ISSN 2663-8169 Vol. 5, Issue 12: 6-14, DOI: 10.25236/IJNDE.2023.051202

The Framework Model of Reverse Curriculum Development Based on OBE and the Application in the Undergraduate Program of Supply Chain Management

Jin Fan*

School of Management, Wuhan College, Wuhan, China
**Corresponding author*

Abstract: *OBE (outcome-based education) emphasizes the development of courses based on the learning results according to the actual needs of the society for talents. This paper introduces the theory of curriculum development, constructs the framework model of curriculum development based on the concept of OBE, discusses how to effectively present the learning results, and applies it in the practice of supply chain management undergraduate curriculum development. Research and practice show that this model is open and applicable to different types of schools. It can clearly show the results-based curriculum development ideas and reflect the process of dynamically adjusting the results and revising the curriculum according to the changes in demand, which provides a strong support for the curriculum construction and development of higher education.*

Keywords: *curriculum development, OBE, supply chain management*

1. Introduction

With the increasing complexity of the world environment and the rapid development of technology, the society's demand for graduates' knowledge, ability and skills is also changing. Therefore, in higher education, more and more attention is paid to what kind of results students can achieve at the end of the whole process of education, that is, what kind of preparation students have for future jobs. Since its creation by William G. Spady in 1981, the consequence-based education (OBE) has received much attention from the educational circles at home and abroad. It provides a systematic method for the curriculum reform of schools. An important aspect of its application in higher education is curriculum development, including curriculum planning, design, implementation and evaluation of four main components. However, it is a daunting challenge for universities to effectively plan, design and implement outcomes-based courses in response to the changing needs of society.

This paper will build a curriculum development framework model based on the research results of domestic and foreign scholars. This model will clearly show the outcome-based course development idea and reflect the process of dynamically adjusting the results and revising the course according to the changing demand. In addition, combining with the study of domestic and foreign scholars on the ability of supply chain management talents and the actual demand for relevant talents in China, this study will apply the model to the course development of supply chain management in an application-oriented university in Wuhan, so as to provide a useful reference for the practice of the construction of supply chain management specialty.

2. Literature review and theoretical basis

2.1 Theory and application of curriculum development

Curriculum development mainly has two schools of thought, objective mode and process mode, which represent two different philosophical methods. Regardless of which model is chosen, course developers need to think holistically about the design of the course (lesson plans, teaching methods, and evaluation) to enable students to acquire the knowledge, skills, and attitudes defined by the course, and to help students become lifelong learners. OBE is the educational concept of "clearly focusing and

ISSN 2663-8169 Vol. 5, Issue 12: 6-14, DOI: 10.25236/IJNDE.2023.051202

organizing everything around what all students must do in the education system to ensure that all students can succeed after graduation [1]". The outcome model is a part of OBE. However, the important thing in curriculum development is not the definition of goals or results, but whether the definition of goals or results answers the key questions in the process of student training [2]. Curriculum development framework based on OBE reflected this idea. HARDEN (1999) built a Three-circle framework model (three-circle model) based on OBE theory and applied it to curriculum design in the medical field [3], and Churi (2015) built an OBEE model applied to engineering curriculum design [4].

In our country, there are relatively few researches on curriculum development theories, even less researches on OBE-based curriculum development theories. A lot of researches focus on the empirical research of OBE-based curriculum design, but the empirical research on curriculum development is relatively short. Bai et al. (2017) constructed an online open course resource structure model based on the concept of OBE and applied it to the online course design of Principles and Methods of Instructional Design [5]. Wang (2017) constructed a framework model of course design from two dimensions and four steps, and applied it to the MOOC course design of Living English Listening and Speaking and English Exploration [6].

