).

Table 4.2 Number and percentage of personal information of the instructors.

Personal information	Number	Percentage
1. Gender		
1.1 Male	16	66.67
1.2 Female	8	33.33
2. Age		
2.1 20 - 30	0	0.00
2.2 31 - 40	7	29.16
2.3 41 - 50	17	70.83
2.4 51 - 60	0	0.00
2.5 Others.....	0	0.00
Total	24	100
3. Work experience		
3.1 Under 5 years	0	0.00
3.2 5 – 10 years	7	29.16
3.3 11 – 15 years	17	70.83
3.4 More than 15 years	0	0.00
Total	24	100
4. Education		
4.1 Bachelor's degree	0	0
4.2 Master's degree	19	79.17
4.3 Doctor's degree	5	20.83
4.4 Other.....	0	0.00
Total	24	100

From table 4.2, there were 16 male (66.67%), 17 have aged 31-40 (29.16%), 17 have work experience 11 – 15 years (70.83%), and 19 undergraduate with Master's degree (79.17%).

Table 4.3 Number and percentage of personal information of the students.

Personal information	Number	Percentage
1. Gender		
1.1 Male	171	74.35
1.2 Female	59	25.65
Total	230	100
2. Age		
2.1 17 - 18	18	7.83
2.2 19 - 20	104	45.22
2.3 20 - 21	33	14.35
2.4 22 - 23	75	32.61
2.5 Others.....	0	0.00
Total	230	100
3. Education level		
3.1 1st Grade	105	45.65
3.2 2nd Grade	35	15.22
3.3 3rd Grade	61	26.52
3.4 4th Grade	29	12.61
3.5 Others.....	0	0.00
Total	230	100

From table 4.3, there were 171 male (74.35%), 104 have aged 19-20 (45.22%), and 105 learn 1th Grade education level (45.65%)

Table 4.4 Number and percentage of personal information of the students undergraduate.

Personal information	Number	Percentage
1. Gender		
1.1 Male	31	77.50
1.2 Female	9	22.50
Total	40	100

Table 4.4 Number and percentage of personal information of the students undergraduate. (Cont.)

Personal information	Number	Percentage
2. Occupation		
2.1 Engineer	19	47.50
2.2 Businessman	10	25.00
2.3 Freelance	4	10.00
2.4 Instructor	7	17.50
Total	40	100
3. Work experience		
3.1 Under 5 years	0	0.00
3.2 5 – 10 years	20	50.00
3.3 11 – 15 years	20	50.00
3.4 More than 15 years	0	0.00
Total	40	100

From table 4.4, there were 31 male (77.50%), 19 work engineers (47.50%), 20 have work experience 5 – 10 years and 11 – 15 years (50.00).

Table 4.5 Number and percentage of personal information of the employers.

Personal information	Number	Percentage
1. Gender		
1.1 Male	34	85.00
1.2 Female	6	15.00
Total	40	100
2. Age		
2.1 20 - 30	0	0.00
2.2 31 - 40	7	17.50
2.3 41 - 50	20	50.00
2.4 51 - 60	13	32.50

Table 4.5 Number and percentage of personal information of the employers. (Cont.)

Personal information	Number	Percentage
2.5 Others.....	0	0.00
Total	40	100
3. Work experience		
3.1 Under 5 years	0	0.00
3.2 5 – 10 years	7	17.50
3.3 11 – 15 years	20	50.00
3.4 More than 15 years	13	32.50
Total	40	100
4. Education		
4.1 Bachelor's degree	23	57.50
4.2 Master's degree	9	22.50
4.3 Doctor's degree	8	20.00
Total	40	100

Based on the data presented in Table 4.5, it was observed that there were 34 males, accounting for 85.00% of the total respondents. Additionally, 20 respondents fell within the age range of 31-40, representing 17.50% of the total. Furthermore, 20 respondents had a work experience of 11-15 years, making up 50.00% of the total. Lastly, there were 19 respondents who held an undergraduate degree, constituting 57.50% of the total.

4.2 The analysis and results evaluate the curriculum of the bachelor's degree in network engineering at Sichuan University of Science and Engineering, focusing, on aspects of context.

The analysis results of the evaluation of the curriculum for the Bachelor's degree program in Network Engineering focused on aspects of context, including curriculum components, curriculum objectives, curriculum structure, and course content. These aspects were classified by administrators, instructors, undergraduate students, and graduate students. Tables 4.6 - 4.10 are provided to present the detailed findings.

Table 4.6 Mean and level of curriculum evaluation focusing on aspects of context.

Context	Component curriculum			Curriculum objectives			Curriculum structure			Course content		
	Mean	Level	No	Mean	Level	No	Mean	Level	No	Mean	Level	No
administrations	3.95	high agree	2	3.82	high agree	3	3.78	high agree	4	4.11	high agree	1
Instructor	3.97	high agree	3	4.00	high agree	2	4.10	high agree	1	4.10	high agree	1
Students	3.90	high agree	3	3.90	high agree	3	3.97	high agree	2	4.00	high agree	1
Undergraduate	4.03	high agree	1	3.97	high agree	3	4.00	high agree	2	4.00	high agree	2
Total	3.96	high agree	2	3.92	high agree	3	3.96	high agree	2	4.05	high agree	1

From table 4.6, it was found that the opinions of administrators, instructors, students, and undergraduate students regarding the bachelor's degree curriculum in Network Engineering were highly positive in terms of the overall context.

Considering the opinions of administrators, the aspects of the curriculum were rated at a high level, with the highest mean in the following order: course content ($\bar{x}$=4.11, S.D.=0.75), component curriculum ($\bar{x}$=3.95, S.D.=0.75), curriculum objectives ($\bar{x}$=3.82, S.D.=0.75), and curriculum structure ($\bar{x}$=3.78, S.D.=0.75).

When considering the opinions of instructors, the aspects of the curriculum were also rated at a high level, with the highest mean in the following order: course content ($\bar{x}$=4.10, S.D.=0.83), curriculum structure ($\bar{x}$=4.10, S.D.=0.84), curriculum objectives ($\bar{x}$=4.00, S.D.=0.73), and component curriculum ($\bar{x}$=3.97, S.D.=0.86).

Similarly, when considering the opinions of students, the aspects of the curriculum were rated at a high level, with the highest mean in the following order: course content ($\bar{x}$=4.00, S.D.=0.81), curriculum structure ($\bar{x}$=3.97, S.D.=0.82), curriculum objectives ($\bar{x}$=3.90, S.D.=0.73), and component curriculum ($\bar{x}$=3.90, S.D.=0.80).

Lastly, considering the opinions of undergraduate students, the aspects of the curriculum were rated at a high level, with the highest mean in the following order:

component curriculum ($\bar{x}$=4.03, S.D.=0.78), course content ($\bar{x}$=4.00, S.D.=0.81), curriculum structure ($\bar{x}$=4.00, S.D.=0.83), and curriculum objectives ($\bar{x}$=3.97, S.D.=0.79).

Table 4.7 Mean and standard deviation of context of the administrations.

Assessment Item	Mean	S.D.	Level	No
Component curriculum	3.95	0.85	high agree	2
1 The curriculum is up-to-date and in line with the needs of the labor market.	3.84	0.83	high agree	
2 The curriculum is appropriate and in line with the needs of learners.	3.79	0.79	high agree	
3 The study plan throughout the program is clear.	4.21	0.92	highest agree	
4 The program of study for each semester is clear.	4.00	0.88	high agree	
Curriculum objectives	3.82	0.87	high agree	3
5 The curriculum objectives are in line with current social conditions.	3.74	0.93	high agree	
6 The course objectives are consistent with the needs of the learners.	3.95	0.78	high agree	
7 The course objectives are language clear and easy to understand.	3.79	0.85	high agree	
8 The course objectives cover the content and structure of the course.	3.95	0.78	high agree	
9 Course objectives are practical.	3.98	0.67	high agree	
Curriculum structure	3.78	0.78	high agree	4
10 The course structure is consistent with the philosophy and objectives of the course.	3.95	0.78	high agree	
11 The course structure has an appropriate number of hours throughout the course.	3.95	0.78	high agree	

Table 4.7 Mean and standard deviation of context of the administrations. (Cont.)

	Assessment Item	Mean	S.D.	Level	No
12	The curriculum structure is divided into proportions of subjects appropriately in each semester.	3.58	0.69	high agree	
13	The curriculum structure can develop students to meet the objectives of the curriculum.	3.63	0.76	high agree	
Course content		4.11	0.34	high agree	1
14	The subjects in the curriculum are consistent with the objectives of the curriculum.	3.95	0.85	high agree	
15	The course content in the curriculum are consistent with the objectives of the curriculum.	4.37	0.68	highest agree	
16	The course content in the curriculum are consistent with the needs of the learners and current social conditions.	4.11	0.81	high agree	
17	The course content in the curriculum is appropriate, clear, and nonredundant.	4.00	0.88	high agree	
18	The course content in the curriculum are up-to-date.	4.11	0.74	high agree	
	Total	3.92	0.75	high agree	

Based on the data presented in table 4.7, the opinions of administrators regarding the bachelor's degree curriculum in Network Engineering were highly positive in terms of the overall context ($\bar{x}$=3.92, S.D.=0.75).

When considering each aspect individually, it was found that all aspects were rated at a high level, with the highest mean in the following order: course content

($\bar{x}$=4.11, S.D.=0.34), component curriculum ($\bar{x}$=3.95, S.D.=0.85), curriculum objectives ($\bar{x}$=3.82, S.D.=0.87), and curriculum structure ($\bar{x}$=3.78, S.D.=0.78).

Table 4.8 Mean and standard deviation of context of the instructors.

Assessment Item	Mean	S.D.	Level	No
Component curriculum	3.97	0.86	high agree	3
1 The curriculum is up-to-date and in line with the needs of the labor market.	4.29	0.69	highest agree	
2 The curriculum is appropriate and in line with the needs of learners.	3.79	0.72	high agree	
3 The study plan throughout the program is clear.	3.75	0.85	high agree	
4 The program of study for each semester is clear.	4.04	0.91	high agree	
Curriculum objectives	4.00	0.73	high agree	2
5 The curriculum objectives are in line with current social conditions.	4.08	0.83	high agree	
6 The course objectives are consistent with the needs of the learners.	3.88	0.80	high agree	
7 The course objectives are language clear and easy to understand.	3.79	0.78	high agree	
8 The course objectives cover the content and structure of the course.	4.25	0.74	highest agree	
9. Course objectives are practical.	4.00	0.72	high agree	
Curriculum structure	4.10	0.84	high agree	1
10 The course structure is consistent with the philosophy and objectives of the course.	4.17	0.92	high agree	
11 The course structure has an appropriate number of hours throughout the course.	3.83	0.70	high agree	

Table 4.8 Mean and standard deviation of context of the instructors. (Cont.)

	Assessment Item	Mean	S.D.	Level	No
12	The curriculum structure is divided into proportions of subjects appropriately in each semester.	4.13	0.80	high agree	
13	The curriculum structure can develop students to meet the objectives of the curriculum.	4.29	0.86	highest agree	
Course content		4.10	0.83	high agree	1
14	The subjects in the curriculum are consistent with the objectives of the curriculum.	4.29	0.81	highest agree	
15	The course content in the curriculum are consistent with the objectives of the curriculum.	4.00	0.88	high agree	
16	The course content in the curriculum are consistent with the needs of the learners and current social conditions.	4.17	0.87	high agree	
17	The course content in the curriculum are appropriate, clear, and nonredundant.	3.96	0.81	high agree	
18	The course content in the curriculum is up to date.	4.08	0.88	high agree	
	Total	4.04	0.81	high agree	

Based on the data presented in table 4.8, the opinions of instructors regarding the bachelor's degree curriculum in Network Engineering were highly positive in terms of the overall context ($\bar{x}$=4.04, S.D.=0.81).

When considering each aspect individually, it was found that all aspects were rated at a high level, with the highest mean in the following order: course content ($\bar{x}$=4.10, S.D.=0.83), curriculum structure ($\bar{x}$=4.10, S.D.=0.84), curriculum objectives

($\bar{x}$=4.00, S.D.=0.73), and component curriculum ($\bar{x}$=3.97, S.D.=0.86). As for table 4.9, it presents the mean and standard deviation of the context as perceived by the students.

Table 4.9 Mean and standard deviation of context of the students.

Assessment Item	Mean	S.D.	Level	N0.
Component curriculum	3.90	0.80	high agree	3
1 The curriculum is up-to-date and in line with the needs of the labor market.	3.99	0.88	high agree	
2 The curriculum is appropriate and in line with the needs of learners.	3.88	0.90	high agree	
3 The study plan throughout the program is clear.	3.94	0.83	high agree	
4 The program of study for each semester is clear.	3.79	0.87	high agree	
Curriculum objectives	3.90	0.80	high agree	3
5 The curriculum objectives are in line with current social conditions.	3.78	0.91	high agree	
6 The course objectives are consistent with the needs of the learners.	3.86	0.88	high agree	
7 The course objectives are language clear and easy to understand.	3.94	0.90	high agree	
8 The course objectives cover the content and structure of the course.	3.96	0.83	high agree	
9 Course objectives are practical.	3.99	0.84	high agree	
Curriculum structure	3.97	0.82	high agree	2
10 The course structure is consistent with the philosophy and objectives of the course.	3.98	0.84	high agree	
11 The course structure has an appropriate number of hours throughout the course.	4.03	0.80	high agree	

Table 4.9 Mean and standard deviation of context of the students.

	Assessment Item	Mean	S.D.	Level	N0.
12	The curriculum structure is divided into proportions of subjects appropriately in each semester.	3.92	0.87	high agree	
13	The curriculum structure can develop students to meet the objectives of the curriculum.	3.95	0.86	high agree	
Course content		4.00	0.81	high agree	1
14	The subjects in the curriculum are consistent with the objectives of the curriculum.	3.95	0.82	high agree	
15	The course content in the curriculum are consistent with the objectives of the curriculum.	4.07	0.79	high agree	
16	The course content in the curriculum are consistent with the needs of the learners and current social conditions.	4.01	0.82	high agree	
17	The course content in the curriculum are appropriate, clear, and nonredundant.	4.04	0.84	high agree	
18	The course content in the curriculum are up-to-date.	3.92	0.93	high agree	
	Total	3.95	0.76	high agree	

Based on the data presented in table 4.9, the opinions of students regarding the bachelor's degree curriculum in Network Engineering were highly positive in terms of the overall context ($\bar{x}$=3.95, S.D.=0.76).

When considering each aspect individually, it was found that all aspects were rated at a high level, with the highest mean in the following order: course content ($\bar{x}$=4.00, S.D.=0.81), curriculum structure ($\bar{x}$=3.97, S.D.=0.82), curriculum objectives ($\bar{x}$=3.90, S.D.=0.80), and component curriculum ($\bar{x}$=3.90, S.D.=0.80).

Table 4.10 Mean and standard deviation of context of the students undergraduate.

Assessment Item	Mean	S.D.	Level	
Component curriculum	4.02	0.78	high agree	1
1 The curriculum is up-to-date and in line with the needs of the labor market.	4.03	0.79	high agree	
2 The curriculum is appropriate and in line with the needs of learners.	3.80	0.85	high agree	
3 The study plan throughout the program is clear.	4.03	0.86	high agree	
4 The program of study for each semester is clear.	4.23	0.77	highest agree	
Curriculum objectives	3.97	0.79	high agree	3
5 The curriculum objectives are in line with current social conditions.	3.88	0.79	high agree	
6 The course objectives are consistent with the needs of the learners.	3.98	0.89	high agree	
7 The course objectives are language clear and easy to understand.	4.13	0.76	high agree	
8 The course objectives cover the content and structure of the course.	3.98	0.89	high agree	
9 Course objectives are practical.	3.88	0.69	high agree	
Curriculum structure	4.00	0.83	high agree	2
10 The course structure is consistent with the philosophy and objectives of the course.	4.03	0.89	high agree	
11 The course structure has an appropriate number of hours throughout the course.	4.05	0.90	high agree	

Table 4.10 Mean and standard deviation of context of the students undergraduate. (Cont.)

Assessment Item	Mean	S.D.	Level	
Course content	4.00	0.81	high agree	2
12 The curriculum structure is divided into proportions of subjects appropriately in each semester.	3.88	0.76	high agree	
13 The curriculum structure can develop students to meet the objectives of the curriculum.	4.05	0.81	high agree	
14 The subjects in the curriculum are consistent with the objectives of the curriculum.	3.78	0.84	high agree	
15 The course content in the curriculum are consistent with the objectives of the curriculum.	4.15	0.83	high agree	
16 The course content in the curriculum are consistent with the needs of the learners and current social conditions.	3.90	0.81	high agree	
17 The course content in the curriculum are appropriate, clear, and nonredundant.	4.08	0.83	high agree	
18 The course content in the curriculum are up-to-date.	4.08	0.80	high agree	
Total	3.99	0.81	high agree	

Based on the data presented in table 4.10, the opinions of undergraduate students regarding the bachelor's degree curriculum in Network Engineering were highly positive in terms of the overall context ($\overline{x}$=3.99, S.D.=0.81).

When considering each aspect individually, it was found that all aspects were rated at a high level, with the highest mean in the following order: component curriculum

($\bar{x}$=4.02, S.D.=0.78), course content ($\bar{x}$=4.00, S.D.=0.81), curriculum structure ($\bar{x}$=4.00, S.D.=0.83), and curriculum objectives ($\bar{x}$=3.97, S.D.=0.79).

4.3 The analysis results evaluate the curriculum of the bachelor's degree in network engineering at Sichuan University of Science and Engineering, focusing, on aspects of input.

The analysis results of the evaluation of the curriculum for the bachelor's degree in network engineering focused on aspects of input, including instructors, administrators, students, learning materials, budget, and buildings. These aspects were classified by administrations, instructors, students, and undergraduate. Table 4.11 - 4.14 presents the findings.

Table 4.11 Mean and level of curriculum evaluation focusing on aspects of input.

input	qualifications of Instructors			Qualifications of Aadministrators			qualifications of Student			Learning materials			Budget and building		
	Mean	Level	No	Mean	Level	No	Mean	Level	No	Mean	Level	No	Mean	Level	No
administrations	4.01	high agree	3	4.04	high agree	2	3.96	high agree	4	3.96	high agree	4	4.08	high agree	1
Instructor	3.96	high agree	5	4.06	high agree	3	4.08	high agree	2	4.03	high agree	4	4.11	high agree	1
Students	4.07	high agree	3	4.01	high agree	4	3.96	high agree	5	4.13	high agree	2	4.15	high agree	1
Undergraduate	3.92	high agree	5	4.08	high agree	1	3.95	high agree	4	4.04	high agree	2	4.05	high agree	3
Total	3.99	high agree	3	4.04	high agree	2	3.98	high agree	4	4.04	high agree	2	4.09	high agree	1

From table 4.11, it was found that the opinions of administrations, instructors, students, and undergraduate toward the curriculum of the bachelor's degree in network engineering at Sichuan University of Science and Engineering were at a high level in terms of input.