2.2 Capacity demand of supply chain managers

Foreign studies on the demand of supply chain managers' competence are relatively mature. Gammelgaard & Larson (2001), through a comprehensive literature review, listed 45 kinds of necessary skills and abilities, some of which are: Global perspective, cross-functional awareness, people management (teamwork, leadership, conflict management and negotiation), reasoning analysis (quantitative and statistical, critical reasoning and problem solving), communication and presentation, decision making, time management, computer and information technology, project management, process management, and ability to perform under pressure [7]. APICS has developed the Supply chain Manager Competency Model to provide professionals with the knowledge and skills they need to succeed. This model divides the competency requirements of supply chain managers into six levels from three aspects of basic competence, professional competence and professional competence, including personal efficacy, academic competence, leadership, operational management competence, supply chain management competence and career development requirements of supply chain managers [8]. In the studies of scholars, Ballou (2007) emphasizes the need to better understand the cross-border characteristics of supply chains and include them in the curriculum [9]. Therefore, undergraduate courses should focus on cultivating graduates who are analytical, critical, reflective, transformative and capable of changing the supply chain landscape (Bak & Boloucher-Passet, 2013) [10]. In terms of the course content of supply chain management, Bandyopadhyay (2004) listed 14 main contents, covering almost all business processes within the product life cycle, from product design and development to reverse logistics and environmental protection issues (product recovery and treatment)[11]. Hong et al. analyzed the factors affecting the competency of supply chain management talents and found that logistics and supply chain knowledge, business knowledge/skills, personnel management skills, process management skills, behavioral skills and decision-making ability were direct factors. Digital and information ability are indirect influencing factors; Self-concept, personal trait and motivation are the key factors. The innovation of cooperative personnel training mode is the basic factor; National policy is the root factor [12]. Among these capabilities, the industrial sector has a significant impact on these dimensions of capability. Manufacturing enterprises pay more attention to generic skills, supply chain management qualifications and leadership, and there is no obvious difference between developed and developing countries (Yongyi Shou & Weijiao Wang,2015) [13].

In general, scholars emphasize that in order to cope with changing business demands and global competitive environment, supply chain managers' continuous self-learning ability and soft skills such as communication and negotiation are particularly important, because supply chain management emphasizes process management rather than functional management (Van Hoek, 2002) [14].

2.3 Harden's "Three-circle Model"

Harden's "three-circle model" classifies learning outcomes from three dimensions (as is shown in Figure 1) : The inner circle represents what the cultivated object can do, that is, what tasks it can undertake after exiting the educational process, which can be called "doing the right thing"; The middle part of the circle shows the way to accomplish the task, which can be thought of as "doing things right"; the outer circle represents outcomes related to the development of professionalism and personal

ISSN 2663-8169 Vol. 5, Issue 12: 6-14, DOI: 10.25236/IJNDE.2023.051202

attributes, which can be understood as "the right people do things". Therefore, a good definition of what a student can accomplish is not the whole presentation of learning results, but more important is the way in which the student can accomplish the task and the kind of person the student can become.

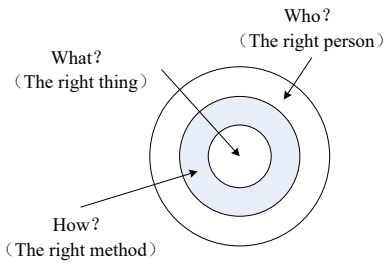

Figure 1: Three-circle Model

A student may possess all the core competencies in the inner circle, but it does not mean that he has achieved a good learning result, because these competencies are determined when students graduate, and they cannot be dynamically changed with the changes of the environment. Therefore, it is more important for individuals to have deeply internalized performance capabilities, such as personal qualities, values, self-awareness, empathy and professional thinking ability, so as to flexibly cope with changing and complex environments over a long period of time. These competencies are considered by managers to be central to achieving performance, so the competencies implicit in the results of the middle circle and the outer circle transcend and act as competencies identified in the inner circle.

The three-circle model can also be viewed from a multi-dimensional perspective. For the same major, the description of results may be different depending on the type of talent training. For example, the learning results of supply chain management will vary due to the differences in the level of junior college, undergraduate and postgraduate education. Even for talents training of a certain major at the undergraduate level, the learning results will be different due to the different orientation of the university. For example, the training results of undergraduate talents under the orientation of research type, application type and career type will definitely be different (as is shown in Figure 2).

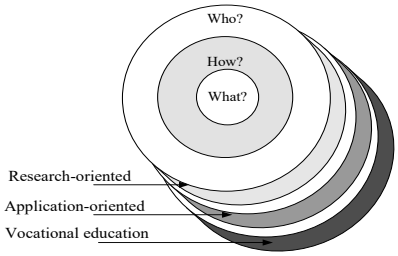

Figure 2: Three-dimensional "Three-circle Model" under different positioning

3. Build a curriculum development model

3.1 Curriculum development framework model

"Outcome" is one of the key elements of OBE. It is the expectation of the outcomes one will learn. These expectations are included in the curriculum, teaching and assessment. Once long-term important outcomes have been identified, they become the starting point for curriculum development (Killen, 2007) [15]. Learning results are increasingly used as an important basis for curriculum planning (Otter, 1995) [16]. We can understand OBE as a "downward design" curriculum development method, which can effectively bridge the gap between education and practice. It is therefore critical that these results be identified, validated, communicated and evaluated, and that schools and educators have a clear vision of what they are.

Different from the traditional education system, which determines the curriculum and evaluation system in advance and "produces a result" through teaching, "Outcome-based" takes learning results as the guiding principle of curriculum development, that is, curriculum development starts with the content learners expect to learn, followed by the design of teaching activities to help learners achieve

ISSN 2663-8169 Vol. 5, Issue 12: 6-14, DOI: 10.25236/IJNDE.2023.051202

the expected learning results. Finally, feedback the learning level achieved by the learners through assessment. The significance of following this approach is that it Bridges the huge gap between course outcomes and talent development outcomes. This process is shown in Figure 3.

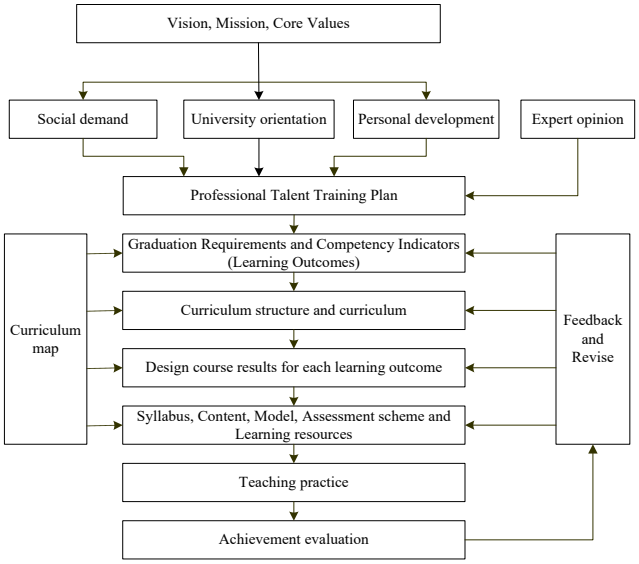

Figure 3: A framework model of curriculum development based on OBE

In OBE's educational philosophy, "student-centered" is another core factor, which emphasizes students' active learning. As one of the main stakeholders of the course, students need to understand the learning outcomes, as well as understand the vision, mission and educational objectives of the industry they will be working in, as they have an impact on the learning outcomes and are therefore included in the model.

In curriculum development, curriculum structure is the foundation. The sequencing of the core curriculum and the arrangement of the prerequisite courses are crucial in constructing the curriculum structure, because the effectiveness of the whole curriculum depends on it, which is closely related to the market demand, the positioning of the school and the individual development of the students. Therefore, on the basis of understanding the positioning of schools, educators need to conduct adequate vocational analysis to obtain more accurate learning results, and consider students' individual needs in curriculum development.