When considering the opinions of administrations, it was found that the input aspects were at a high level, sorted from the highest mean in the following order: budget and building ($\bar{x}$=4.08, S.D.=0.35), qualifications of administrators ($\bar{x}$=4.04, S.D.=0.50),

qualifications of instructors ($\bar{x}$=4.01, S.D.=0.30), learning materials ($\bar{x}$=3.96, S.D.=0.39), and qualifications of students ($\bar{x}$=3.96, S.D.=0.46).

When considering the opinions of instructors, it was found that the input aspects were at a high level, sorted from the highest mean in the following order: budget and building ($\bar{x}$=4.11, S.D.=0.72), qualifications of students ($\bar{x}$=4.08, S.D.=0.83), qualifications of administrators ($\bar{x}$=4.06, S.D.=0.80), learning materials ($\bar{x}$=4.03, S.D.=0.79), and qualifications of instructors ($\bar{x}$=3.96, S.D.=0.78).

When considering the opinions of students, it was found that the input aspects were at a high level, sorted from the highest mean in the following order: budget and building ($\bar{x}$=4.15, S.D.=0.81), learning materials ($\bar{x}$=4.13, S.D.=0.80), qualifications of instructors ($\bar{x}$=4.07, S.D.=0.84), qualifications of administrators ($\bar{x}$=4.01, S.D.=0.93), and qualifications of students ($\bar{x}$=3.96, S.D.=0.99).

When considering the opinions of undergraduate students, it was found that the input aspects were at a high level, sorted from the highest mean in the following order: qualifications of administrators ($\bar{x}$=4.08, S.D.=0.80), learning materials ($\bar{x}$=4.04, S.D.=0.81), budget and building ($\bar{x}$=4.05, S.D.=0.80), qualifications of students ($\bar{x}$=3.95, S.D.=0.83), and qualifications of instructors ($\bar{x}$=3.92, S.D.=0.77).

Table 4.12 Mean and standard deviation of input of the administrations.

	Assessment Item	Mean	S.D.	Level	No
Qualifications of instructors		4.01	0.30	high agree	3
1	Instructors are well knowledgeable in the subject taught.	4.11	high agree	high agree	
2	Instructors are qualified and experienced in the subjects they teach.	4.26	0.81	highest agree	
3	Instructors are virtuous and conscious of being a teacher	3.95	0.91	high agree	
4	Instructors integrate learning content into more than one skill.	3.79	0.85	high agree	

Table 4.12 Mean and standard deviation of input of the administrations. (Cont.)

	Assessment Item	Mean	S.D.	Level	No
5	Instructors prepare interesting materials and plan their lessons in a step-by-step manner.	4.00	0.88	high agree	
6	Instructors are attentive to teaching and take care of the learners in the classroom thoroughly.	4.16	0.69	high agree	
7	Instructors always instill morality and ethics into their learners	4.00	0.88	high agree	
8	Instructors encourage students to think, research, and solve everyday problems on their own.	4.05	0.78	high agree	
9	Instructors have teaching techniques that can arouse a wide range of interests.	3.63	0.68	high agree	
10	Instructors have appropriate counseling in academic and other areas.	4.05	0.71	high agree	
11	Instructors recommend additional learning resources.	4.11	0.88	high agree	
Qualifications of administrators		4.04	0.50	high agree	2
12	Administrators work with determination, dedication, and self-sacrifice to improve the school.	4.21	0.85	highest Agree	
13	Administrators have leadership.	3.95	0.85	high agree	
14	Administrators accept the student's opinions and problems.	3.95	0.85	high agree	
Qualifications of student		3.96	0.46	high agree	
15	Students are interested in applying continuously for courses.	3.68	0.75	high agree	

Table 4.12 Mean and standard deviation of input of the administrations. (Cont.)

Assessment Item	Mean	S.D.	Level	No
16 Students have knowledge suitable for the content of the curriculum structure.	4.26	0.81	highest agree	
17 Students are interested and conscientious about learning according to the curriculum.	3.89	0.94	high agree	
18 Students are prompt to learn according to the curriculum.	4.00	0.82	high agree	
Learning materials	3.96	0.39	high agree	4
19 Media, materials, teaching and learning equipment are sufficient to meet the needs of the students.	4.00	0.82	high agree	
20 Media, materials, and teaching equipment are diverse and suitable for teaching and learning in the curriculum.	4.11	0.81	high agree	
21 Media, materials, teaching and learning equipment are of good quality and can be used to manage teaching and learning in the course.	3.74	0.73	high agree	
22 Media, materials, teaching equipment can be used conveniently and valuably in the course.	4.21	0.92	highest agree	
23 Media, materials, and teaching equipment are up-to-date.	3.74	0.73	high agree	
Budget and building	4.08	0.30	high agree	1
24 The buildings, classrooms, conference rooms, audio-visual rooms and laboratories are sufficient for teaching and learning in the curriculum.	4.16	0.90	high agree	

Table 4.12 Mean and standard deviation of input of the administrations. (Cont.)

No	Assessment Item	Mean	S.D.	Level
25	The buildings, classrooms, conference rooms, audio-visual rooms and laboratories have suitable environment and atmosphere.	3.84	0.90	high agree
26	The buildings, classrooms, conference rooms, audio-visual rooms and laboratories are suitable for teaching and learning in the curriculum.	3.89	0.81	high agree
27	The buildings, classrooms, conference rooms, audio-visual rooms and laboratories are safe.	4.05	0.71	high agree
28	Libraries are sufficient, appropriate, and conducive to learning.	4.21	0.85	highest agree
29	The activity areas are appropriate, sufficient, and conducive to learning.	4.21	0.79	highest agree
30	The overall environment is appropriate and conducive to learning.	4.21	0.85	highest agree
	Total	4.01	0.78	high agree

From table 4.12, it was found that the opinions of administrators toward the bachelor's degree in network engineering curriculum in wholistic on input were at a high level ($\bar{x}$=4.01, S.D.=0.78).

When considering the opinions of administrators, it was found that wholistic on input were at a high level, sorted from the highest mean in the following order: budget and building ($\bar{x}$=4.08, S.D.=0.30), qualifications of administrators ($\bar{x}$=4.04, S.D.=0.50), qualifications of instructors ($\bar{x}$=4.01, S.D.=0.30), learning materials ($\bar{x}$=3.96, S.D.=0.39), and qualifications of students ($\bar{x}$=3.96, S.D.=0.46).

Table 4.13 Mean and standard deviation of input of the instructors.

	Assessment Item	Mean	S.D.	Level	No
Qualifications of instructors		3.96	0.78	high agree	5
1	Instructors are well knowledgeable in the subject taught.	4.13	0.80	high agree	
2	Instructors are qualified and experienced in the subjects they teach.	3.79	0.72	high agree	
3	Instructors are virtuous and conscious of being a teacher	3.75	0.74	high agree	
4	Instructors integrate learning content into more than one skill.	4.08	0.83	high agree	
5	Instructors prepare interesting materials and plan their lessons in a step-by-step manner.	3.92	0.93	high agree	
6	Instructors are attentive to teaching and take care of the learners in the classroom thoroughly.	3.92	0.78	high agree	
7	Instructors always instill morality and ethics into their learners	3.96	0.81	high agree	
8	Instructors encourage students to think, research, and solve everyday problems on their own.	3.92	0.93	high agree	
9	Instructors have teaching techniques that can arouse a wide range of interests.	4.13	0.80	high agree	
10	Instructors have appropriate counseling in academic and other areas.	3.79	0.72	high agree	
11	Instructors recommend additional learning resources.	4.17	0.76	high agree	

Table 4.13 Mean and standard deviation of input of the instructors. (Cont.)

Assessment Item	Mean	S.D.	Level	No
Qualifications of administrators	4.06	0.80	high agree	3
12 Administrators work with determination, dedication, and self-sacrifice to improve the school.	4.04	0.81	high agree	
13 Administrators have leadership.	4.17	0.82	high agree	
14 Administrators accept the student's opinions and problems.	3.96	0.81	high agree	
Qualifications of student	4.08	0.83	high agree	2
15 Students are interested in applying continuously for courses.	4.17	0.82	high agree	
16 Students have knowledge suitable for the content of the curriculum structure.	4.17	0.76	high agree	
17 Students are interested and conscientious about learning according to the curriculum.	3.79	0.83	high agree	
18 Students are prompt to learn according to the curriculum.	4.21	0.78	highest agree	
Learning materials	4.03	0.79	high agree	4
19 Media, materials, teaching and learning equipment are sufficient to meet the needs of the students.	3.88	0.80	high agree	
20 Media, materials, and teaching equipment are diverse and suitable for teaching and learning in the curriculum.	4.17	0.82	high agree	
21 Media, materials, teaching and learning equipment are of good quality and can be used to manage teaching and learning in the course	3.96	0.86	high agree	

Table 4.13 Mean and standard deviation of input of the instructors. (Cont.)

	Assessment Item	Mean	S.D.	Level	No
22	Media, materials, teaching equipment can be used conveniently and valuably in the course.	4.13	0.74	high agree	
23	Media, materials, and teaching equipment are up to date.	4.00	0.78	high agree	
Budget and building		4.11	0.82	high agree	1
24	The buildings, classrooms, conference rooms, audio-visual rooms and laboratories are sufficient for teaching and learning in the curriculum.	4.21	0.72	highest agree	
25	The buildings, classrooms, conference rooms, audio-visual rooms and laboratories have suitable environment and atmosphere.	4.08	0.78	high agree	
26	The buildings, classrooms, conference rooms, audio-visual rooms and laboratories are suitable for teaching and learning in the curriculum.	4.00	0.88	high agree	
27	The buildings, classrooms, conference rooms, audio-visual rooms and laboratories are safe.	3.88	0.95	high agree	
28	Libraries are sufficient, appropriate, and conducive to learning.	4.50	0.78	highest agree	
29	The activity areas are appropriate, sufficient, and conducive to learning.	3.96	0.81	high agree	
30	The overall environment is appropriate and conducive to learning.	4.13	0.90	high agree	
	Total	4.03	0.83	high agree	

From table 4.13, it was found that the opinions of instructors toward the bachelor's degree in network engineering curriculum in wholistic on input were at a high level ($\overline{x}$=4.03, S.D.=0.83).

When considering the opinions of instructors, it was found that wholistic on input were at a high level, sorted from the highest mean in the following order: budget and building ($\overline{x}$=4.11, S.D.=0.82), qualifications of students ($\overline{x}$=4.08, S.D.=0.83), qualifications of administrators ($\overline{x}$=4.06, S.D.=0.80), learning materials ($\overline{x}$=4.03, S.D.=0.79), and qualifications of instructors ($\overline{x}$=3.96, S.D.=0.78).

Table 4.14 Mean and standard deviation of input of the students.

	Assessment Item	Mean	S.D.	Level	No
Qualifications of instructors		4.07	0.84	high agree	3
1	Instructors are well knowledgeable in the subject taught.	4.04	0.94	high agree	
2	Instructors are qualified and experienced in the subjects they teach.	4.04	0.94	high agree	
3	Instructors are virtuous and conscious of being a teacher	4.29	0.81	highest agree	
4	Instructors integrate learning content into more than one skill.	4.04	0.87	high agree	
5	Instructors prepare interesting materials and plan their lessons in a step-by-step manner.	4.00	0.93	high agree	
6	Instructors are attentive to teaching and take care of the learners in the classroom thoroughly.	3.98	0.99	high agree	
7	Instructors always instill morality and ethics into their learners	4.03	0.87	high agree	
8	Instructors encourage students to think, research, and solve everyday problems on their own.	4.08	0.88	high agree	

Table 4.14 Mean and standard deviation of input of the students. (Cont.)

	Assessment Item	Mean	S.D.	Level	No
9	Instructors have teaching techniques that can arouse a wide range of interests.	4.00	0.97	high agree	
10	Instructors have appropriate counseling in academic and other areas.	4.07	0.92	high agree	
11	Instructors recommend additional learning resources.	4.11	0.82	high agree	
Qualifications of administrators		4.01	0.93	high agree	4
12	Administrators work with determination, dedication, and self-sacrifice to improve the school.	4.01	0.92	high agree	
13	Administrators have leadership.	4.00	0.98	high agree	
14	Administrators accept the student's opinions and problems.	4.01	0.92	high agree	
Qualifications of student		3.96	0.99	high agree	5
15	Students are interested in applying continuously for courses.	3.96	0.90	high agree	
16	Students have knowledge suitable for the content of the curriculum structure.	3.89	1.08	high agree	
17	Students are interested and conscientious about learning according to the curriculum.	4.00	1.02	high agree	
18	Students are prompt to learn according to the curriculum.	3.99	1.07	high agree	

Table 4.14 Mean and standard deviation of input of the students. (Cont.)

Assessment Item	Mean	S.D.	Level	No
Learning materials	4.13	0.80	high agree	2
19 Media, materials, teaching and learning equipment are sufficient to meet the needs of the students.	4.00	0.97	high agree	
20 Media, materials, and teaching equipment are diverse and suitable for teaching and learning in the curriculum.	4.19	0.85	high agree	
21 Media, materials, teaching and learning equipment are of good quality and can be used to manage teaching and learning in the course	4.28	0.78	highest agree	
22 Media, materials, teaching equipment can be used conveniently and valuably in the course.	4.13	0.84	high agree	
23 Media, materials, and teaching equipment are up to date.	4.07	0.84	high agree	
Budget and building	4.15	0.81	high agree	1
24 The buildings, classrooms, conference rooms, audio-visual rooms and laboratories are sufficient for teaching and learning in the curriculum.	4.10	0.85	high agree	
25 The buildings, classrooms, conference rooms, audio-visual rooms and laboratories have suitable environment and atmosphere.	4.19	0.85	high agree	
26 The buildings, classrooms, conference rooms, audio-visual rooms and laboratories are suitable for teaching and learning in the curriculum.	4.13	0.89	high agree	

Table 4.14 Mean and standard deviation of input of the students. (Cont.)

	Assessment Item	Mean	S.D.	Level	No
27	The buildings, classrooms, conference rooms, audio-visual rooms and laboratories are safe.	4.13	0.89	high agree	
28	Libraries are sufficient, appropriate, and conducive to learning.	4.25	0.83	high agree	
29	The activity areas are appropriate, sufficient, and conducive to learning.	4.14	0.84	high agree	
30	The overall environment is appropriate and conducive to learning.	4.08	0.87	high agree	
	Total	4.08	0.82	high agree	

From table 4.14, it was found that the opinions of students toward the bachelor's degree in network engineering curriculum in wholistic on input were at a high level ($\overline{x}$=4.08, S.D.=0.82).

When considering the opinions of students, it was found that wholistic on input were at a high level, sorted from the highest mean in the following order: budget and building ($\overline{x}$=4.15, S.D.=0.81), learning materials ($\overline{x}$=4.13, S.D.=0.80), instructors ($\overline{x}$=4.07, S.D.=0.84), administrators ($\overline{x}$=4.01, S.D.=0.93), and students ($\overline{x}$=3.96, S.D.=0.99).

Table 4.15 Mean and standard deviation of input of the student undergraduate.

	Assessment Item	Mean	S.D.	Level	No
Qualifications of instructors		3.92	0.77	high agree	5
1	Instructors are well knowledgeable in the subject taught.	3.83	0.84	high agree	
2	Instructors are qualified and experienced in the subjects they teach.	3.90	0.78	high agree	
3	Instructors are virtuous and conscious of being a teacher	3.85	0.83	high agree	

Table 4.15 Mean and standard deviation of input of the undergraduate. (Cont.)

	Assessment Item	Mean	S.D.	Level	No
4	Instructors integrate learning content into more than one skill.	4.00	0.82	high agree	
5	Instructors prepare interesting materials and plan their lessons in a step-by-step manner.	4.03	0.80	high agree	
6	Instructors are attentive to teaching and take care of the learners in the classroom thoroughly.	4.10	0.84	high agree	
7	Instructors always instill morality and ethics into their learners	3.80	0.76	high agree	
8	Instructors encourage students to think, research, and solve everyday problems on their own.	4.18	0.75	high agree	
9	Instructors have teaching techniques that can arouse a wide range of interests.	3.83	0.84	high agree	
10	Instructors have appropriate counseling in academic and other areas.	3.75	0.81	high agree	
11	Instructors recommend additional learning resources.	3.88	0.76	high agree	
Qualifications of administrators		4.08	0.80	high agree	1
12	Administrators work with determination, dedication, and self-sacrifice to improve the school.	4.05	0.85	high agree	
13	Administrators have leadership.	4.03	0.80	high agree	
14	Administrators accept the student's opinions and problems.	4.15	0.80	high agree	

Table 4.15 Mean and standard deviation of input of the undergraduate. (Cont.)

Assessment Item	Mean	S.D.	Level	No
Qualifications of student	3.95	0.83	high agree	4
15 Students are interested in applying continuously for courses.	3.93	0.83	high agree	
16 Students have knowledge suitable for the content of the curriculum structure.	4.13	0.76	high agree	
17 Students are interested and conscientious about learning according to the curriculum.	3.78	0.80	high agree	
18 Students are prompt to learn according to the curriculum.	3.98	0.86	high agree	
Learning materials	4.04	0.81	high agree	2
19 Media, materials, teaching and learning equipment are sufficient to meet the needs of the students.	4.10	0.81	high agree	
20 Media, materials, and teaching equipment are diverse and suitable for teaching and learning in the curriculum.	3.98	0.83	high agree	
21 Media, materials, teaching and learning equipment are of good quality and can be used to manage teaching and learning in the course	3.95	0.81	high agree	
22 Media, materials, teaching equipment can be used conveniently and valuably in the course.	4.13	0.88	high agree	
23 Media, materials, and teaching equipment are up to date.	4.05	0.81	high agree	

Table 4.15 Mean and standard deviation of input of the undergraduate. (Cont.)

Assessment Item	Mean	S.D.	Level	No
Budget and building	4.02	0.80	high agree	3
24 The buildings, classrooms, conference rooms, audio-visual rooms and laboratories are sufficient for teaching and learning in the curriculum.	4.05	0.88	high agree	
25 The buildings, classrooms, conference rooms, audio-visual rooms and laboratories have suitable environment and atmosphere.	4.08	0.83	high agree	
26 The buildings, classrooms, conference rooms, audio-visual rooms and laboratories are suitable for teaching and learning in the curriculum.	4.00	0.72	high agree	
27 The buildings, classrooms, conference rooms, audio-visual rooms and laboratories are safe.	3.85	0.80	high agree	
28 Libraries are sufficient, appropriate, and conducive to learning.	4.18	0.75	high agree	
29 The activity areas are appropriate, sufficient, and conducive to learning.	4.13	0.82	high agree	
30 The overall environment is appropriate and conducive to learning.	3.85	0.80	high agree	
Total	3.98	0.74	high agree	

From table 4.15, it was determined that the opinions of undergraduates towards the bachelor's degree in network engineering curriculum were overall positive when considering wholistic input, with a high level of satisfaction ($\bar{x}$=3.98, S.D.=0.74).

Upon analyzing the undergraduate opinions, it was observed that the wholistic input regarding various factors ranked at a high level in the following order: qualifications

of administrators ($\bar{x}$=4.08, S.D.=0.80), learning materials ($\bar{x}$=4.04, S.D.=0.81), budget and building ($\bar{x}$=4.02, S.D.=0.80), qualifications of students ($\bar{x}$=3.95, S.D.=0.83), and qualifications of instructors ($\bar{x}$=3.92, S.D.=0.77).

4.4 The analysis results evaluate the curriculum of the bachelor's degree in network engineering at Sichuan University of Science and Engineering, focusing, on aspects of process.

The analysis results evaluated the curriculum of the bachelor's degree in network engineering, with a focus on the aspects of the process, such as curriculum management, learning management, and measurement and evaluation. These aspects were categorized by administrations, instructors, students, undergraduates, and students. Table 4.16 to 4.19 presents the corresponding findings.

Table 4.16 Mean and level of curriculum evaluation focusing on aspects of process.

Process	Curriculum management			Learning management			Measurement and evaluation		
	Mean	Level	No	Mean	Level	No	Mean	Level	No
administrations	3.55	high agree	3	4.00	high agree	2	4.05	high agree	1
Instructor	3.57	high agree	3	4.03	high agree	1	3.98	high agree	2
Students	3.63	high agree	3	4.13	high agree	2	4.25	high agree	1
Undergraduate	3.63	high agree	3	3.97	high agree	2	4.05	high agree	1
Total	3.59	high agree	3	4.03	high agree	2	4.08	high agree	1

Based on the findings from table 4.16, it was discovered that the opinions of administrations, instructors, students, and undergraduates towards the curriculum of the bachelor's degree in network engineering at Sichuan University of Science and Engineering were highly positive when considering the wholistic approach to the process.

Regarding the opinions of administrations, the wholistic approach to the process received high ratings, with measurement and evaluation ($\bar{x}$=4.05, S.D.=0.89) and learning management ($\bar{x}$=4.00, S.D.=0.68) being the top-ranked factors. Curriculum management ($\bar{x}$=3.55, S.D.=0.61) was rated slightly lower in comparison.

Considering the opinions of instructors, the wholistic approach to the process also garnered high ratings. Learning management ($\bar{x}$=4.03, S.D.=0.62) and measurement and evaluation ($\bar{x}$=3.98, S.D.=0.83) were the most positively assessed factors. Curriculum management ($\bar{x}$=3.57, S.D.=0.79) received a slightly lower rating.

Examining the opinions of students, the wholistic approach to the process was also deemed highly satisfactory. Measurement and evaluation ($\bar{x}$=4.25, S.D.=0.82) and learning management ($\bar{x}$=4.13, S.D.=0.71) were ranked as the top factors, while Curriculum management ($\bar{x}$=3.63, S.D.=0.84) obtained a slightly lower rating.

Analyzing the opinions of undergraduates, it was determined that the wholistic approach to the process was highly regarded. Measurement and evaluation ($\bar{x}$=4.08), learning management ($\bar{x}$=4.03), and Curriculum management ($\bar{x}$=3.59) were ranked as the top factors in descending order of mean scores.

Table 4.17 Mean and standard deviation of process of the administrations.

	Assessment Item	Mean	S.D.	Level	No
Curriculum management		3.55	0.61	high agree	3
1	Vision and strategy for curriculum administration are appropriate.	3.61	1.09	high agree	
2	The meetings are organized to implement the curriculum with relevant people	3.55	1.09	high agree	
3	A proper operational calendar is set up for curriculum management	3.77	1.21	high agree	
4	The curriculum has appropriate course management according to the study plan for each semester	3.88	1.02	high agree	

Table 4.17 Mean and standard deviation of process of the administrations. (Cont.)

	Assessment Item	Mean	S.D.	Level	No
5	The curriculum has a process to organize instructors for each subject appropriately.	3.44	1.09	high agree	
6	The curriculum has an appropriately clear teaching schedule and activities	3.94	1.05	high agree	
7	The curriculum requires a learning management plan.	3.61	1.28	high agree	
8	The curriculum encourages teaching and learning activities according to the prepared plan.	3.38	1.03	moderate agree	
9	The curriculum organizes supervision of learning activities	3.77	1.00	high agree	
10	The curriculum has supporting activities that encourage learning activities.	3.27	1.07	moderate agree	
11	The curriculum constantly evaluates instructors' organizational learning activities periodically and continuously.	3.00	0.90	moderate agree	
12	The curriculum supports useful learning materials and facilities for learning activities implementation.	3.38	1.24	moderate agree	
Learning management		4.00	0.68	high agree	2
13	The instructional management in the curriculum is consistent with the subjects and learning objectives.	4.26	0.81	the most	
14	Instructional management is complete as specified in the curriculum.	3.84	0.76	high agree	
15	Instructional management responds to the needs and interests of the learners.	4.11	0.74	high agree	

Table 4.17 Mean and standard deviation of process of the administrations. (Cont.)

	Assessment Item	Mean	S.D.	Level	No
16	Learning management provides opportunities for learners to engage.	3.95	0.91	high agree	
17	Instructional management covers the development of knowledge, skills, and attitudes.	3.95	0.91	high agree	
18	Instructional management in the curriculum is diverse.	4.00	0.75	high agree	
19	Instructional management in the curriculum allows students to participate.	3.95	0.91	high agree	
20	Learners come up with a problem-solving process to learn on their own.	3.95	0.91	high agree	
21	Learning activities encourage learners to plan and research together from the sources around them.	3.95	0.85	high agree	
22	Instructional management encourage learners to learn on a regular basis.	3.74	0.73	high agree	
23	Instructional media are used properly in instructional management in the curriculum.	4.21	0.71	highest agree	
24	Information technology is used properly in instructional management in the curriculum.	4.05	0.71	high agree	
Measurement and evaluation		4.05	0.89	high agree	1
25	Instructors inform the learners about the methods of measurement and evaluation.	3.79	0.71	high agree	

Table 4.17 Mean and standard deviation of process of the administrations. (Cont.)

No	Assessment Item	Mean	S.D.	Level
27	Learners are systematically measured and evaluated in covering all aspects.	3.84	0.76	high agree
26	Measurement and evaluation are appropriate and consistent with the objectives of the course.	3.95	0.78	high agree
28	Measurement and evaluation are diverse.	3.95	0.91	high agree
29	Measurement and evaluation are in accordance with the predetermined rules and regulations.	4.37	0.60	highest agree
30	Measurement and evaluation are fair and efficient.	4.26	0.81	highest agree
31	Assessment results are used for the improvement of learners and instruction.	4.11	0.74	high agree
	Total	4.01	0.65	high agree

According to the findings in table 4.17, it was determined that the opinions of undergraduates regarding the curriculum of the bachelor's degree in network engineering, when evaluated holistically in terms of the process, were highly positive ($\bar{x}$=4.01, S.D.=0.65).

When examining the opinions of administrations, it was discovered that the holistic evaluation of the process received high ratings. The factors were ranked from the highest mean as follows: measurement and evaluation ($\bar{x}$=4.05, S.D.=0.89), learning management ($\bar{x}$=4.00, S.D.=0.68), and Curriculum management ($\bar{x}$=3.55, S.D.=0.61).

Table 4.18 Mean and standard deviation of process of the instructors.

	Assessment Item	Mean	S.D.	Level	No
Curriculum management		3.57	0.79	high agree	3
1	Vision and strategy for curriculum administration are appropriate.	3.44	1.00	high agree	
2	The meetings are organized to implement the curriculum with relevant people	3.64	1.07	high agree	
3	A proper operational calendar is set up for curriculum management	3.44	1.08	high agree	
4	The curriculum has appropriate course management according to the study plan for each semester	3.92	1.15	high agree	
5	The curriculum has a process to organize instructors for each subject appropriately.	3.24	1.09	moderate agree	
6	The curriculum has an appropriately clear teaching schedule and activities	3.80	1.22	high agree	
7	The curriculum requires a learning management plan.	3.60	1.11	high agree	
8	The curriculum encourages teaching and learning activities according to the prepared plan.	3.60	1.08	high agree	
9	The curriculum organizes supervision of learning activities	4.00	1.15	high agree	
10	The curriculum has supporting activities that encourage learning activities.	3.48	1.12	high agree	
11	The curriculum constantly evaluates instructors' organizational learning activities periodically and continuously.	3.12	1.20	moderate agree	

Table 4.18 Mean and standard deviation of process of the instructors. (Cont.)

Assessment Item	Mean	S.D.	Level	No
learning management	4.03	0.79	high agree	1
12 The curriculum supports useful learning materials and facilities for learning activities implementation.	3.64	1.15	high agree	
13 The instructional management in the curriculum is consistent with the subjects and learning objectives.	4.17	0.70	high agree	
14 Instructional management is complete as specified in the curriculum.	4.04	0.75	high agree	
15 Instructional management responds to the needs and interests of the learners.	4.00	0.78	high agree	
16 Learning management provides opportunities for learners to engage.	3.88	0.85	high agree	
17 Instructional management covers the development of knowledge, skills, and attitudes.	4.04	0.81	high agree	
18 Instructional management in the curriculum is diverse.	4.29	0.81	highest agree	
19 Instructional management in the curriculum allows students to participate.	3.75	0.85	high agree	
20 Learners come up with a problem-solving process to learn on their own.	3.96	0.86	high agree	
21 Learning activities encourage learners to plan and research together from the sources around them.	4.04	0.75	high agree	

Table 4.18 Mean and standard deviation of process of the instructors. (Cont.)

	Assessment Item	Mean	S.D.	Level	No
22	Instructional management encourage learners to learn on a regular basis.	3.96	0.81	high agree	
23	Instructional media are used properly in instructional management in the curriculum.	4.38	0.65	highest agree	
24	Information technology is used properly in instructional management in the curriculum.	3.88	0.85	high agree	
Measurement and evaluation		3.98	0.83	high agree	2
25	Instructors inform the learners about the methods of measurement and evaluation.	3.96	0.75	high agree	
26	Measurement and evaluation are appropriate and consistent with the objectives of the course.	4.00	0.78	high agree	
27	Learners are systematically measured and evaluated in covering all aspects.	3.71	0.75	high agree	
28	Measurement and evaluation are diverse.	3.96	0.81	high agree	
29	Measurement and evaluation are in accordance with the predetermined rules and regulations.	4.17	0.76	high agree	
30	Measurement and evaluation are fair and efficient.	4.04	0.81	high agree	
31	Assessment results are used for the improvement of learners and instruction.	4.00	0.72	high agree	
	Total	4.01	0.78	high agree	

Based on the data presented in table 4.18, it was observed that the opinions of undergraduates towards the curriculum of the bachelor's degree in network engineering, when evaluated holistically in terms of the process, were highly favorable ($\bar{x}$=4.01, S.D.=0.78).

When examining the opinions of instructors, it was found that the holistic evaluation of the process received high ratings. The factors were ranked from the highest mean as follows: learning management ($\bar{x}$=4.03, S.D.=0.62) and measurement and evaluation ($\bar{x}$=3.98, S.D.=0.83). Curriculum management ($\bar{x}$=3.57, S.D.=0.79) obtained a slightly lower rating.

Table 4.19 Mean and standard deviation of process of the students.

	Assessment Item	Mean	S.D.	Level	No
Curriculum management		3.63	0.84	high agree	3
1	Vision and strategy for curriculum administration are appropriate.	3.49	1.13	high agree	
2	The meetings are organized to implement the curriculum with relevant people	3.58	1.10	high agree	
3	A proper operational calendar is set up for curriculum management	3.32	1.12	moderate agree	
4	The curriculum has appropriate course management according to the study plan for each semester	3.40	1.14	high agree	
5	The curriculum has a process to organize instructors for each subject appropriately.	3.38	1.11	moderate agree	
6	The curriculum has an appropriately clear teaching schedule and activities	3.55	1.12	high agree	
7	The curriculum requires a learning management plan.	3.45	1.11	high agree	

Table 4.19 Mean and standard deviation of process of the students. (Cont.)

	Assessment Item	Mean	S.D.	Level	No
8	The curriculum encourages teaching and learning activities according to the prepared plan.	3.59	1.14	high agree	
9	The curriculum organizes supervision of learning activities	3.55	1.13	high agree	
10	The curriculum has supporting activities that encourage learning activities.	3.56	1.12	high agree	
11	The curriculum constantly evaluates instructors' organizational learning activities periodically and continuously.	3.47	1.11	high agree	
12	The curriculum supports useful learning materials and facilities for learning activities implementation.	3.57	1.12	high agree	
learning management		4.07	0.84	high agree	2
13	The instructional management in the curriculum is consistent with the subjects and learning objectives.	4.13	0.83	high agree	
14	Instructional management is complete as specified in the curriculum.	4.10	0.87	high agree	
15	Instructional management responds to the needs and interests of the learners.	4.09	0.88	high agree	
16	Learning management provides opportunities for learners to engage.	4.08	0.89	high agree	
17	Instructional management covers the development of knowledge, skills, and attitudes.	4.07	0.94	high agree	
18	Instructional management in the curriculum is diverse.	4.09	0.88	high agree	

Table 4.19 Mean and standard deviation of process of the students. (Cont.)

	Assessment Item	Mean	S.D.	Level	No
20	Learners come up with a problem-solving process to learn on their own.	3.93	0.89	high agree	
19	Instructional management in the curriculum allows students to participate.	4.00	0.98	high agree	
21	Learning activities encourage learners to plan and research together from the sources around them.	4.10	0.80	high agree	
22	Instructional management encourage learners to learn on a regular basis.	4.05	0.82	high agree	
23	Instructional media are used properly in instructional management in the curriculum.	4.07	0.85	high agree	
24	Information technology is used properly in instructional management in the curriculum.	4.13	0.91	high agree	
Measurement and evaluation		4.25	0.82	highest agree	1
25	Instructors inform the learners about the methods of measurement and evaluation.	4.19	0.86	high agree	
26	Measurement and evaluation are appropriate and consistent with the objectives of the course.	4.28	0.91	highest agree	
27	Learners are systematically measured and evaluated in covering all aspects.	4.20	0.90	high agree	
28	Measurement and evaluation are diverse.	4.26	0.85	Highest agree	

Table 4.19 Mean and standard deviation of process of the students. (Cont.)

	Assessment Item	Mean	S.D.	Level	No
29	Measurement and evaluation are in accordance with the predetermined rules and regulations.	4.33	0.80	Highest agree	
30	Measurement and evaluation are fair and efficient.	4.22	0.93	Highest agree	
31	Assessment results are used for the improvement of learners and instruction.	4.17	0.88	high agree	
	Total	4.03	0.81	high agree	

Based on the data presented in table 4.19, it was determined that the opinions of undergraduates regarding the curriculum of the bachelor's degree in network engineering, when evaluated holistically in terms of the process, were highly positive ($\overline{x}$=4.03, S.D.=0.81).

When considering the opinions of students, it was found that the holistic evaluation of the process received high ratings. The factors were ranked from the highest mean as follows: measurement and evaluation ($\overline{x}$=4.25, S.D.=0.82), learning management ($\overline{x}$=4.13, S.D.=0.71), and Curriculum management ($\overline{x}$=3.63, S.D.=0.84).

Table 4.20 Mean and standard deviation of process of the students undergraduate.

	Assessment Item	Mean	S.D.	Level	No
Curriculum management		3.63	0.65	high agree	3
1	Vision and strategy for curriculum administration are appropriate.	4.97	0.15	highest agree	
2	The meetings are organized to implement the curriculum with relevant people	3.37	1.14	moderate agree	

Table 4.20 Mean and standard deviation of process of the students undergraduate. (Cont.)

	Assessment Item	Mean	S.D.	Level	No
3	A proper operational calendar is set up for curriculum management	3.42	1.21	high agree	3.42
4	The curriculum has appropriate course management according to the study plan for each semester	3.47	1.08	high agree	3.47
5	The curriculum has a process to organize instructors for each subject appropriately.	3.52	1.10	high agree	3.52
6	The curriculum has an appropriately clear teaching schedule and activities	3.40	1.05	high agree	3.40
7	The curriculum requires a learning management plan.	3.87	1.13	high agree	3.87
8	The curriculum encourages teaching and learning activities according to the prepared plan.	3.50	1.17	high agree	3.50
9	The curriculum organizes supervision of learning activities	3.37	1.12	moderate agree	3.37
10	The curriculum has supporting activities that encourage learning activities.	3.62	1.23	high agree	3.62
11	The curriculum constantly evaluates instructors' organizational learning activities periodically and continuously.	3.35	1.21	moderate agree	3.35
12	The curriculum supports useful learning materials and facilities for learning activities implementation.	3.67	1.14	high agree	3.67

Table 4.20 Mean and standard deviation of process of the students undergraduate. (Cont.)

Assessment Item	Mean	S.D.	Level	No
learning management	3.97	0.75	high agree	2
13 The instructional management in the curriculum is consistent with the subjects and learning objectives.	4.03	0.89	high agree	
14 Instructional management is complete as specified in the curriculum.	3.98	0.77	high agree	
15 Instructional management responds to the needs and interests of the learners.	3.95	0.90	high agree	
16 Learning management provides opportunities for learners to engage.	4.00	0.82	high agree	
17 Instructional management covers the development of knowledge, skills, and attitudes.	3.95	0.85	high agree	
18 Instructional management in the curriculum is diverse.	3.93	0.89	high agree	
19 Instructional management in the curriculum allows students to participate.	4.05	0.85	high agree	
20 Learners come up with a problem-solving process to learn on their own.	3.93	0.83	high agree	
21 Learning activities encourage learners to plan and research together from the sources around them.	4.00	0.78	high agree	
22 Instructional management encourage learners to learn on a regular basis.	4.05	0.85	high agree	
13 Instructional media are used properly in instructional management in the curriculum.	3.93	0.92	high agree	

Table 4.20 Mean and standard deviation of process of the students undergraduate. (Cont.)

	Assessment Item	Mean	S.D.	Level	No
24	Information technology is used properly in instructional management in the curriculum.	3.90	0.87	high agree	
Measurement and evaluation		4.05	0.83	high agree	1
25	Instructors inform the learners about the methods of measurement and evaluation.	4.18	0.75	high agree	
26	Measurement and evaluation are appropriate and consistent with the objectives of the course.	3.72	0.82	high agree	
27	Learners are systematically measured and evaluated in covering all aspects.	4.03	0.86	high agree	
28	Measurement and evaluation are diverse.	4.00	0.85	high agree	
29	Measurement and evaluation are in accordance with the predetermined rules and regulations.	4.15	0.80	high agree	
30	Measurement and evaluation are fair and efficient.	4.10	0.87	high agree	
31	Assessment results are used for the improvement of learners and instruction.	4.15	0.83	high agree	

Based on the data presented in table 4.20, it was determined that the opinions of undergraduates regarding the curriculum of the bachelor's degree in network engineering, when evaluated holistically in terms of the process, were highly positive ($\bar{x}$=4.00, S.D.=0.80).

When considering the opinions of undergraduates, it was found that the holistic evaluation of the process received high ratings. The factors were ranked from the highest

mean as follows: measurement and evaluation ($\bar{x}$=4.05, S.D.=0.83), learning management ($\bar{x}$=3.97, S.D.=0.65), and curriculum management ($\bar{x}$=3.63, S.D.=0.75).