The next step after establishing the course structure is how to implement each course in order to achieve the course objectives through the implementation of each course and allow students to acquire the competencies required by the industry. The implementation results of each course can be presented in the form of a "curriculum map" (as is shown in Figure 4), which can be understood as a branch of the curriculum development framework model. Figure 4 takes the course of Supply Chain Strategic Management (SC Strategic Management for short) as an example. Through the course map, it shows the links between abilities, course objectives, learning outcomes and teaching activities, and tells students the "intermediate results" to be achieved in the learning process of each course, thus highlighting the integrity of the model. These intermediate results provide ideas for the design of the teaching process and also enable students to understand that various learning modes can be used to develop self-learning abilities rather than relying solely on classroom teaching.

After the completion of curriculum development, it is necessary to select appropriate teachers to implement the curriculum and evaluate the implementation results. The evaluation results will be dynamically fed back to each stage of curriculum development, so that the relevant content of each stage can be corrected when necessary, and a closed-loop curriculum development process can be formed.

Throughout the development of the course, learning outcomes have been cleverly incorporated and woven into the course design and can be developed, evaluated and certified through a variety of methods. This model also makes it easier for the industry to find the right people because they have a clear picture of the courses, outcomes and specific abilities students are taking.

ISSN 2663-8169 Vol. 5, Issue 12: 6-14, DOI: 10.25236/IJNDE.2023.051202

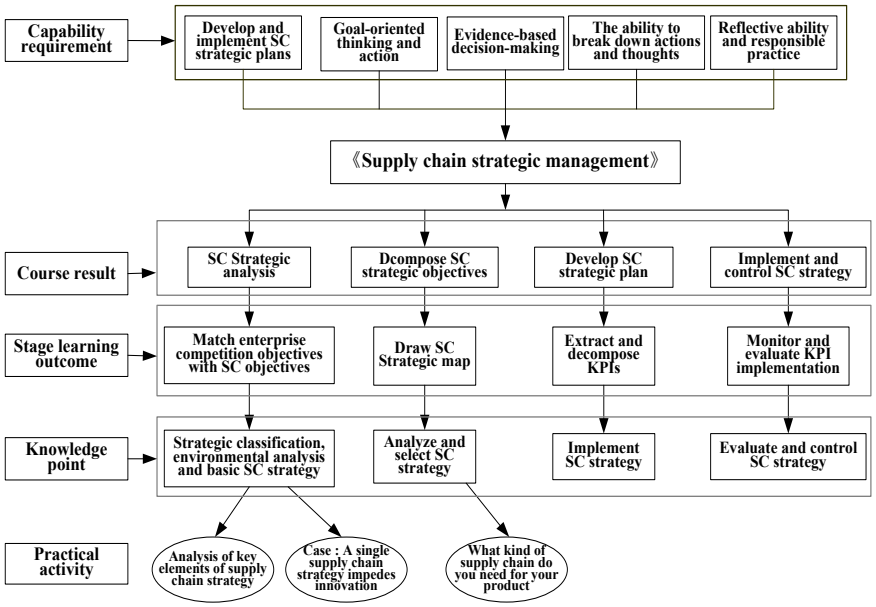

Figure 4: <Supply Chain Strategic Management>curriculum map

3.2 Presentation of learning results

We can learn from the model that learning outcome is an important basis for curriculum development, which can provide a clear and explicit framework for curriculum development, and also encourage teachers and students to jointly assume learning responsibilities, which has a guiding effect on student evaluation and curriculum evaluation. A clear and open learning outcome can let the student know clearly what he can expect in the next four years of study, can let the education administrator judge whether the student meets the training requirements, and can let the demander identify whether their requirements can be met. Therefore, it is important to have clear results that are easy to practice, but how to conceptualize and present learning results is a challenge.

In the talent cultivation program of Chinese undergraduate education, it describes the result that students should obtain after finishing their university study from the three aspects of knowledge, ability and accomplishment, but it is only "there is a result". In addition, the lack of stage, level, relevance and comparability of the results is also a disadvantage of the traditional results presentation. The three-circle model provides a basis for presenting results clearly and unambiguously, and we can divide learning outcomes into three levels (as is shown in Table 1). The three categories in Table 1 represent the first level of the learning outcomes framework. The second level is the key learning outcomes of the students. These outcomes can be further subdivided to form the third level of the framework, and each school can further interpret the results and determine how they should be achieved, as needed.