4.5 The analysis results evaluate the curriculum of the bachelor's degree in network engineering at Sichuan University of Science and Engineering, focusing, on aspects of product.

The analysis results evaluated the curriculum of the bachelor's degree in network engineering, with a focus on the aspects of the product, including knowledge, skills, and emotional attitudinal value aspects. These aspects were categorized by administrations, instructors, students, undergraduates, and employers. Table 4.21 to 4.25 present the corresponding findings.

Table 4.21 Mean and level of curriculum evaluation focusing on aspects of product.

Product	Knowledge			Skills			Emotional, attitudinal and value aspects		
	Mean	Level	No	Mean	Level	No	Mean	Level	No
administrations	4.00	high agree	1	3.86	high agree	3	3.98	high agree	2
Instructor	4.02	high agree	2	3.94	high agree	3	4.09	high agree	1
Students	4.08	high agree	1	3.96	high agree	3	4.05	high agree	2
Undergraduate	4.01	high agree	1	3.99	high agree	2	3.96	high agree	3
Employer	4.15	high agree	1	4.07	high agree	2	3.94	high agree	3
Total	4.05	high agree	1	3.96	high agree	3	4.00	high agree	2

Based on the findings from table 4.21, it was determined that the opinions of administrations, instructors, students, undergraduates, and employers regarding the bachelor's degree in network engineering curriculum at Sichuan University of Science and Engineering, when evaluated holistically in terms of the product, were at a high level.

When considering the opinions of administrations, it was found that the holistic evaluation of the product received high ratings. The factors were ranked from the highest mean as follows: knowledge ($\bar{x}$=4.00, S.D.=0.82), emotional attitudinal value aspects ($\bar{x}$=3.98, S.D.=0.75), and skills ($\bar{x}$=3.86, S.D.=0.86).

Examining the opinions of instructors, it was discovered that the holistic evaluation of the product also received high ratings. The factors were ranked from the highest mean as follows: emotional attitudinal value aspects ($\bar{x}$=4.09, S.D.=0.81), knowledge ($\bar{x}$=4.02, S.D.=0.73), and skills ($\bar{x}$=3.94, S.D.=0.89).

Considering the opinions of students, it was found that the holistic evaluation of the product received high ratings. The factors were ranked from the highest mean as follows: knowledge ($\bar{x}$=4.08, S.D.=0.88), emotional attitudinal value aspects ($\bar{x}$=4.05, S.D.=0.88), and skills ($\bar{x}$=3.96, S.D.=1.00).

Examining the opinions of undergraduates, it was determined that the holistic evaluation of the product received high ratings. The factors were ranked from the highest mean as follows: knowledge ($\bar{x}$=4.01, S.D.=0.83), skills ($\bar{x}$=3.99, S.D.=0.74), and emotional attitudinal value aspects ($\bar{x}$=3.96, S.D.=0.83).

Considering the opinions of employers, it was found that the holistic evaluation of the product received high ratings. The factors were ranked from the highest mean as follows: knowledge ($\bar{x}$=4.15, S.D.=0.80), skills ($\bar{x}$=4.07, S.D.=0.81), and emotional attitudinal value aspects ($\bar{x}$=3.94, S.D.=0.74).

Table 4.22 Mean and standard deviation of product of the administrations.

	Assessment Item	Mean	S.D.	Level	No
Knowledge		4.00	0.82	high agree	1
1	Students can know the core concepts and working principles of computer network architecture.	3.68	0.89	high agree	
2	Students can know the analysis and setting methods of network protocols.	4.16	0.76	high agree	
3	Students can understand the working principles of major network devices	4.16	0.90	high agree	

Table 4.22 Mean and standard deviation of product of the administrations. (Cont.)

	Assessment Item	Mean	S.D.	Level	No
4	Students can understand the characteristics and functions of network operating systems.	405	0.71	high agree	
5	Students can understand the basic principles, basic methods and related technologies of network security.	3.95	0.85	high agree	
Skills		3.86	0.86	high agree	3
6	Students have basic techniques of setting up a simple network.	3.74	0.93	high agree	
7	Students have basic skills of using the network.	4.00	0.75	high agree	
8	Students have basic skills of managing and maintaining a network.	3.84	0.76	high agree	
Emotional, attitudinal and value aspects		3.98	0.75	high agree	2
9	Students have comprehensive and profound understanding of the important role of computer networks in the construction of modern information technology.	3.79	0.79	high agree	
10	Students have awareness of network security and confidentiality.	3.58	0.77	high agree	
11	Students have a good awareness of caring for equipment and consciously maintaining the learning environment	4.32	0.82	highest agree	
12	Students have interest in computer science and a spirit of scientific exploration	4.11	0.74	high agree	

Table 4.22 Mean and standard deviation of product of the administrations. (Cont.)

	Assessment Item	Mean	S.D.	Level	No
13	Students have team spirit of solidarity and cooperation and a good spiritual atmosphere of willingness to work together.	4.11	0.81	high agree	
	Total	3.96	0.80	high agree	

Based on the data presented in table 4.22, it was determined that the opinions of administrations regarding the curriculum of the bachelor's degree in network engineering, when evaluated holistically in terms of the product, were at a high level ($\bar{x}$=3.96, S.D.=0.80).

When considering the opinions of administrations, it was found that the holistic evaluation of the product received high ratings. The factors were ranked from the highest mean as follows: knowledge ($\bar{x}$=4.00, S.D.=0.82), emotional attitudinal value aspects ($\bar{x}$=3.98, S.D.=0.75), and skills ($\bar{x}$=3.86, S.D.=0.86).

Table 4.23 Mean and standard deviation of product of the instructors.

	Assessment Item	Mean	S.D.	Level	No
Knowledge		4.02	0.73	high agree	2
1	Students can know the core concepts and working principles of computer network architecture.	3.88	0.74	high agree	
2	Students can know the analysis and setting methods of network protocols.	4.17	0.76	high agree	
3	Students can understand the working principles of major network devices	3.83	0.76	high agree	
4	Students can understand the characteristics and functions of network operating systems.	4.21	0.78	the most	

Table 4.23 Mean and standard deviation of product of the instructors. (Cont.)

	Assessment Item	Mean	S.D.	Level	No
5	Students can understand the basic principles, basic methods and related technologies of network security.	4.00	0.86	high agree	
Skills		3.94	0.89	high agree	3
6	Students have basic techniques of setting up a simple network.	3.83	0.82	high agree	
7	Students have basic skills of using the network.	4.04	0.75	high agree	
8	Students have basic skills of managing and maintaining a network.	3.96	0.91	high agree	
Emotional, attitudinal and value aspects		4.09	0.81	high agree	1
9	Students have comprehensive and profound understanding of the important role of computer networks in the construction of modern information technology.	3.96	0.86	high agree	
10	Students have awareness of network security and confidentiality.	4.17	0.92	high agree	
11	Students have a good awareness of caring for equipment and consciously maintaining the learning environment	3.79	0.78	high agree	
12	Students have interest in computer science and a spirit of scientific exploration	4.29	0.91	highest agree	
13	Students have team spirit of solidarity and cooperation and a good spiritual atmosphere of willingness to work together.	4.25	0.74	highest agree	
	Total	4.03	0.81	high agree	

Based on the data presented in table 4.23, it was determined that the opinions of instructors regarding the curriculum of the bachelor's degree in network engineering,

when evaluated holistically in terms of the product, were at a high level ($\bar{x}$=4.03, S.D.=0.81).

When considering the opinions of instructors, it was found that the holistic evaluation of the product received high ratings. The factors were ranked from the highest mean as follows: emotional attitudinal value aspects ($\bar{x}$=4.09, S.D.=0.81), knowledge ($\bar{x}$=4.02, S.D.=0.73), and skills ($\bar{x}$=3.94, S.D.=0.89).

Table 4.24 Mean and standard deviation of product of the students.

	Assessment Item	Mean	S.D.	Level	No
Knowledge		4.08	0.88	high agree	1
1	Students can know the core concepts and working principles of computer network architecture.	4.23	0.88	highest agree	
2	Students can know the analysis and setting methods of network protocols.	4.16	0.96	high agree	
3	Students can understand the working principles of major network devices	4.00	0.96	high agree	
4	Students can understand the characteristics and functions of network operating systems.	3.97	1.01	high agree	
5	Students can understand the basic principles, basic methods and related technologies of network security.	4.04	0.97	high agree	
Skills		3.96	1.00	high agree	3
6	Students have basic techniques of setting up a simple network.	3.96	1.04	high agree	
7	Students have basic skills of using the network.	3.99	0.99	high agree	
8	Students have basic skills of managing and maintaining a network.	3.93	1.01	high agree	

Table 4.24 Mean and standard deviation of product of the students. (Cont.)

Assessment Item		Mean	S.D.	Level	No
Emotional, attitudinal and value aspects		4.05	0.88	high agree	2
9	Students have comprehensive and profound understanding of the important role of computer networks in the construction of modern information technology.	4.00	0.89	high agree	
10	Students have awareness of network security and confidentiality.	4.00	1.04	high agree	
11	Students have a good awareness of caring for equipment and consciously maintaining the learning environment	4.07	0.91	high agree	
12	Students have interest in computer science and a spirit of scientific exploration	4.11	0.82	high agree	
13	Students have team spirit of solidarity and cooperation and a good spiritual atmosphere of willingness to work together.	4.08	0.91	high agree	
	Total	4.06	0.90	high agree	

Based on the data presented in table 4.24, it was determined that the opinions of students regarding the curriculum of the bachelor's degree in network engineering, when evaluated holistically in terms of the product, were at a high level ($\overline{x}$=4.06, S.D.=0.90).

When considering the opinions of students, it was found that the holistic evaluation of the product received high ratings. The factors were ranked from the highest mean as follows: knowledge ($\overline{x}$=4.08, S.D.=0.88), emotional attitudinal value aspects ($\overline{x}$=4.05, S.D.=0.88), and skills ($\overline{x}$=3.96, S.D.=1.00).

Table 4.25 Mean and standard deviation of product of the student undergraduate.

Assessment Item	Mean	S.D.	Level	No
Knowledge	4.01	0.83	high agree	1
1 Students can know the core concepts and working principles of computer network architecture.	4.00	0.88	high agree	
2 Students can know the analysis and setting methods of network protocols.	4.05	0.81	high agree	
3 Students can understand the working principles of major network devices	4.05	0.81	high agree	
4 Students can understand the characteristics and functions of network operating systems.	3.93	0.73	high agree	
5 Students can understand the basic principles, basic methods and related technologies of network security.	4.03	0.83	high agree	
Skills	3.99	0.74	high agree	2
6 Students have basic techniques of setting up a simple network.	3.83	0.75	high agree	
7 Students have basic skills of using the network.	4.03	0.86	high agree	
8 Students have basic skills of managing and maintaining a network.	4.13	0.76	high agree	
Emotional, attitudinal and value aspects	3.96	0.83	high agree	3
9 Students have comprehensive and profound understanding of the important role of computer networks in the construction of modern information technology.	3.75	0.78	high agree	
10 Students have awareness of network security and confidentiality.	3.88	0.76	high agree	

Table 4.25 Mean and standard deviation of product of the student undergraduate. (Cont.)

	Assessment Item	Mean	S.D.	Level	No
11	Students have a good awareness of caring for equipment and consciously maintaining the learning environment	3.98	0.92	high agree	
12	Students have interest in computer science and a spirit of scientific exploration	4.05	0.81	high agree	
13	Students have team spirit of solidarity and cooperation and a good spiritual atmosphere of willingness to work together.	4.13	0.82	high agree	
	Total	3.99	0.78	high agree	

Based on the data presented in table 4.25, it was determined that the opinions of undergraduates regarding the curriculum of the bachelor's degree in network engineering, when evaluated holistically in terms of the product, were at a high level ($\overline{x}$=3.99, S.D.=0.78).

When considering the opinions of undergraduates, it was found that the holistic evaluation of the product received high ratings. The factors were ranked from the highest mean as follows: knowledge ($\overline{x}$=4.01, S.D.=0.83), skills ($\overline{x}$=3.99, S.D.=0.74), and emotional attitudinal value aspects ($\overline{x}$=3.96, S.D.=0.83).

Table 4.26 Mean and standard deviation of product of the employers.

	Assessment Item	Mean	S.D.	Level	No
Knowledge		4.10	0.80	high agree	1
1	Students can know the core concepts and working principles of computer network architecture.	4.15	0.65	high agree	

Table 4.26 Mean and standard deviation of product of the employers. (Cont.)

	Assessment Item	Mean	S.D.	Level	No
2	Students can know the analysis and setting methods of network protocols.	4.07	0.75	high agree	
3	Students can understand the working principles of major network devices	3.98	0.91	high agree	
4	Students can understand the characteristics and functions of network operating systems.	4.10	0.77	high agree	
5	Students can understand the basic principles, basic methods and related technologies of network security.	4.20	0.78	high agree	
Skills		4.07	0.81	high agree	3
6	Students have basic techniques of setting up a simple network.	4.17	0.74	high agree	
7	Students have basic skills of using the network.	4.05	0.92	high agree	
8	Students have basic skills of managing and maintaining a network.	4.00	0.84	high agree	
Emotional, attitudinal and value aspects		3.94	0.74	high agree	2
9	Students have comprehensive and profound understanding of the important role of computer networks in the construction of modern information technology.	4.07	0.79	high agree	
10	Students have awareness of network security and confidentiality.	3.80	0.75	high agree	
11	Students have a good awareness of caring for equipment and consciously maintaining the learning environment	3.98	0.79	high agree	

Table 4.26 Mean and standard deviation of product of the employers. (Cont.)

	Assessment Item	Mean	S.D.	Level	No
12	Students have interest in computer science and a spirit of scientific exploration	3.85	0.85	high agree	
13	Students have team spirit of solidarity and cooperation and a good spiritual atmosphere of willingness to work together.	3.98	0.85	high agree	
	Total	4.03	0.89	high agree	

Based on the data presented in table 4.26, it was determined that the opinions of employers regarding the curriculum of the bachelor's degree in network engineering, when evaluated holistically in terms of the product, were at a high level ($\bar{x}$=4.03, S.D.=0.89).

When considering the opinions of employers, it was found that the holistic evaluation of the product received high ratings. The factors were ranked from the highest mean as follows: knowledge ($\bar{x}$=4.10, S.D.=0.80), skills ($\bar{x}$=4.07, S.D.=0.81), and emotional attitudinal value aspects ($\bar{x}$=3.94, S.D.=0.74).

4.6 The analysis results evaluate the curriculum of the bachelor's degree in network engineering, focusing, focusing on aspects of context, input, process, and product.

The analysis results evaluated the curriculum of the bachelor's degree in network engineering, focusing on aspects of context, input, process, and product, which were classified by administrations, instructors, students, undergraduates, and employers. Table 4.27 and Figure 4.1 present the corresponding findings.

Table 4.27 Mean and level of curriculum evaluation focusing on aspects of context, input, process, and product.

CIPP model	Context		Input		Process		Product	
	Mean	Level	Mean	Level	Mean	Level	Mean	Level
administrations	3.92	high agree	4.01	high agree	3.86	high agree	3.96	high agree
Instructor	4.04	high agree	4.03	high agree	3.86	high agree	4.03	high agree
Students	3.95	high agree	4.08	high agree	3.98	high agree	4.06	high agree
Undergraduate	3.99	high agree	3.98	high agree	3.83	high agree	3.99	high agree
Employer	-	-	-	-	-	-	4.03	high agree
Total	3.97	high agree	4.02	high agree	3.89	high agree	4.01	high agree

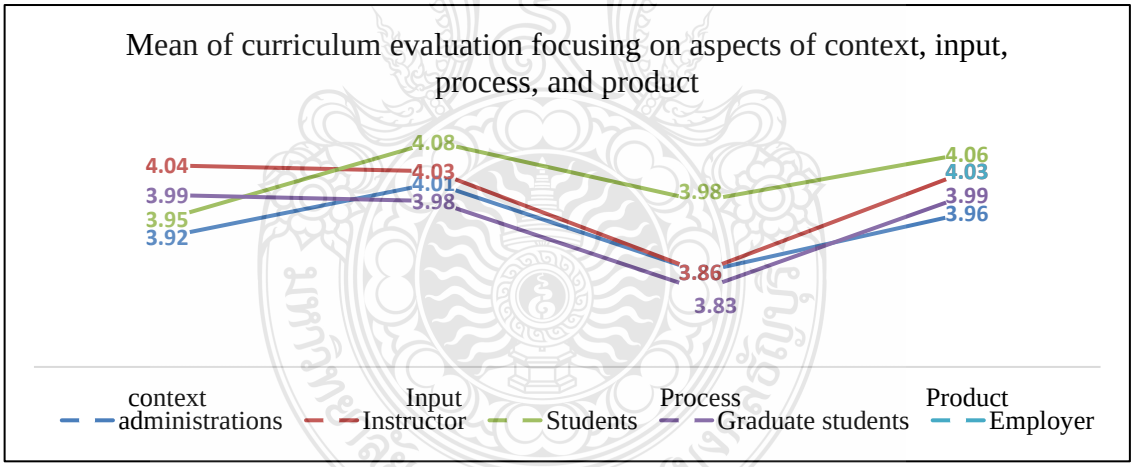

Figure 4.1 Mean of curriculum evaluation focusing on aspects of context, input, process, product.

Based on the findings from table 4.27 - 4.28 and Figure 4.1, it was determined that the opinions of instructors, administrations, students, undergraduates, and employers regarding the bachelor's degree in network engineering were at a high level. They were sorted from the highest mean as follows: process ($\bar{x}$=4.12), input ($\bar{x}$=4.02), product ($\bar{x}$=4.01), and context ($\bar{x}$=3.97).

When considering the opinions of context, it was found that the holistic opinions toward the curriculum of the bachelor's degree in network engineering were at a high level for all aspects. They were sorted from the highest mean as follows: course content ($\bar{x}$=4.11), component curriculum ($\bar{x}$=3.95), curriculum structure ($\bar{x}$=3.78), and curriculum objectives ($\bar{x}$=3.82).

When considering the opinions of input, it was found that the holistic opinions toward the curriculum of the bachelor's degree in network engineering were at a high level for all aspects. They were sorted from the highest mean as follows: budget and building ($\bar{x}$=4.08), administrators ($\bar{x}$=4.04), learning materials ($\bar{x}$=3.96), instructors ($\bar{x}$=4.01), and students ($\bar{x}$=3.82).

When considering the opinions of process, it was found that the holistic opinions toward the curriculum of the bachelor's degree in network engineering were at a high level for all aspects. They were sorted from the highest mean as follows: measurement and evaluation ($\bar{x}$=4.08), learning management ($\bar{x}$=4.03), and Curriculum management ($\bar{x}$=3.59").

When considering the opinions of the product, it was found that the holistic opinions toward the curriculum of the bachelor's degree in network engineering were at a high level for all aspects. They were sorted from the highest mean as follows: knowledge ($\bar{x}$=4.05"), emotional, attitudinal, and value aspects ($\bar{x}$=4.00"), and skills ($\bar{x}$=3.96").

Table 4.28 Mean of curriculum evaluation focusing on aspects of context, input, process, and product.

CIPP Model	Context				Input				Process				Product		
	Component curriculum	Curriculum objectives	Curriculum structure	Course content	Instructors	Aadmini strators	Student	Learning materials	Budget and building	Curriculum management	Curriculum management	Measurement and evaluation	Knowledge	Skills	Emotional, attitudinal and value aspects
	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
administrations	3.95	3.82	3.78	4.11	4.01	4.04	3.96	3.96	4.08	3.55	4.00	4.05	4.00	3.86	3.98
Instructor	3.97	4.00	4.10	4.10	3.96	4.06	4.08	4.03	4.11	3.57	4.03	3.98	4.02	3.94	4.09
Students	3.90	3.90	3.97	4.00	4.07	4.01	3.96	4.13	4.15	3.63	4.13	4.25	4.08	3.96	4.05
Undergraduates	4.03	3.97	4.00	4.00	3.92	4.08	3.95	4.04	4.05	3.63	3.97	4.05	4.01	3.99	3.96
Employer	-	-	-	-	-	-	-	-	-	-	-	-	4.15	4.07	3.94
Total	3.95	3.82	3.78	4.11	4.01	4.04	3.96	3.96	4.08	3.59	4.03	4.08	4.05	3.96	4.00

CHAPTER 5
CONCLUSION AND RECOMMENDATION

The study aimed to evaluate the curriculum of the bachelor's degree in network engineering at Sichuan University of Science and Engineering. The research objectives focused on evaluating the curriculum of the bachelor's degree in network engineering at the university, utilizing the CIPPI model and emphasizing the context, inputs, processes, and outcomes based on Stufflebeam's decision-making approach. The research sample consisted of 353 individuals who were selected using purposive random sampling. The participants were divided into five groups, including 19 administrators, 24 instructors, 230 students, 40 undergraduates, and 40 employers. These groups were selected through purposive sampling. Questionnaires were employed as the data collection instruments, and mean, standard deviation, and percentage were utilized for data analysis.

5.1 Summary of Research Results

5.1.1 The analysis results provide information on the personal characteristics of individuals enrolled in the bachelor's degree in network engineering curriculum at Sichuan University of Science and Engineering.

Regarding the administrators, there were 10 males (52.63%). In terms of age, 10 fell within the 31-40 range (47.37%). Additionally, 8 administrators had work experience ranging from 5 to 10 years and 11 to 15 years (42.11%). Furthermore, 11 administrators held a Bachelor's Degree (57.89%).

For the instructors, there were 16 males (66.67%). In terms of age, 17 fell within the 31-40 range (70.83%). Moreover, 17 instructors had work experience ranging from 11 to 15 years (70.83%). Additionally, 19 instructors held a Master's degree (79.17%).

Regarding the students, there were 171 males (74.35%). In terms of age, 104 students were in the 19-20 age group (45.22%). Furthermore, 105 students were in their 1st Grade education level (45.65%).

For the undergraduate students who had graduated, there were 31 males (77.50%). Among them, 19 individuals were working as engineers (47.50%). Addition ally, 20 students had work experience ranging from 5 to 10 years and 11 to 15 years (50.00%).

Regarding the employers, there were 34 males (85.00%). In terms of age, 20 fell within the 31-40 range (50.00%). Moreover, 20 employers had work experience ranging from 11 to 15 years (50.00%). Additionally, 19 employers held a bachelor's degree (57.50%).

5.1.2 The results evaluated the curriculum of the bachelor's degree in network engineering at Sichuan University of Science and Engineering, focusing on aspects of context. It was found that the opinions of instructors, administrations, students, undergraduates, and employers toward the bachelor's degree in network engineering were at a high level. They were sorted from the highest mean as follows: process ($\overline{x}$ =4.12), input ($\overline{x}$ =4.02), product ($\overline{x}$ =4.01), and context ($\overline{x}$ =3.97).

5.1.3 The analysis results evaluated the curriculum of the bachelor's degree in network engineering at Sichuan University of Science and Engineering, focusing on aspects of input. It was found that the holistic opinions toward the curriculum of the bachelor's degree in network engineering were at a high level for all aspects. They were sorted from the highest mean as follows: course content ($\overline{x}$ =4.05), component curriculum ($\overline{x}$ =3.96), curriculum structure ($\overline{x}$ =3.96), and curriculum objectives ($\overline{x}$ =3.92).

5.1.4 The analysis results evaluated the curriculum of the bachelor's degree in network engineering at Sichuan University of Science and Engineering, focusing on aspects of process. It was found that the holistic opinions toward the curriculum of the bachelor's degree in network engineering were at a high level for all aspects. They were sorted from the highest mean as follows: budget and building ($\overline{x}$ =4.09), administrators ($\overline{x}$ =4.04), learning materials ($\overline{x}$ =4.04), instructors ($\overline{x}$ =3.99), and students ($\overline{x}$ =3.98).

5.1.5 The analysis results evaluated the curriculum of the bachelor's degree in network engineering at Sichuan University of Science and Engineering, focusing on aspects of product. It was found that the holistic opinions toward the curriculum of the bachelor's degree in network engineering were at a high level for all aspects. They were sorted from the highest mean as follows: measurement and evaluation ($\overline{x}$ =4.08), learning management ($\overline{x}$ =4.03), and curriculum management ($\overline{x}$ =3.59).

5.1.6 The analysis results evaluated the curriculum of the bachelor's degree in network engineering at Sichuan University of Science and Engineering, focusing on aspects of context, input, process, and product. It was found that the holistic opinions toward the curriculum of the bachelor's degree in network engineering were at a high level for all aspects. They were sorted from the highest mean as follows: knowledge ($\overline{x}$ =4.05), emotional, attitudinal, and value aspects ($\overline{x}$ =4.00), and skills ($\overline{x}$ =4.96").

5.2 Discussion and Recommendation

5.2.1 The results of the curriculum evaluation indicated that the context aspects were highly appropriate, the input factors were highly appropriate, the processes were highly appropriate, and the outputs were highly appropriate. Overall, all four aspects were deemed highly appropriate. The curriculum planning was clear and well-structured, with effective curriculum management in place. As a result, the curriculum operations were efficient and effectively addressed the needs of society, organizations, and educational personnel.

These findings align with a study conducted by Duan (2017, pp.42-59), which utilized the CIPP model to evaluate an all-English undergraduate program at University H. The study demonstrated the overall appropriateness of the model due to its clear and suitable course management plan, leading to effective learning outcomes and improved course management quality. Similarly, Liu, M., and Zhang,Y. (2023, pp.127-134) conducted a study that evaluated a of Education program and developed an evaluation system based on the CIPP model for a hybrid teaching approach. Wang, Q and Liang, L. (2021, pp.25-32) also conducted a study that assessed curriculum development, specifically focusing on the implementation of a new curriculum for a university English course in China. The study found that the CIPP model provided a comprehensive and systematic evaluation of the curriculum, with all four dimensions - context, input, process, and product - being evaluated at the highest level. Furthermore, the study revealed that both the overall and individual product aspects were highly appropriate.

5.2.2 The context of the curriculum was found to be highly appropriate, likely attributed to the well-designed curriculum. A systematic process was in place to develop and enhance the curriculum based on standard criteria. This involved analyzing essential

data from various fields to determine the different components of the curriculum, ensuring satisfactory outcomes for users Taba (1962, pp155-162). Consequently, the assessment of the context received a high-level rating. This finding aligns with the concept discussed by Tanner, D., and Tanner, L. (2018, pp.207), who emphasized the importance of consistency in curriculum objectives, structure, and content for effective assessment. Furthermore, Jiang (2007, pp.10-12) conducted a study on the evaluation and development of the Doctor of Education curriculum at Kasetsart University's Department of Educational Research and Evaluation. The research findings indicated that the input factors were highly satisfactory. The opinions of the instructors revealed that the learning environment, including buildings, equipment, and learning materials, was adequate and appropriate.

5.2.3 The input aspect of the curriculum was considered highly appropriate, primarily due to the presence of numerous qualified teachers responsible for its implementation. Additionally, the availability of suitable buildings and sufficient budgets further facilitated effective educational management. Consequently, the assessment results for the input factors yielded a high-level rating. This finding is consistent with the findings of Pirak (2011, pp.86-90), who also observed that the input aspect of the curriculum was appropriate at a high level. Furthermore, Saran (2009, pp.65-66) conducted research that demonstrated the appropriateness of learning media and teaching methods at a high level. The teaching and learning materials were deemed suitable and aligned with the course objectives.

5.2.4 The process aspect of the curriculum was considered highly appropriate. The curriculum followed a well-defined system and employed effective mechanisms for curriculum administration, along with a diverse range of learning activities. This aligns with the curriculum implementation process, which is a crucial component of curriculum development aimed at achieving specific curriculum goals. As a result, the evaluation of the process aspect yielded a high-level rating. This finding is consistent with the research conducted by Wilasinee and Prasart (2019, pp.411-422), who studied the evaluation of the Master's degree program in Geo-Informatics (improvement version 2017) at the Faculty of Informatics, Mahasarakham University, using the CIPP model. Their research demonstrated that the overall process aspects were rated highly, as evidenced by the

positive opinions expressed by the curriculum advisory board, current students, graduates, and employers.

5.2.5 The product of the curriculum was considered highly appropriate, likely due to the competence of the students. This aligns with the concept presented by Stufflebeam, D., and Shinkfield, A. (2007, pp.81-94), stating that the evaluation of the product aims to assess the extent to which the outcomes achieved by learners align with expectations. The research conducted by Srinonyang et al. (2020, pp.182-194) supported this notion, as they evaluated the Bachelor of Education program in Teaching English (5 years) with a revised curriculum at the Faculty of Education, Mahamakut Buddhist University. Their findings revealed that undergraduate users expressed high satisfaction with the quality of the curriculum, which was based on the TQF (Thai Qualifications Framework) standards.

In conclusion, the curriculum evaluation of the Bachelor's degree program in Network Engineering at Sichuan University of Science and Engineering demonstrated its effectiveness and alignment with its objectives. However, there was room for improvement in certain areas, and it was recommended that further implementation of the curriculum takes these improvements into consideration.

5.3 Implication for Practice and Future Research

5.3.1 Suggestions for applying the research results.

5.3.1.1 The curriculum of the Bachelor's degree in Network Engineering at Sichuan University of Science and Engineering has incorporated the findings from the curriculum evaluation. Adjustments were made to the curriculum details for the upcoming cycle to address areas that received lower ratings compared to other aspects.

5.3.1.2 The evaluation of the curriculum was considered an essential step in its development, and it was assessed periodically. This approach helped identify and address potential problems that could arise during curriculum implementation.

5.3.1.3 The curriculum was evaluated every 5 years to understand its characteristics, including both strengths and weaknesses. This evaluation served as a guideline for curriculum improvement.

5.3.2 Suggestions for future research

5.3.2.1 Curriculum evaluation has been conducted using various assessment formats such as CIPPIEST, CIPPO, and CIPPI.

5.3.2.2 The curriculum evaluation study utilized a mixed methods approach.

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APPENDICES

APPENDIX A

- **List of Experts Reviewing Research Instruments**
- **Sample Letter to Experts and Specialists for Research Instruments Validation**

List of Experts Reviewing Research Instruments

Specialists

1. Associate Professor GuangJian Chen
   Sichuan University of Science and Engineering, Zigong, China.

2. Associate Professor XiaoLing Wang
   Sichuan University of Science and Engineering, Zigong, China.

3. Asst. Prof. Dr. Methee Pikunthong
   Faculty of Technical Education, Rajamangala University of Technology Thanyaburi, Thailand.

4. Dr. Surat Kwanboonchan
   Faculty of Technical Education, Rajamangala University of Technology Thanyaburi, Thailand.

5. Dr. Saengrung Poolsuwan
   Aksorn CharoenTat ACT Co., Ltd., Thailand.

No. 0649.02/0207

Faculty of Technical Education
Rajamangala University of Technology
Thanyaburi
39 Moo 1, Rangsit-Nakhon Nayok Road,
Klong Hok, Khlong Luang, Pathum Thani
Postal Code 12110, Thailand

17 February 2022

Subject Invitation letter inviting experts to validate research instruments

Dear Dr. Saengrung Poolsuwan

Due to Mr. Nanyang Xiang, a student who is taking up Master of Education Program in Curriculum Development and Instructional Innovation, Faculty of Technical Education, Rajamangala University of Technology Thanyaburi (RMUTT), is currently processing a thesis for this semester entitled "Curriculum Evaluation of bachelor's Network Engineering Major, Sichuan University of Science and Engineering" with Asst. Prof. Dr. Rossarin Jermtatsong , a research advisor.

In relation to this, the researcher has a strong desire to be assisted with regard to the validation of the instruments required studies. The curriculum administration committee consider that you are the most qualified professional with knowledge and capabilities to provide such, the researcher has chosen and would like to ask approval from your good office to be the evaluator. I would like to invite you to be an expert to the validation research instruments for Mr. Nanyang Xiang for the benefit of further education. I am highly anticipating your kind approval regarding this matter.

Thank you for your kind consideration.

Sincerely Yours,

(Asst. Prof. Arnon Niyomphol)
Dean, Faculty of Technical Education

Department of Education
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Fax: +66-2577-3207

No. 0649.02/0207

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Rajamangala University of Technology
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Postal Code 12110, Thailand

17 February 2022

Subject Invitation letter inviting experts to validate research instruments

Dear Dr.Surat Kwanboonchan

Due to Mr. Nanyang Xiang, a student who is taking up Master of Education Program in Curriculum Development and Instructional Innovation, Faculty of Technical Education, Rajamangala University of Technology Thanyaburi (RMUTT), is currently processing a thesis for this semester entitled "Curriculum Evaluation of bachelor's Network Engineering Major, Sichuan University of Science and Engineering" with Asst. Prof. Dr. Rossarin Jermtatsong , a research advisor.

In relation to this, the researcher has a strong desire to be assisted with regard to the validation of the instruments required studies. The curriculum administration committee consider that you are the most qualified professional with knowledge and capabilities to provide such, the researcher has chosen and would like to ask approval from your good office to be the evaluator. I would like to invite you to be an expert to the validation research instruments for Mr. Nanyang Xiang for the benefit of further education. I am highly anticipating your kind approval regarding this matter.

Thank you for your kind consideration.

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Postal Code 12110, Thailand

17 February 2022

Subject Invitation letter inviting experts to validate research instruments

Dear Asst. Prof. Dr. Methee Pikunthong

Due to Mr. Nanyang Xiang, a student who is taking up Master of Education Program in Curriculum Development and Instructional Innovation, Faculty of Technical Education, Rajamangala University of Technology Thanyaburi (RMUTT), is currently processing a thesis for this semester entitled "Curriculum Evaluation of bachelor's Network Engineering Major, Sichuan University of Science and Engineering" with Asst. Prof. Dr. Rossarin Jermtatsong , a research advisor.

In relation to this, the researcher has a strong desire to be assisted with regard to the validation of the instruments required studies. The curriculum administration committee consider that you are the most qualified professional with knowledge and capabilities to provide such, the researcher has chosen and would like to ask approval from your good office to be the evaluator. I would like to invite you to be an expert to the validation research instruments for Mr. Nanyang Xiang for the benefit of further education. I am highly anticipating your kind approval regarding this matter.

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Subject Invitation letter inviting experts to validate research instruments

Dear Associate Professor XiaoLing Wang

Due to Mr. Nanyang Xiang, a student who is taking up Master of Education Program in Curriculum Development and Instructional Innovation, Faculty of Technical Education, Rajamangala University of Technology Thanyaburi (RMUTT), is currently processing a thesis for this semester entitled "Curriculum Evaluation of bachelor's Network Engineering Major, Sichuan University of Science and Engineering" with Asst. Prof. Dr. Rossarin Jermtatsong , a research advisor.

In relation to this, the researcher has a strong desire to be assisted with regard to the validation of the instruments required studies. The curriculum administration committee consider that you are the most qualified professional with knowledge and capabilities to provide such, the researcher has chosen and would like to ask approval from your good office to be the evaluator. I would like to invite you to be an expert to the validation research instruments for Mr. Nanyang Xiang for the benefit of further education. I am highly anticipating your kind approval regarding this matter.

Thank you for your kind consideration.

Sincerely Yours,

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17 February 2022

Subject Invitation letter inviting experts to validate research instruments

Dear Associate Professor GuangJian Chen

Due to Mr. Nanyang Xiang, a student who is taking up Master of Education Program in Curriculum Development and Instructional Innovation, Faculty of Technical Education, Rajamangala University of Technology Thanyaburi (RMUTT), is currently processing a thesis for this semester entitled "Curriculum Evaluation of bachelor's Network Engineering Major, Sichuan University of Science and Engineering" with Asst. Prof. Dr. Rossarin Jermtatsong , a research advisor.

In relation to this, the researcher has a strong desire to be assisted with regard to the validation of the instruments required studies. The curriculum administration committee consider that you are the most qualified professional with knowledge and capabilities to provide such, the researcher has chosen and would like to ask approval from your good office to be the evaluator. I would like to invite you to be an expert to the validation research instruments for Mr. Nanyang Xiang for the benefit of further education. I am highly anticipating your kind approval regarding this matter.

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APPENDIX B

Instrument of Research

Questionnaire for Aadministrators

of curriculum evaluation of bachelor's degree in network engineering,

Sichuan University of Science & Engineering

Instructions:

1. This questionnaire is intended to evaluate curriculum of bachelor's degree in network engineering at Sichuan University of Science & Engineering using CIPP model focusing on aspects of context input process product.

2. This questionnaire is divided into parts:

Part 1: The personal information.

Part 2: Information on context (C): component curriculum, curriculum objectives, curriculum structure, course content and relevant suggestions.

Part 3: Information on inputs (I): qualifications of instructors, qualifications of administrators, qualifications of student, learning materials, building, budget and recommendations for improving the inputs.

Part 4: Information on process (P): curriculum management, learning management, measurement and evaluation, and recommendations for improving the process.

Part 5: Information on product (P): Knowledge, Skills, Emotional, attitudinal and value aspects and recommendations for improving the product.

3. Please consider answering the questionnaire with all reality. The information provided by you will be keep confidential and will be used as important improvement of the bachelor's degree in network engineering at Sichuan University of Science & Engineering.

I hope that we will be able to get a good deal of cooperation from our students in answering the questionnaire. Thank you for coming to this opportunity.

Mr. NanYang xiang
Master's degree student in Curriculum
Development and Teaching Innovation
RMUTT, Thailand

<u>Part 1</u> The personal information

Instructions: Please put a tick (✓) in the box that closely match your personal information.

1. Gender ☐ Male ☐ Female
2. Age ☐ 20-30 ☐ 31-40
   ☐ 41-50 ☐ 51-60
   ☐ Others.....
3. Work experience
   ☐ Under 5 years ☐ 5 – 10 years
   ☐ 11 – 15 years ☐ More than 15 years
4. Education ☐ Bachelor's Degree ☐ Master's Degree
   ☐ Doctor's Degree ☐ Other.....