Table 1: .A learning outcome framework for competitive learners

Level 1	A What can be done?—— “Do the right thing” (Technical intelligence)				B How to do it?—— “Do it correctly” (Academic, emotional, analytical and creative intelligence)			C What kind of person to be?——“Do it by right people” (personal attributes)		
Level 2	Outcome 1	Outcome 2	Outcome 3	Outcome 4	Outcome 5	Outcome 6	Outcome 7	Outcome 8	Outcome 9	Outcome 10
Level 3	Subdivide the second layer of results									

The advantage of this presentation is that it not only clearly presents the learning results that students should obtain upon graduation, but also can compare and communicate the learning results between different majors, different training levels or different school positioning. Table 2 lists some basic differentiation criteria.

The distinction criteria in Table 2 provide a basis for the presentation of results by different types of colleges and universities. For example, both of them are students majoring in supply chain management. In terms of core competitiveness, research-oriented undergraduates focus on academic skills and students' creativity, while application-oriented undergraduates pay more attention to skills required by the industry and cultivate students' ability to apply knowledge. Therefore, there will be obvious

ISSN 2663-8169 Vol. 5, Issue 12: 6-14, DOI: 10.25236/IJNDE.2023.051202

differences in learning results between them. Even if they are application-oriented undergraduates, they will have different requirements on student training due to different local economic development and school-running characteristics. Similarly, in terms of vocational level, the description of vocational level of application-oriented undergraduate universities may be "able to handle different tasks in different environments, and apply deep knowledge, technology and other skills in certain fields. Working under limited guidance and being able to plan and supervise the work of others ". However, the description of vocational level in research-oriented undergraduate universities may be that "the functions include planning, budgeting and strategy, and be responsible for all aspects of others' work". Obviously, this puts forward higher requirements for students to independently develop and master a series of knowledge and skills.

Table 2: Comparison of learning outcomes in different domains of the three-circle model

Type of result Criterion of distinction	A "WHAT"	B "HOW"	C "WHO"
Core competence	All students should be proficient	Core competencies (which are open-ended and separate good people from the rest)	Excellent practitioners with the most personal traits
Knowledge	Basic theories, principles and methods	Understand the comprehensive application of basic theories, principles and methods	Knowledge of the basis of one's future development
Teaching and learning	Acquire knowledge and skills through teacher teaching	Reflection and discussion, such as group learning and problem-based learning	Role play and student-centered learning
Evaluation	Evaluate mastery at a specific point in time	Developmental assessment of student change and growth	Comprehensive development assessment of students' professional growth
Level of occupation	Position and basic requirements	The ability to be qualified for the relevant occupation	Personal traits required for career development

These criteria can vary depending on the requirements. For example, we can also distinguish the educational results of different types of learners from the aspects of judgment in work, application of theoretical knowledge, complexity of tasks, supervision and responsibility for others, creativity and so on. Therefore, the clearer the understanding of these standards by educators, the more helpful it is to classify the learning outcome, so that the designed learning outcome framework is more suitable for the special needs of college talent training, and also provides a strong support for the rational development of curriculum.

4. Application of curriculum development framework model in supply chain management major

4.1 Present learning results

There have been many researches on the demand of supply chain management ability at home and abroad. Based on previous studies, this paper determines the learning results of the supply chain management major of a university in Wuhan by referring to the APICS Supply chain competency model and China's National Vocational Skill Standard for Supply Chain Managers [17] and combining with its school-running positioning and school-running characteristics (as shown in Table 3).