<u>Part 2</u> Information on context (C): component curriculum, curriculum objectives, curriculum structure, course content and relevant suggestions.

Instructions: Please put a tick (✓) in the box that most closely matches your opinion with the criteria as follows:

5 means the most appropriate level.
4 means appropriate to a large extent.
3 means moderately appropriate.
2 means appropriate to a lesser extent.
1 means the least appropriate.

No.	Assessment list	Suitability level				
		5	4	3	2	1
Component curriculum						
1	The curriculum is up-to-date and in line with the needs of the labor market.					
2	The curriculum is appropriate and in line with the needs of learners.					
3	The study plan throughout the program is clear.					
4	The program of study for each semester is clear.					

No.	Assessment list	Suitability level				
		5	4	3	2	1
Curriculum objectives						
5	The curriculum objectives are in line with current social conditions.					
6	The course objectives are consistent with the needs of the learners.					
7	The course objectives are language clear and easy to understand.					
8	The course objectives cover the content and structure of the course.					
9	Course objectives are practical.					
Curriculum structure						
10	The course structure is consistent with the philosophy and objectives of the course.					
11	The course structure has an appropriate number of hours throughout the course.					
12	The curriculum structure is divided into proportions of subjects appropriately in each semester.					
13	The curriculum structure can develop students to meet the objectives of the curriculum.					
Course content						
14	The subjects in the curriculum are consistent with the objectives of the curriculum.					
15	The course content in the curriculum are consistent with the objectives of the curriculum.					
16	The course content in the curriculum are consistent with the needs of the learners and current social conditions.					

No.	Assessment list	Suitability level				
		5	4	3	2	1
17	The course content in the curriculum are appropriate, clear, and nonredundant.					
18	The course content in the curriculum are up-to-date.					

Relevant suggestions:

……

……

<u>Part 3</u> Information on inputs (I): qualifications of instructors, qualifications of administrators, qualifications of student, learning materials, building, budget and recommendations for improving the inputs.

No.	Assessment list	Suitability level				
		5	4	3	2	1
Qualifications of instructors						
1	Instructors are well knowledgeable in the subject taught.					
2	Instructors are qualified and experienced in the subjects they teach.					
3	Instructors are virtuous and conscious of being a teacher					
4	Instructors integrate learning content into more than one skill.					
5	Instructors prepare interesting materials and plan their lessons in a step-by-step manner.					
6	Instructors are attentive to teaching and take care of the learners in the classroom thoroughly.					
7	Instructors always instill morality and ethics into their learners					

No.	Assessment list	Suitability level				
		5	4	3	2	1
8	Instructors encourage students to think, research, and solve everyday problems on their own.					
9	Instructors have teaching techniques that can arouse a wide range of interests.					
10	Instructors have appropriate counseling in academic and other areas.					
11	Instructors recommend additional learning resources.					
Qualifications of administrators						
12	Administrators work with determination, dedication, and self-sacrifice to improve the school.					
13	Administrators have leadership.					
14	Administrators accept the student's opinions and problems.					
Qualifications of student						
15	Students are interested in applying continuously for courses.					
16	Students have knowledge suitable for the content of the curriculum structure.					
17	Students are interested and conscientious about learning according to the curriculum.					
18	Students are prompt to learn according to the curriculum.					
Learning materials						
19	Media, materials, teaching and learning equipment are sufficient to meet the needs of the students.					
20	Media, materials, and teaching equipment are diverse and suitable for teaching and learning in the curriculum.					

No.	Assessment list	Suitability level				
		5	4	3	2	1
21	Media, materials, teaching and learning equipment are of good quality and can be used to manage teaching and learning in the course					
22	Media, materials, teaching equipment can be used conveniently and valuably in the course.					
23	Media, materials, and teaching equipment are up-to-date.					
Budget and building						
24	The buildings, classrooms, conference rooms, audio-visual rooms and laboratories are sufficient for teaching and learning in the curriculum.					
25	The buildings, classrooms, conference rooms, audio-visual rooms and laboratories have suitable environment and atmosphere.					
26	The buildings, classrooms, conference rooms, audio-visual rooms and laboratories are suitable for teaching and learning in the curriculum.					
27	The buildings, classrooms, conference rooms, audio-visual rooms and laboratories are safe.					
28	Libraries are sufficient, appropriate, and conducive to learning.					
29	The activity areas are appropriate, sufficient, and conducive to learning.					
30	The overall environment is appropriate and conducive to learning.					
31	The budget is sufficient for teaching and learning activities according to the curriculum.					
32	The budget allocated in the course is used wisely.					
33	Budget management is appropriate.					

Recommendations for improving the inputs:

……

……

<u>Part 4</u> Information on process (P): curriculum management, learning management, measurement and evaluation, and recommendations for improving the process.

No.	Assessment list	Suitability level				
		5	4	3	2	1
Curriculum management						
1	Vision and strategy for curriculum administration are appropriate.					
2	The meetings are organized to implement the curriculum with relevant people.					
3	A proper operational calendar is set up for curriculum management.					
4	The curriculum has appropriate course management according to the study plan for each semester.					
5	The curriculum has a process to organize instructors for each subject appropriately.					
6	The curriculum has an appropriately clear teaching schedule and activities.					
7	The curriculum requires a learning management plan.					
8	The curriculum encourages teaching and learning activities according to the prepared plan.					
9	The curriculum organizes supervision of learning activities					
10	The curriculum has supporting activities that encourage learning activities.					

No.	Assessment list	Suitability level				
		5	4	3	2	1
11	The curriculum constantly evaluates instructors' organizational learning activities periodically and continuously.					
12	The curriculum supports useful learning materials and facilities for learning activities implementation.					
Learning management						
13	The instructional management in the curriculum is consistent with the subjects and learning objectives.					
14	Instructional management is complete as specified in the curriculum.					
15	Instructional management responds to the needs and interests of the learners.					
16	Learning management provides opportunities for learners to engage.					
17	Instructional management covers the development of knowledge, skills, and attitudes.					
18	Instructional management in the curriculum is diverse.					
19	Instructional management in the curriculum allows students to participate.					
20	Learners come up with a problem-solving process to learn on their own.					
21	Learning activities encourage learners to plan and research together from the sources around them.					
22	Instructional management encourage learners to learn on a regular basis.					
23	Instructional media are used properly in instructional management in the curriculum.					

No.	Assessment list	Suitability level				
		5	4	3	2	1
24	Information technology is used properly in instructional management in the curriculum.					
Measurement and evaluation						
25	Instructors inform the learners about the methods of measurement and evaluation.					
26	Measurement and evaluation are appropriate and consistent with the objectives of the course.					
27	Learners are systematically measured and evaluated in covering all aspects.					
28	Measurement and evaluation are diverse.					
29	Measurement and evaluation are in accordance with the predetermined rules and regulations.					
30	Measurement and evaluation are fair and efficient.					
31	Assessment results are used for the improvement of learners and instruction.					

Recommendations for improving the process:

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<u>Part 5</u> Information on the product (P): Knowledge, Skills, Emotional, attitudinal and value aspects and recommendations for improving the product.

No.	Assessment list	Suitability level				
		5	4	3	2	1
Knowledge						
1	Students can know the core concepts and working principles of computer network architecture.					
2	Students can know the analysis and setting methods of network protocols.					
3	Students can understand the working principles of major network devices					
4	Students can understand the characteristics and functions of network operating systems.					
5	Students can understand the basic principles, basic methods and related technologies of network security.					
Skills						
6	Students have basic techniques of setting up a simple network.					
7	Students have basic skills of using the network.					
8	Students have basic skills of managing and maintaining a network.					
Emotional, attitudinal and value aspects						
9	Students have comprehensive and profound understanding of the important role of computer networks in the construction of modern information technology.					
10	Students have awareness of network security and confidentiality.					

No.	Assessment list	Suitability level				
		5	4	3	2	1
11	Students have a good awareness of caring for equipment and consciously maintaining the learning environment					
12	Students have interest in computer science and a spirit of scientific exploration					
13	Students have team spirit of solidarity and cooperation and a good spiritual atmosphere of willingness to work together.					

Recommendations for improving the product:

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---------- Thank you for coming to this opportunity ----------

Questionnaire for Instructors

of curriculum evaluation of bachelor's degree in network engineering,

Sichuan University of Science & Engineering

Instructions:

1. This questionnaire is intended to evaluate curriculum of bachelor's degree in network engineering at Sichuan University of Science & Engineering using CIPP model focusing on aspects of context input process product.

2. This questionnaire is divided into parts:

Part 1: The personal information.

Part 2: Information on context (C): component curriculum, curriculum objectives, curriculum structure, course content and relevant suggestions.

Part 3: Information on inputs (I): qualifications of instructors, qualifications of administrators, qualifications of student, learning materials, building, budget and recommendations for improving the inputs.

Part 4: Information on process (P): curriculum management, learning management, measurement and evaluation, and recommendations for improving the process.

Part 5: Information on product (P): Knowledge, Skills, Emotional, attitudinal and value aspects and recommendations for improving the product.

3. Please consider answering the questionnaire with all reality. The information provided by you will be keep confidential and will be used as important improvement of the bachelor's degree in network engineering at Sichuan University of Science & Engineering.

I hope that we will be able to get a good deal of cooperation from our students in answering the questionnaire. Thank you for coming to this opportunity.

Mr. NanYang xiang

Master's degree student in Curriculum

Development and Teaching Innovation

RMUTT, Thailand

Part 1 The personal information

Instructions: Please put a tick (✓) in the box that closely match your personal information.

1. Position ☐ Instructors ☐ Aadministrators
2. Gender ☐ Male ☐ Female
3. Age ☐ 20-30 ☐ 31-40
   ☐ 41-50 ☐ 51-60
   ☐ Others.....
4. Work experience
   ☐ Under 5 years ☐ 5 – 10 years
   ☐ 11 – 15 years ☐ More than 15 years
5. Education ☐ Bachelor's Degree ☐ Master's Degree
   ☐ Doctor's Degree ☐ Other.....

Part 2 **Information on context (C):** component curriculum, curriculum objectives, curriculum structure, course content and relevant suggestions.

Instructions: Please put a tick (✓) in the box that most closely matches your opinion with the criteria as follows:

5 means the most appropriate level.
4 means appropriate to a large extent.
3 means moderately appropriate.
2 means appropriate to a lesser extent.
1 means the least appropriate.

No.	Assessment list	Suitability level				
		5	4	3	2	1
Component curriculum						
1	The curriculum is up-to-date and in line with the needs of the labor market.					
2	The curriculum is appropriate and in line with the needs of learners.					
3	The study plan throughout the program is clear.					

No.	Assessment list	Suitability level				
		5	4	3	2	1
4	The program of study for each semester is clear.					
Curriculum objectives						
5	The curriculum objectives are in line with current social conditions.					
6	The course objectives are consistent with the needs of the learners.					
7	The course objectives are language clear and easy to understand.					
8	The course objectives cover the content and structure of the course.					
9	Course objectives are practical.					
Curriculum structure						
10	The course structure is consistent with the philosophy and objectives of the course.					
11	The course structure has an appropriate number of hours throughout the course.					
12	The curriculum structure is divided into proportions of subjects appropriately in each semester.					
13	The curriculum structure can develop students to meet the objectives of the curriculum.					
Course content						
14	The subjects in the curriculum are consistent with the objectives of the curriculum.					
15	The course content in the curriculum are consistent with the objectives of the curriculum.					
16	The course content in the curriculum are consistent with the needs of the learners and current social conditions.					

No.	Assessment list	Suitability level				
		5	4	3	2	1
17	The course content in the curriculum are appropriate, clear, and nonredundant.					
18	The course content in the curriculum are up-to-date.					

Relevant suggestions:

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<u>Part 3</u> Information on inputs (I): instructors, administrators, learner, learning materials, building, budget and recommendations for improving the inputs.

No.	Assessment list	Suitability level				
		5	4	3	2	1
Qualifications of instructors						
1	Instructors are well knowledgeable in the subject taught.					
2	Instructors are qualified and experienced in the subjects they teach.					
3	Instructors are virtuous and conscious of being a teacher					
4	Instructors integrate learning content into more than one skill.					
5	Instructors prepare interesting materials and plan their lessons in a step-by-step manner.					
6	Instructors are attentive to teaching and take care of the learners in the classroom thoroughly.					
7	Instructors always instill morality and ethics into their learners					
8	Instructors encourage students to think, research, and solve everyday problems on their own.					

No.	Assessment list	Suitability level				
		5	4	3	2	1
9	Instructors have teaching techniques that can arouse a wide range of interests.					
10	Instructors have appropriate counseling in academic and other areas.					
11	Instructors recommend additional learning resources.					
Qualifications of administrators						
12	Administrators work with determination, dedication, and self-sacrifice to improve the school.					
13	Administrators have leadership.					
14	Administrators accept the student's opinions and problems.					
Qualifications of student						
15	Students are interested in applying continuously for courses.					
16	Students have knowledge suitable for the content of the curriculum structure.					
17	Students are interested and conscientious about learning according to the curriculum.					
18	Students are prompt to learn according to the curriculum.					
Learning materials						
19	Media, materials, teaching and learning equipment are sufficient to meet the needs of the students.					
20	Media, materials, and teaching equipment are diverse and suitable for teaching and learning in the curriculum.					

No.	Assessment list	Suitability level				
		5	4	3	2	1
21	Media, materials, teaching and learning equipment are of good quality and can be used to manage teaching and learning in the course					
22	Media, materials, teaching equipment can be used conveniently and valuably in the course.					
23	Media, materials, and teaching equipment are up-to-date.					
Budget and building						
24	The buildings, classrooms, conference rooms, audio-visual rooms and laboratories are sufficient for teaching and learning in the curriculum.					
25	The buildings, classrooms, conference rooms, audio-visual rooms and laboratories have suitable environment and atmosphere.					
26	The buildings, classrooms, conference rooms, audio-visual rooms and laboratories are suitable for teaching and learning in the curriculum.					
27	The buildings, classrooms, conference rooms, audio-visual rooms and laboratories are safe.					
28	Libraries are sufficient, appropriate, and conducive to learning.					
29	The activity areas are appropriate, sufficient, and conducive to learning.					
30	The overall environment is appropriate and conducive to learning.					
31	The budget is sufficient for teaching and learning activities according to the curriculum.					
32	The budget allocated in the course is used wisely.					
33	Budget management is appropriate.					

Recommendations for improving the inputs:

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<u>Part 4</u> Information on process (P): curriculum management, learning management, measurement and evaluation, and recommendations for improving the process.

No.	Assessment list	Suitability level				
		5	4	3	2	1
Curriculum management						
1	Vision and strategy for curriculum administration are appropriate.					
2	The meetings are organized to implement the curriculum with relevant people.					
3	A proper operational calendar is set up for curriculum management.					
4	The curriculum has appropriate course management according to the study plan for each semester.					
5	The curriculum has a process to organize instructors for each subject appropriately.					
6	The curriculum has an appropriately clear teaching schedule and activities.					
7	The curriculum requires a learning management plan.					
8	The curriculum encourages teaching and learning activities according to the prepared plan.					
9	The curriculum organizes supervision of learning activities					
10	The curriculum has supporting activities that encourage learning activities.					

No.	Assessment list	Suitability level				
		5	4	3	2	1
11	The curriculum constantly evaluates instructors' organizational learning activities periodically and continuously.					
12	The curriculum supports useful learning materials and facilities for learning activities implementation.					
Learning management						
13	The instructional management in the curriculum is consistent with the subjects and learning objectives.					
14	Instructional management is complete as specified in the curriculum.					
15	Instructional management responds to the needs and interests of the learners.					
16	Learning management provides opportunities for learners to engage.					
17	Instructional management covers the development of knowledge, skills, and attitudes.					
18	Instructional management in the curriculum is diverse.					
19	Instructional management in the curriculum allows students to participate.					
20	Learners come up with a problem-solving process to learn on their own.					
21	Learning activities encourage learners to plan and research together from the sources around them.					
22	Instructional management encourage learners to learn on a regular basis.					
23	Instructional media are used properly in instructional management in the curriculum.					

No.	Assessment list	Suitability level				
		5	4	3	2	1
24	Information technology is used properly in instructional management in the curriculum.					
Measurement and evaluation						
25	Instructors inform the learners about the methods of measurement and evaluation.					
26	Measurement and evaluation are appropriate and consistent with the objectives of the course.					
27	Learners are systematically measured and evaluated in covering all aspects.					
28	Measurement and evaluation are diverse.					
29	Measurement and evaluation are in accordance with the predetermined rules and regulations.					
30	Measurement and evaluation are fair and efficient.					
31	Assessment results are used for the improvement of learners and instruction.					

Recommendations for improving the process:

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<u>Part 5</u> Information on the product (P): Knowledge, Skills, Emotional, attitudinal and value aspects and recommendations for improving the product.

No.	Assessment list	Suitability level				
		5	4	3	2	1
Knowledge						
1	Students can know the core concepts and working principles of computer network architecture.					
2	Students can know the analysis and setting methods of network protocols.					
3	Students can understand the working principles of major network devices					
4	Students can understand the characteristics and functions of network operating systems.					
5	Students can understand the basic principles, basic methods and related technologies of network security.					
Skills						
6	Students have basic techniques of setting up a simple network.					
7	Students have basic skills of using the network.					
8	Students have basic skills of managing and maintaining a network.					
Emotional, attitudinal and value aspects						
9	Students have comprehensive and profound understanding of the important role of computer networks in the construction of modern information technology.					
10	Students have awareness of network security and confidentiality.					

No.	Assessment list	Suitability level				
		5	4	3	2	1
11	Students have a good awareness of caring for equipment and consciously maintaining the learning environment					
12	Students have interest in computer science and a spirit of scientific exploration					
13	Students have team spirit of solidarity and cooperation and a good spiritual atmosphere of willingness to work together.					

Recommendations for improving the product:

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---------- Thank you for coming to this opportunity ----------

Questionnaire for Students

of curriculum evaluation of bachelor's degree in network engineering,

Sichuan University of Science & Engineering

Instructions:

1. This questionnaire is intended to evaluate curriculum of bachelor's degree in network engineering at Sichuan University of Science & Engineering using CIPP model focusing on aspects of context input process product.

2. This questionnaire is divided into parts:

Part 1: The personal information.

Part 2: Information on context (C): component curriculum, curriculum objectives, curriculum structure, course content and relevant suggestions.

Part 3: Information on inputs (I): qualifications of instructors, qualifications of administrators, qualifications of student, learning materials, building, budget and recommendations for improving the inputs.

Part 4: Information on process (P): curriculum management, learning management, measurement and evaluation, and recommendations for improving the process.

Part 5: Information on product (P): Knowledge, Skills, Emotional, attitudinal and value aspects and recommendations for improving the product.

3. Please consider answering the questionnaire with all reality. The information provided by you will be keep confidential and will be used as important improvement of the bachelor's degree in network engineering at Sichuan University of Science & Engineering.

I hope that we will be able to get a good deal of cooperation from our students in answering the questionnaire. Thank you for coming to this opportunity.

Mr. NanYang xiang

Master's degree student in Curriculum

Development and Teaching Innovation

RMUTT, Thailand

<u>Part 1</u> The personal information

Instructions: Please put a tick (✓) in the box that closely match your personal information.

1. Gender ☐ Male ☐ Female

2. Age ☐ 17-18 ☐ 19-20 ☐ 20-21
☐ 22-23 ☐ Others.....

3. Education level
☐ 1th Grade ☐ 2rd Grade ☐ 3th Grade
☐ 4rd Grade ☐ Others.....

<u>Part 2</u> Information on context (C): Curriculum, curriculum objectives, curriculum structure, course content and relevant suggestions.

Instructions: Please put a tick (✓) in the box that most closely matches your opinion with the criteria as follows:

5 means the most appropriate level.
4 means appropriate to a large extent.
3 means moderately appropriate.
2 means appropriate to a lesser extent.
1 means the least appropriate.

No.	Assessment list	Suitability level				
		5	4	3	2	1
Component curriculum						
1	The curriculum is up-to-date and in line with the needs of the labor market.					
2	The curriculum is appropriate and in line with the needs of learners.					
3	The study plan throughout the program is clear.					
4	The program of study for each semester is clear.					
Curriculum objectives						
5	The curriculum objectives are in line with current social conditions.					

No.	Assessment list	Suitability level				
		5	4	3	2	1
6	The course objectives are consistent with the needs of the learners.					
7	The course objectives are language clear and easy to understand.					
8	The course objectives cover the content and structure of the course.					
9	Course objectives are practical.					
Curriculum structure						
10	The course structure is consistent with the philosophy and objectives of the course.					
11	The course structure has an appropriate number of hours throughout the course.					
12	The curriculum structure is divided into proportions of subjects appropriately in each semester.					
13	The curriculum structure can develop students to meet the objectives of the curriculum.					
Course content						
14	The subjects in the curriculum are consistent with the objectives of the curriculum.					
15	The course content in the curriculum are consistent with the objectives of the curriculum.					
16	The course content in the curriculum are consistent with the needs of the learners and current social conditions.					
17	The course content in the curriculum are appropriate, clear, and nonredundant.					
18	The course content in the curriculum are up-to-date.					

Relevant suggestions:

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Part 3 **Information on inputs (I):** qualifications of instructors, qualifications of administrators, qualifications of student, learning materials, building, budget and recommendations for improving the inputs.

No.	Assessment list	Suitability level				
		5	4	3	2	1
Qualifications of Instructors						
1	Instructors are well knowledgeable in the subject taught.					
2	Instructors are qualified and experienced in the subjects they teach.					
3	Instructors are virtuous and conscious of being a teacher					
4	Instructors integrate learning content into more than one skill.					
5	Instructors prepare interesting materials and plan their lessons in a step-by-step manner.					
6	Instructors are attentive to teaching and take care of the learners in the classroom thoroughly.					
7	Instructors always instill morality and ethics into their learners					
8	Instructors encourage students to think, research, and solve everyday problems on their own.					
9	Instructors have teaching techniques that can arouse a wide range of interests.					
10	Instructors have appropriate counseling in academic and other areas.					

No.	Assessment list	Suitability level				
		5	4	3	2	1
11	Instructors recommend additional learning resources.					
Qualifications of administrators						
12	Administrators work with determination, dedication, and self-sacrifice to improve the school.					
13	Administrators have leadership.					
14	Administrators accept the student's opinions and problems.					
Qualifications of student						
15	Students are interested in applying continuously for courses.					
16	Students have knowledge suitable for the content of the curriculum structure.					
17	Students are interested and conscientious about learning according to the curriculum.					
18	Students are prompt to learn according to the curriculum.					
Learning materials						
19	Media, materials, teaching and learning equipment are sufficient to meet the needs of the students.					
20	Media, materials, and teaching equipment are diverse and suitable for teaching and learning in the curriculum.					
21	Media, materials, teaching and learning equipment are of good quality and can be used to manage teaching and learning in the course					
22	Media, materials, teaching equipment can be used conveniently and valuably in the course.					

No.	Assessment list	Suitability level				
		5	4	3	2	1
23	Media, materials, and teaching equipment are up-to-date.					
Budget and building						
24	The buildings, classrooms, conference rooms, audio-visual rooms and laboratories are sufficient for teaching and learning in the curriculum.					
25	The buildings, classrooms, conference rooms, audio-visual rooms and laboratories have suitable environment and atmosphere.					
26	The buildings, classrooms, conference rooms, audio-visual rooms and laboratories are suitable for teaching and learning in the curriculum.					
27	The buildings, classrooms, conference rooms, audio-visual rooms and laboratories are safe.					
28	Libraries are sufficient, appropriate, and conducive to learning.					
29	The activity areas are appropriate, sufficient, and conducive to learning.					
30	The overall environment is appropriate and conducive to learning.					

Recommendations for improving the inputs:

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<u>Part 4</u> Information on process (P): curriculum management, learning management, measurement and evaluation, and recommendations for improving the process.

No.	Assessment list	Suitability level				
		5	4	3	2	1
Learning management						
1	The instructional management in the curriculum is consistent with the subjects and learning objectives.					
2	Instructional management is complete as specified in the curriculum.					
3	Instructional management responds to the needs and interests of the learners.					
4	Learning management provides opportunities for learners to engage.					
5	Instructional management covers the development of knowledge, skills, and attitudes.					
6	Instructional management in the curriculum is diverse.					
7	Instructional management in the curriculum allows students to participate.					
8	Learners come up with a problem-solving process to learn on their own.					
9	Learning activities encourage learners to plan and research together from the sources around them.					
10	Instructional management encourage learners to learn on a regular basis.					
11	Instructional media are used properly in instructional management in the curriculum.					
12	Information technology is used properly in instructional management in the curriculum.					

No.	Assessment list	Suitability level				
		5	4	3	2	1
Measurement and evaluation						
13	Instructors inform the learners about the methods of measurement and evaluation.					
14	Measurement and evaluation are appropriate and consistent with the objectives of the course.					
15	Learners are systematically measured and evaluated in covering all aspects.					
16	Measurement and evaluation are diverse.					
17	Measurement and evaluation are in accordance with the predetermined rules and regulations.					
18	Measurement and evaluation are fair and efficient.					
19	Assessment results are used for the improvement of learners and instruction.					

Recommendations for improving the process:

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<u>Part 5</u> Information on the product (P): Knowledge, Skills, Emotional, attitudinal and value aspects and recommendations for improving the product.

No.	Assessment list	Suitability level				
		5	4	3	2	1
Knowledge						
1	Students can know the core concepts and working principles of computer network architecture.					
2	Students can know the analysis and setting methods of network protocols.					
3	Students can understand the working principles of major network devices					

No.	Assessment list	Suitability level				
		5	4	3	2	1
4	Students can understand the characteristics and functions of network operating systems.					
5	Students can understand the basic principles, basic methods and related technologies of network security.					
Skills						
6	Students have basic techniques of setting up a simple network.					
7	Students have basic skills of using the network.					
8	Students have basic skills of managing and maintaining a network.					
Emotional, attitudinal and value aspects						
9	Students have comprehensive and profound understanding of the important role of computer networks in the construction of modern information technology.					
10	Students have awareness of network security and confidentiality.					
11	Students have a good awareness of caring for equipment and consciously maintaining the learning environment					
12	Students have interest in computer science and a spirit of scientific exploration					
13	Students have team spirit of solidarity and cooperation and a good spiritual atmosphere of willingness to work together.					

Recommendations for improving the product:

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……

---------- Thank you for coming to this opportunity ----------

Questionnaire for Students Graduate

of curriculum evaluation of bachelor's degree in network engineering,

Sichuan University of Science & Engineering

Instructions:

1. This questionnaire is intended to evaluate curriculum of bachelor's degree in network engineering at Sichuan University of Science & Engineering using CIPP model focusing on aspects of context input process product.

2. This questionnaire is divided into parts:

Part 1: The personal information.

Part 2: Information on context (C): component curriculum, curriculum objectives, curriculum structure, course content and relevant suggestions.

Part 3: Information on inputs (I): qualifications of instructors, qualifications of administrators, qualifications of student, learning materials, building, budget and recommendations for improving the inputs.

Part 4: Information on process (P): curriculum management, learning management, measurement and evaluation, and recommendations for improving the process.

Part 5: Information on product (P): Knowledge, Skills, Emotional, attitudinal and value aspects and recommendations for improving the product.

3. Please consider answering the questionnaire with all reality. The information provided by you will be keep confidential and will be used as important improvement of the bachelor's degree in network engineering at Sichuan University of Science & Engineering.

I hope that we will be able to get a good deal of cooperation from our students in answering the questionnaire. Thank you for coming to this opportunity.

Mr. NanYang xiang
Master's degree student in Curriculum
Development and Teaching Innovation
RMUTT, Thailand

<u>Part 1</u> The personal information

Instructions: Please put a tick (✓) in the box that closely match your personal information.

1. Gender ☐ Male ☐ Female
2. Age ☐ 20-25 ☐ 26-30
   ☐ 30-35 ☐ 36-40
   ☐ 40-45 ☐ Others.....
3. Occupation
   ☐ Engineering ☐ Businessman
   ☐ Freelance ☐ Instructor
   ☐ Others.....
4. Work experience
   ☐ Under 5 years ☐ 5 – 10 years
   ☐ 11 – 15 years ☐ More than 15 years

<u>Part 2</u> Information on context (C): Curriculum, curriculum objectives, curriculum structure, course content and relevant suggestions.

Instructions: Please put a tick (✓) in the box that most closely matches your opinion with the criteria as follows:

5 means the most appropriate level.
4 means appropriate to a large extent.
3 means moderately appropriate.
2 means appropriate to a lesser extent.
1 means the least appropriate.

No.	Assessment list	Suitability level				
		5	4	3	2	1
Component curriculum						
1	The curriculum is up-to-date and in line with the needs of the labor market.					
2	The curriculum is appropriate and in line with the needs of learners.					

No.	Assessment list	Suitability level				
		5	4	3	2	1
3	The study plan throughout the program is clear.					
4	The program of study for each semester is clear.					
Curriculum objectives						
5	The curriculum objectives are in line with current social conditions.					
6	The course objectives are consistent with the needs of the learners.					
7	The course objectives are language clear and easy to understand.					
8	The course objectives cover the content and structure of the course.					
9	Course objectives are practical.					
Curriculum structure						
10	The course structure is consistent with the philosophy and objectives of the course.					
11	The course structure has an appropriate number of hours throughout the course.					
12	The curriculum structure is divided into proportions of subjects appropriately in each semester.					
13	The curriculum structure can develop students to meet the objectives of the curriculum.					
Course content						
14	The subjects in the curriculum are consistent with the objectives of the curriculum.					
15	The course content in the curriculum are consistent with the objectives of the curriculum.					

No.	Assessment list	Suitability level				
		5	4	3	2	1
16	The course content in the curriculum are consistent with the needs of the learners and current social conditions.					
17	The course content in the curriculum are appropriate, clear, and nonredundant.					
18	The course content in the curriculum are up-to-date.					

Relevant suggestions:

……

……

Part 3 **Information on inputs (I):** qualifications of instructors, qualifications of administrators, qualifications of student, learning materials, building, budget and recommendations for improving the inputs.

No.	Assessment list	Suitability level				
		5	4	3	2	1
Instructors						
1	Instructors are well knowledgeable in the subject taught.					
2	Instructors are qualified and experienced in the subjects they teach.					
3	Instructors are virtuous and conscious of being a teacher					
4	Instructors integrate learning content into more than one skill.					
5	Instructors prepare interesting materials and plan their lessons in a step-by-step manner.					

No.	Assessment list	Suitability level				
		5	4	3	2	1
6	Instructors are attentive to teaching and take care of the learners in the classroom thoroughly.					
7	Instructors always instill morality and ethics into their learners					
8	Instructors encourage students to think, research, and solve everyday problems on their own.					
9	Instructors have teaching techniques that can arouse a wide range of interests.					
10	Instructors have appropriate counseling in academic and other areas.					
11	Instructors recommend additional learning resources.					
Aadministrators						
12	Administrators work with determination, dedication, and self-sacrifice to improve the school.					
13	Administrators have leadership.					
14	Administrators accept the student's opinions and problems.					
Student						
15	Students are interested in applying continuously for courses.					
16	Students have knowledge suitable for the content of the curriculum structure.					
17	Students are interested and conscientious about learning according to the curriculum.					
18	Students are prompt to learn according to the curriculum.					

No.	Assessment list	Suitability level				
		5	4	3	2	1
Learning materials						
19	Media, materials, teaching and learning equipment are sufficient to meet the needs of the students.					
20	Media, materials, and teaching equipment are diverse and suitable for teaching and learning in the curriculum.					
21	Media, materials, teaching and learning equipment are of good quality and can be used to manage teaching and learning in the course					
22	Media, materials, teaching equipment can be used conveniently and valuably in the course.					
23	Media, materials, and teaching equipment are up-to-date.					
Budget and building						
24	The buildings, classrooms, conference rooms, audio-visual rooms and laboratories are sufficient for teaching and learning in the curriculum.					
25	The buildings, classrooms, conference rooms, audio-visual rooms and laboratories have suitable environment and atmosphere.					
26	The buildings, classrooms, conference rooms, audio-visual rooms and laboratories are suitable for teaching and learning in the curriculum.					
27	The buildings, classrooms, conference rooms, audio-visual rooms and laboratories are safe.					
28	Libraries are sufficient, appropriate, and conducive to learning.					

No.	Assessment list	Suitability level				
		5	4	3	2	1
29	The activity areas are appropriate, sufficient, and conducive to learning.					
30	The overall environment is appropriate and conducive to learning.					

Recommendations for improving the inputs:

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<u>Part 4</u> Information on process (P): curriculum management, learning management, measurement and evaluation, and recommendations for improving the process.

No.	Assessment list	Suitability level				
		5	4	3	2	1
Learning management						
1	The instructional management in the curriculum is consistent with the subjects and learning objectives.					
2	Instructional management is complete as specified in the curriculum.					
3	Instructional management responds to the needs and interests of the learners.					
4	Learning management provides opportunities for learners to engage.					
5	Instructional management covers the development of knowledge, skills, and attitudes.					
6	Instructional management in the curriculum is diverse.					
7	Instructional management in the curriculum allows students to participate.					

No.	Assessment list	Suitability level				
		5	4	3	2	1
8	Learners come up with a problem-solving process to learn on their own.					
9	Learning activities encourage learners to plan and research together from the sources around them.					
10	Instructional management encourage learners to learn on a regular basis.					
11	Instructional media are used properly in instructional management in the curriculum.					
12	Information technology is used properly in instructional management in the curriculum.					
Measurement and evaluation						
13	Instructors inform the learners about the methods of measurement and evaluation.					
14	Measurement and evaluation are appropriate and consistent with the objectives of the course.					
15	Learners are systematically measured and evaluated in covering all aspects.					
16	Measurement and evaluation are diverse.					
17	Measurement and evaluation are in accordance with the predetermined rules and regulations.					
18	Measurement and evaluation are fair and efficient.					
19	Assessment results are used for the improvement of learners and instruction.					

Recommendations for improving the process:

……

……

<u>Part 5</u> Information on the product (P): Knowledge, Skills, Emotional, attitudinal and value aspects and recommendations for improving the product.

No.	Assessment list	Suitability level				
		5	4	3	2	1
Knowledge						
1	Students can know the core concepts and working principles of computer network architecture.					
2	Students can know the analysis and setting methods of network protocols.					
3	Students can understand the working principles of major network devices					
4	Students can understand the characteristics and functions of network operating systems.					
5	Students can understand the basic principles, basic methods and related technologies of network security.					
Skills						
6	Students have basic techniques of setting up a simple network.					
7	Students have basic skills of using the network.					
8	Students have basic skills of managing and maintaining a network.					
Emotional, attitudinal and value aspects						
9	Students have comprehensive and profound understanding of the important role of computer networks in the construction of modern information technology.					
10	Students have awareness of network security and confidentiality.					

No.	Assessment list	Suitability level				
		5	4	3	2	1
11	Students have a good awareness of caring for equipment and consciously maintaining the learning environment					
12	Students have interest in computer science and a spirit of scientific exploration					
13	Students have team spirit of solidarity and cooperation and a good spiritual atmosphere of willingness to work together.					

Recommendations for improving the product:

……

……

---------- Thank you for coming to this opportunity ----------

Questionnaire for Employer

of curriculum evaluation of bachelor's degree in network engineering,

Sichuan University of Science & Engineering

Instructions:

1. This questionnaire is intended to evaluate curriculum of bachelor's degree in network engineering at Sichuan University of Science & Engineering using CIPP model focusing on aspects of context input process product.

2. This questionnaire is divided into parts:

Part 1: The personal information.

Part 2: Information on product (P): Knowledge, Skills, Emotional, attitudinal and value aspects and recommendations for improving the product.

3. Please consider answering the questionnaire with all reality. The information provided by you will be keep confidential and will be used as important improvement of the bachelor's degree in network engineering at Sichuan University of Science & Engineering.

I hope that we will be able to get a good deal of cooperation from our students in answering the questionnaire. Thank you for coming to this opportunity.

Mr. NanYang xiang
Master's degree student in Curriculum
Development and Teaching Innovation
RMUTT, Thailand

<u>Part 1</u> The personal information

Instructions: Please put a tick (✓) in the box that closely match your personal information.

1. Gender ☐ Male ☐ Female
2. Age ☐ 20-25 ☐ 26-30
   ☐ 30-35 ☐ 36-40
   ☐ 40-45 ☐ Others.....
3. Work experience
   ☐ Under 5 years ☐ 5 – 10 years
   ☐ 11 – 15 years ☐ More than 15 years
4. Education
   ☐ Bachelor's Degree ☐ Master's Degree
   ☐ Doctor's Degree ☐ Other.....

<u>Part 2</u> Information on the product (P): Knowledge, skills, emotional, attitudinal and value aspects and recommendations for improving the product.

No.	Assessment list	Suitability level				
		5	4	3	2	1
Knowledge						
1	Students can know the core concepts and working principles of computer network architecture.					
2	Students can know the analysis and setting methods of network protocols.					
3	Students can understand the working principles of major network devices					
4	Students can understand the characteristics and functions of network operating systems.					
5	Students can understand the basic principles, basic methods and related technologies of network security.					

No.	Assessment list	Suitability level				
		5	4	3	2	1
Skills						
6	Students have basic techniques of setting up a simple network.					
7	Students have basic skills of using the network.					
8	Students have basic skills of managing and maintaining a network.					
Emotional, attitudinal and value aspects						
9	Students have comprehensive and profound understanding of the important role of computer networks in the construction of modern information technology.					
10	Students have awareness of network security and confidentiality.					
11	Students have a good awareness of caring for equipment and consciously maintaining the learning environment					
12	Students have interest in computer science and a spirit of scientific exploration					
13	Students have team spirit of solidarity and cooperation and a good spiritual atmosphere of willingness to work together.					