Table 3 is an improvement on the learning outcome framework of Table 1, which not only reflects the level of students' ability requirements, but also reflects the relationship between stages and progressive development of learning outcomes. According to the three dimensions of the "three-circle model", the author divides the learning results into 11 key abilities, among which the inner circle reflects what students can do upon graduation, including the ability of supply chain execution, planning and planning at three levels, as well as the basic communication and information abilities required by managers. The middle circle puts forward the requirements for students to complete the task. These requirements are the embodiment of students' profound internalization ability, involving professional ethics, comprehensive application of knowledge, professional thinking ability and innovation ability. The outer circle is the prospect of students' personal development, including professional roles and personal attributes. On this basis, the author divides the four-year training time of undergraduates into three stages and subdivides 11 key abilities according to the relevant regulations of the school's talent training requirements, so as to reflect the requirements of each learning stage on relevant abilities. As for the learning results of the subdivision of the third layer, each school can explain in detail according to the needs, so as to reflect the differences in the training of different types and levels of students in different colleges and universities. It will not be further elaborated here for space reasons.

ISSN 2663-8169 Vol. 5, Issue 12: 6-14, DOI: 10.25236/IJNDE.2023.051202

Table 3: Supply Chain Management undergraduate learning outcome framework

Level 1		The right thing					The right method				The right person	
Level 2		SC execution	SC design	SC planning	Communication and exchange	information ability	Attitude, moral understanding and legal responsibility	Knowledge of basic science, social science and management engineering science	Reasoning, judgment and decision making skills	innovation ability	Role in the profession	personal attribute
Level3	Phase 1 (Term 1, 2, 3)	Basic procurement process; Basic functions of logistics	demand forecast	The relationship between enterprise core value, mission, vision with strategy	Ability to listen,use appropriate communication skills; Oral presentation ,writing report/paper	Managing information record; Accessing data sources; Basic information technology; Computer application skills	Integrity; Maintain a positive, supportive and appreciative attitude; Be willing to accept responsibility and take responsibility for your actions	Reading and writing comprehension; Mathematics, statistics and analytical thinking; Applied science and technology; Fundamentals of business management; Fundamentals of Business Economics	Goal-oriented thinking and action; Break down behaviors and thoughts; Be able to prioritize things	Curiosity; A strong thirst for knowledge; Force of action; The courage to break the mold	Supply chain management system; The code of conduct of the profession; Requirements for personal attributes	reflective ability; A responsible practitioner; self-management ability for Physical and mental; Self motivation ability
	Phase 2 (Term 4, 5, 6)	Relationship management; Demand management; Order fulfillment; purchasing management; Inventory management; Transportation and delivery strategy; Warehousing and distribution management; material Control; Reverse logistics; Plan implementation and support; Apply lean management tools; Project management		Decompose supply chain strategic objectives; Supply planning; Demand planning; Inventory planning and control strategy; Sales and operations plan; Production and operation plan; Location of production and service facilities; Supply chain performance evaluation	Communicating with customers and suppliers; Communicating with colleagues; Communicating with government; Conflict management; Team work	ERP system; Business Data analysis; Data mining; Big data visualization technology	Proper professional attitude; Basic ethical codes and standards; Demonstrate legal responsibility in your area of responsibility; Multicultural social practices; Focus on the impact of social development and changes in the economic environment	Logistics management; Supply chain Basics; Operating management; Risk management; Technical methods for process improvement; Techniques and methods to enhance the quality management system	Reasoning for supply chain management problems; Evidence-based decision-making ability; Choose appropriate methods of quantitative thinking and communication; Ability to deal with uncertainty and error in decision making	Be able to elaborate, adapt, change/improve your own or others' ideas; The ability to keep learning	Roles and responsibilities of supply chain managers; Roles and responsibilities of supply chain researchers; Roles and responsibilities as a teacher or mentor; Roles and responsibilities in the management team	Self-learning ability; Career planning ability
	Phase 3 (Term 7, 8)	Cross-functional management	Supply chain collaborative planning; Supply chain Network design	Supply chain planning and layout	Communicating as an organizer and manager	Supply chain system simulation; Development trend and impact of information technology	Promoting supply chain management	Methods and strategies to enhance supply chain flexibility and resilience	Systems thinking; critical thinking	Ability to use techniques and methods creatively; Transforming ideas into products or services through action	Professional certification	Dedication to the profession

4.2 Construct the course structure

From the learning outcomes presented, supply chain managers require a very wide range of knowledge, skills and capabilities to enable them to coordinate and manage some or all of the processes (activities) in the product lifecycle. To be specific, the following points should be considered in the course design:

(1) They must understand the different concepts used in the field of logistics and supply chain management, technology and tools, and information support system.