Recommendations for improving the product:

……

---------- Thank you for coming to this opportunity ----------

APPENDIX C

IOC (Index of Item Objective Congruence)

Instrument of Research

IOC (Index of Item Objective Congruence)

Questionnaire of curriculum evaluation of bachelor's degree in Network Engineering, Sichuan University of Science & Engineering

1. Questionnaire for Aadministrators

Section	Item	Expert results					Total	IOC	Result
		1	2	3	4	5			
1 The personal information	1	1	1	1	1	1	5	1	yes
	2	1	1	1	1	1	5	1	yes
	3	1	1	1	1	1	5	1	yes
	4	1	1	1	1	1	5	1	yes
	5	1	1	1	1	1	5	1	yes
2 Information on context	1	1	1	1	1	1	5	1	yes
	2	1	1	1	1	1	5	1	yes
	3	1	1	1	1	1	5	1	yes
	4	1	1	1	1	1	5	1	yes
	5	1	1	1	1	1	5	1	yes
	6	1	1	1	1	1	5	1	yes
	7	1	1	1	1	1	5	1	yes
	8	1	1	1	1	1	5	1	yes
	9	1	1	1	1	1	5	1	yes
	10	1	1	1	1	1	5	1	yes
	11	1	1	1	1	1	5	1	yes
	12	1	1	1	1	1	5	1	yes
	13	1	1	1	1	1	5	1	yes
	14	1	1	1	1	1	5	1	yes
	15	1	1	1	1	1	5	1	yes
	16	1	1	1	1	1	5	1	yes
	17	1	1	1	1	1	5	1	yes
	18	1	1	1	1	1	5	1	yes

Section	Item	Expert results					Total	IOC	Result
		1	2	3	4	5			
3 Information on inputs	1	1	1	1	1	1	5	1	yes
	2	1	1	1	1	1	5	1	yes
	3	1	1	1	1	1	5	1	yes
	4	1	1	1	1	1	5	1	yes
	5	1	1	1	1	1	5	1	yes
	6	1	1	1	1	1	5	1	yes
	7	1	1	1	1	1	5	1	yes
	8	1	1	1	1	1	5	1	yes
	9	1	1	1	1	1	5	1	yes
	10	1	1	1	1	1	5	1	yes
	11	1	1	1	1	1	5	1	yes
	12	1	1	1	1	1	5	1	yes
	13	1	1	1	1	1	5	1	yes
	14	1	1	1	1	1	5	1	yes
	15	1	1	1	1	1	5	1	yes
	16	1	1	1	1	1	5	1	yes
	17	1	1	1	1	1	5	1	yes
	18	1	1	1	1	1	5	1	yes
	19	1	1	1	1	1	5	1	yes
	20	1	1	1	1	1	5	1	yes
	21	1	1	1	1	1	5	1	yes
	22	1	1	1	1	1	5	1	yes
	23	1	1	1	1	1	5	1	yes
	24	1	1	1	1	1	5	1	yes
	25	1	1	1	1	1	5	1	yes
	26	1	1	1	1	1	5	1	yes
	27	1	1	1	1	1	5	1	yes
	28	1	1	1	1	1	5	1	yes

Section	Item	Expert results					Total	IOC	Result
		1	2	3	4	5			
	29	1	1	1	1	1	5	1	yes
	30	1	1	1	1	1	5	1	yes
	31	1	1	1	1	1	5	1	yes
	32	1	1	1	1	1	5	1	yes
	33	1	1	1	1	1	5	1	yes
4 Information on process	1	1	1	1	1	1	5	1	yes
	2	1	1	1	1	1	5	1	yes
	3	1	1	1	1	1	5	1	yes
	4	1	1	1	1	1	5	1	yes
	5	1	1	1	1	1	5	1	yes
	6	1	1	1	1	1	5	1	yes
	7	1	1	1	1	1	5	1	yes
	8	1	1	1	1	1	5	1	yes
	9	1	1	1	1	1	5	1	yes
	10	1	1	1	1	1	5	1	yes
	11	1	1	1	1	1	5	1	yes
	12	1	1	1	1	1	5	1	yes
	13	1	1	1	1	1	5	1	yes
	14	1	1	1	1	1	5	1	yes
	15	1	1	1	1	1	5	1	yes
	16	1	1	1	1	1	5	1	yes
	17	1	1	1	1	1	5	1	yes
	18	1	1	1	1	1	5	1	yes
	19	1	1	1	1	1	5	1	yes
	20	1	1	1	1	1	5	1	yes
	21	1	1	1	1	1	5	1	yes
	22	1	1	1	1	1	5	1	yes
	23	1	1	1	1	1	5	1	yes

Section	Item	Expert results					Total	IOC	Result
		1	2	3	4	5			
	24	1	1	1	1	1	5	1	yes
	25	1	1	1	1	1	5	1	yes
	26	1	1	1	1	1	5	1	yes
	27	1	1	1	1	1	5	1	yes
	28	1	1	1	1	1	5	1	yes
	29	1	1	1	1	1	5	1	yes
	30	1	1	1	1	1	5	1	yes
	31	1	1	1	1	1	5	1	yes
5 Information on the product	1	1	1	1	1	1	5	1	yes
	2	1	1	1	1	1	5	1	yes
	3	1	1	1	1	1	5	1	yes
	4	1	1	1	1	1	5	1	yes
	5	1	1	1	1	1	5	1	yes
	6	1	1	1	1	1	5	1	yes
	7	1	1	1	1	1	5	1	yes
	8	1	1	1	1	1	5	1	yes

2. Questionnaire for Instructors

Section	Item	Expert results					Total	IOC	Result
		1	2	3	4	5			
1 The personal information	1	1	1	1	1	1	5	1	yes
	2	1	1	1	1	1	5	1	yes
	3	1	1	1	1	1	5	1	yes
	4	1	1	1	1	1	5	1	yes
	5	1	1	1	1	1	5	1	yes
2 Information on context	1	1	1	1	1	1	5	1	yes
	2	1	1	1	1	1	5	1	yes
	3	1	1	1	1	1	5	1	yes
	4	1	1	1	1	1	5	1	yes
	5	1	1	1	1	1	5	1	yes
	6	1	1	1	1	1	5	1	yes
	7	1	1	1	1	1	5	1	yes
	8	1	1	1	1	1	5	1	yes
	9	1	1	1	1	1	5	1	yes
	10	1	1	1	1	1	5	1	yes
	11	1	1	1	1	1	5	1	yes
	12	1	1	1	1	1	5	1	yes
	13	1	1	1	1	1	5	1	yes
	14	1	1	1	1	1	5	1	yes
	15	1	1	1	1	1	5	1	yes
	16	1	1	1	1	1	5	1	yes
	17	1	1	1	1	1	5	1	yes
	18	1	1	1	1	1	5	1	yes
3 Information on inputs	1	1	1	1	1	1	5	1	yes
	2	1	1	1	1	1	5	1	yes
	3	1	1	1	1	1	5	1	yes
	4	1	1	1	1	1	5	1	yes

Section	Item	Expert results					Total	IOC	Result
		1	2	3	4	5			
	5	1	1	1	1	1	5	1	yes
	6	1	1	1	1	1	5	1	yes
	7	1	1	1	1	1	5	1	yes
	8	1	1	1	1	1	5	1	yes
	9	1	1	1	1	1	5	1	yes
	10	1	1	1	1	1	5	1	yes
	11	1	1	1	1	1	5	1	yes
	12	1	1	1	1	1	5	1	yes
	13	1	1	1	1	1	5	1	yes
	14	1	1	1	1	1	5	1	yes
	15	1	1	1	1	1	5	1	yes
	16	1	1	1	1	1	5	1	yes
	17	1	1	1	1	1	5	1	yes
	18	1	1	1	1	1	5	1	yes
	19	1	1	1	1	1	5	1	yes
	20	1	1	1	1	1	5	1	yes
	21	1	1	1	1	1	5	1	yes
	22	1	1	1	1	1	5	1	yes
	23	1	1	1	1	1	5	1	yes
	24	1	1	1	1	1	5	1	yes
	25	1	1	1	1	1	5	1	yes
	26	1	1	1	1	1	5	1	yes
	27	1	1	1	1	1	5	1	yes
	28	1	1	1	1	1	5	1	yes
	29	1	1	1	1	1	5	1	yes
	30	1	1	1	1	1	5	1	yes
	31	1	1	1	1	1	5	1	yes
	32	1	1	1	1	1	5	1	yes

Section	Item	Expert results					Total	IOC	Result
		1	2	3	4	5			
	33	1	1	1	1	1	5	1	yes
4 Information on process	1	1	1	1	1	1	5	1	yes
	2	1	1	1	1	1	5	1	yes
	3	1	1	1	1	1	5	1	yes
	4	1	1	1	1	1	5	1	yes
	5	1	1	1	1	1	5	1	yes
	6	1	1	1	1	1	5	1	yes
	7	1	1	1	1	1	5	1	yes
	8	1	1	1	1	1	5	1	yes
	9	1	1	1	1	1	5	1	yes
	10	1	1	1	1	1	5	1	yes
	11	1	1	1	1	1	5	1	yes
	12	1	1	1	1	1	5	1	yes
	13	1	1	1	1	1	5	1	yes
	14	1	1	1	1	1	5	1	yes
	15	1	1	1	1	1	5	1	yes
	16	1	1	1	1	1	5	1	yes
	17	1	1	1	1	1	5	1	yes
	18	1	1	1	1	1	5	1	yes
	19	1	1	1	1	1	5	1	yes
	20	1	1	1	1	1	5	1	yes
	21	1	1	1	1	1	5	1	yes
	22	1	1	1	1	1	5	1	yes
	23	1	1	1	1	1	5	1	yes
	24	1	1	1	1	1	5	1	yes
	25	1	1	1	1	1	5	1	yes
	26	1	1	1	1	1	5	1	yes
	27	1	1	1	1	1	5	1	yes

Section	Item	Expert results					Total	IOC	Result
		1	2	3	4	5			
	28	1	1	1	1	1	5	1	yes
	29	1	1	1	1	1	5	1	yes
	30	1	1	1	1	1	5	1	yes
	31	1	1	1	1	1	5	1	yes
5 Information on the product	1	1	1	1	1	1	5	1	yes
	2	1	1	1	1	1	5	1	yes
	3	1	1	1	1	1	5	1	yes
	4	1	1	1	1	1	5	1	yes
	5	1	1	1	1	1	5	1	yes
	6	1	1	1	1	1	5	1	yes
	7	1	1	1	1	1	5	1	yes
	8	1	1	1	1	1	5	1	yes

3. Questionnaire for students

Section	Item	Expert results					Total	IOC	Result
		1	2	3	4	5			
1 The personal information	1	1	1	1	1	1	5	1	yes
	2	1	1	1	1	1	5	1	yes
	3	1	1	1	1	1	5	1	yes
	4	1	1	1	1	1	5	1	yes
	5	1	1	1	1	1	5	1	yes
2 Information on context	1	1	1	1	1	1	5	1	yes
	2	1	1	1	1	1	5	1	yes
	3	1	1	1	1	1	5	1	yes
	4	1	1	1	1	1	5	1	yes
	5	1	1	1	1	1	5	1	yes
	6	1	1	1	1	1	5	1	yes
	7	1	1	1	1	1	5	1	yes
	8	1	1	1	1	1	5	1	yes
	9	1	1	1	1	1	5	1	yes
	10	1	1	1	1	1	5	1	yes
	11	1	1	1	1	1	5	1	yes
	12	1	1	1	1	1	5	1	yes
	13	1	1	1	1	1	5	1	yes
	14	1	1	1	1	1	5	1	yes
	15	1	1	1	1	1	5	1	yes
	16	1	1	1	1	1	5	1	yes
	17	1	1	1	1	1	5	1	yes
	18	1	1	1	1	1	5	1	yes
3 Information on inputs	1	1	1	1	1	1	5	1	yes
	2	1	1	1	1	1	5	1	yes
	3	1	1	1	1	1	5	1	yes
	4	1	1	1	1	1	5	1	yes

Section	Item	Expert results					Total	IOC	Result
		1	2	3	4	5			
	5	1	1	1	1	1	5	1	yes
	6	1	1	1	1	1	5	1	yes
	7	1	1	1	1	1	5	1	yes
	8	1	1	1	1	1	5	1	yes
	9	1	1	1	1	1	5	1	yes
	10	1	1	1	1	1	5	1	yes
	11	1	1	1	1	1	5	1	yes
	12	1	1	1	1	1	5	1	yes
	13	1	1	1	1	1	5	1	yes
	14	1	1	1	1	1	5	1	yes
	15	1	1	1	1	1	5	1	yes
	16	1	1	1	1	1	5	1	yes
	17	1	1	1	1	1	5	1	yes
	18	1	1	1	1	1	5	1	yes
	19	1	1	1	1	1	5	1	yes
	20	1	1	1	1	1	5	1	yes
	21	1	1	1	1	1	5	1	yes
	22	1	1	1	1	1	5	1	yes
	23	1	1	1	1	1	5	1	yes
	24	1	1	1	1	1	5	1	yes
	25	1	1	1	1	1	5	1	yes
	26	1	1	1	1	1	5	1	yes
	27	1	1	1	1	1	5	1	yes
	28	1	1	1	1	1	5	1	yes
	29	1	1	1	1	1	5	1	yes
	30	1	1	1	1	1	5	1	yes
	31	1	1	1	1	1	5	1	yes
	32	1	1	1	1	1	5	1	yes

Section	Item	Expert results					Total	IOC	Result
		1	2	3	4	5			
	33	1	1	1	1	1	5	1	yes
4 Information on process	1	1	1	1	1	1	5	1	yes
	2	1	1	1	1	1	5	1	yes
	3	1	1	1	1	1	5	1	yes
	4	1	1	1	1	1	5	1	yes
	5	1	1	1	1	1	5	1	yes
	6	1	1	1	1	1	5	1	yes
	7	1	1	1	1	1	5	1	yes
	8	1	1	1	1	1	5	1	yes
	9	1	1	1	1	1	5	1	yes
	10	1	1	1	1	1	5	1	yes
	11	1	1	1	1	1	5	1	yes
	12	1	1	1	1	1	5	1	yes
	13	1	1	1	1	1	5	1	yes
	14	1	1	1	1	1	5	1	yes
	15	1	1	1	1	1	5	1	yes
	16	1	1	1	1	1	5	1	yes
	17	1	1	1	1	1	5	1	yes
	18	1	1	1	1	1	5	1	yes
	19	1	1	1	1	1	5	1	yes
	20	1	1	1	1	1	5	1	yes
	21	1	1	1	1	1	5	1	yes
	22	1	1	1	1	1	5	1	yes
	23	1	1	1	1	1	5	1	yes
	24	1	1	1	1	1	5	1	yes
	25	1	1	1	1	1	5	1	yes
	26	1	1	1	1	1	5	1	yes
	27	1	1	1	1	1	5	1	yes

Section	Item	Expert results					Total	IOC	Result
		1	2	3	4	5			
	28	1	1	1	1	1	5	1	yes
	29	1	1	1	1	1	5	1	yes
	30	1	1	1	1	1	5	1	yes
	31	1	1	1	1	1	5	1	yes
5 Information on the product	1	1	1	1	1	1	5	1	yes
	2	1	1	1	1	1	5	1	yes
	3	1	1	1	1	1	5	1	yes
	4	1	1	1	1	1	5	1	yes
	5	1	1	1	1	1	5	1	yes
	6	1	1	1	1	1	5	1	yes
	7	1	1	1	1	1	5	1	yes
	8	1	1	1	1	1	5	1	yes

3. Questionnaire for graduate students

Part	Item	Expert results					Total	IOC	Result
		1	2	3	4	5			
1 The personal information	1	1	1	1	1	1	5	1	yes
	2	1	1	1	1	1	5	1	yes
	3	1	1	1	1	1	5	1	yes
	4	1	1	1	1	1	5	1	yes
	5	1	1	1	1	1	5	1	yes
2 Information on context	1	1	1	1	1	1	5	1	yes
	2	1	1	1	1	1	5	1	yes
	3	1	1	1	1	1	5	1	yes
	4	1	1	1	1	1	5	1	yes
3 Information on inputs	1	1	1	1	1	1	5	1	yes
	2	1	1	1	1	1	5	1	yes
	3	1	1	1	1	1	5	1	yes
	4	1	1	1	1	1	5	1	yes
	5	1	1	1	1	1	5	1	yes
	6	1	1	1	1	1	5	1	yes
	7	1	1	1	1	1	5	1	yes
	8	1	1	1	1	1	5	1	yes
	9	1	1	1	1	1	5	1	yes
	10	1	1	1	1	1	5	1	yes
	11	1	1	1	1	1	5	1	yes
	12	1	1	1	1	1	5	1	yes
	13	1	1	1	1	1	5	1	yes
	14	1	1	1	1	1	5	1	yes
	15	1	1	1	1	1	5	1	yes
	16	1	1	1	1	1	5	1	yes
	17	1	1	1	1	1	5	1	yes
	18	1	1	1	1	1	5	1	yes

Part	Item	Expert results					Total	IOC	Result
		1	2	3	4	5			
	19	1	1	1	1	1	5	1	yes
4 Information on process	1	1	1	1	1	1	5	1	yes
	2	1	1	1	1	1	5	1	yes
	3	1	1	1	1	1	5	1	yes
	4	1	1	1	1	1	5	1	yes
	5	1	1	1	1	1	5	1	yes
	6	1	1	1	1	1	5	1	yes
	7	1	1	1	1	1	5	1	yes
	8	1	1	1	1	1	5	1	yes
	9	1	1	1	1	1	5	1	yes
	10	1	1	1	1	1	5	1	yes
	11	1	1	1	1	1	5	1	yes
	12	1	1	1	1	1	5	1	yes
	13	1	1	1	1	1	5	1	yes
	14	1	1	1	1	1	5	1	yes
	15	1	1	1	1	1	5	1	yes
	16	1	1	1	1	1	5	1	yes
	17	1	1	1	1	1	5	1	yes
	18	1	1	1	1	1	5	1	yes
	19	1	1	1	1	1	5	1	yes
5 Information on the product	1	1	1	1	1	1	5	1	yes
	2	1	1	1	1	1	5	1	yes
	3	1	1	1	1	1	5	1	yes
	4	1	1	1	1	1	5	1	yes
	5	1	1	1	1	1	5	1	yes
	6	1	1	1	1	1	5	1	yes
	7	1	1	1	1	1	5	1	yes
	8	1	1	1	1	1	5	1	yes

4. Questionnaire for employer

Section	Item	Expert results					Total	IOC	Result
		1	2	3	4	5			
1 The personal information	1	1	1	1	1	1	5	1	yes
	2	1	1	1	1	1	5	1	yes
	3	1	1	1	1	1	5	1	yes
	4	1	1	1	1	1	5	1	yes
5 Information on the product	1	1	1	1	1	1	5	1	yes
	2	1	1	1	1	1	5	1	yes
	3	1	1	1	1	1	5	1	yes
	4	1	1	1	1	1	5	1	yes
	5	1	1	1	1	1	5	1	yes
	6	1	1	1	1	1	5	1	yes
	7	1	1	1	1	1	5	1	yes
	8	1	1	1	1	1	5	1	yes

Biography

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