(2) They both to manage the function, also can undertake cross-functional cooperation.

(3) They need both business knowledge, but also need technical knowledge.

ISSN 2663-8169 Vol. 5, Issue 12: 6-14, DOI: 10.25236/IJNDE.2023.051202

(4) They need to contact the international problem, environment and macroeconomic problems, also need to know these questions related legal structure and regulations.

(5) They need to have a lot of soft skills (social, communication, language...), subject specific knowledge and industry skills are also required.

(6) They both need to understand the theoretical knowledge of supply chain management, also need to get real world experience.

The key is how the above points can be combined in structuring the curriculum to help students achieve their learning goals. Here we use a matrix to show the course structure (As is shown in Figure 5), and learning outcomes are the basis for defining this matrix.

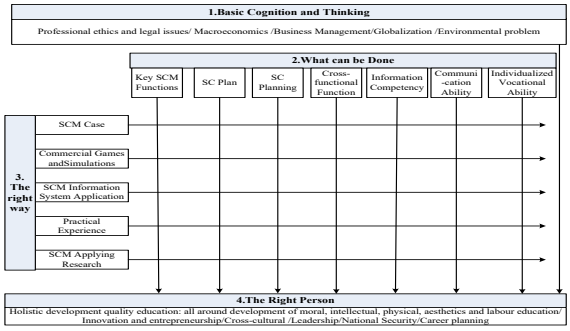

Figure 5: Curriculum structure of supply chain Management major

The first part of the curriculum structure is the general education course, which cultivates students' basic cognition and thinking, including the understanding of professional ethics and legal responsibility, the understanding of the world situation, macro-economy, globalization issues and environmental issues, as well as mastering basic reading and writing methods, and forming basic mathematical, statistical and analytical thinking.

The part 2 takes a linear functional approach to the broad areas that comprise supply chain management capabilities, including supply chain execution, planning, and programming, as well as concepts, technologies, tools, and information support systems associated with the supply chain management discipline. In this section, we also discuss how these concepts and information support systems overlap and are applied in the supply chain. In addition, given that SCM is a cross-functional discipline, other business functions (finance and accounting, marketing, human resource management, etc.) are also included. Finally, students can also choose some elective modules to meet their individualized career development needs.

The part 3 takes a process approach to building an integrated applied curriculum that enables students to use different concepts and technologies to solve relatively complex business problems in an interdisciplinary and cross-functional manner. Classic supply chain examples, business games and simulations, and applications of supply chain support systems develop SCM's cross-functional capabilities and show how different functional disciplines interact with them. Students are also required to design supply chain systems using Excel, Flexsim and other tools to gain basic supply chain planning and design capabilities. In addition, in order to allow students to gain real experience, we designed a spiral progressive practice course from primary cognition to professional practice, and then to comprehensive application, including: conducting social research to understand the needs of the society for this major; Visit different business units of the company to help students understand how supply chain management concepts and techniques adapt to different business environments; Invite supply chain managers to share with students how to realize supply chain management ideas in the production practice of enterprises; Enter the enterprise production practice, experience the application process of supply chain management thought. Finally, students need to do some applied research to fully understand the connection between theory and practice.

The part 4 is to help students understand their role in career development and develop their personal attributes through holistic development quality education courses to achieve the "right person" to do the right thing.

5. Conclusion and Prospect

Based on the concept of OBE and the "three-circle model", this paper constructs the framework model of higher education curriculum development, and applies the model to the undergraduate major

ISSN 2663-8169 Vol. 5, Issue 12: 6-14, DOI: 10.25236/IJNDE.2023.051202

of supply chain management in an application-oriented university in Wuhan. This model is a general structure which can be applied to different types and levels of higher education curriculum development. In the process of applying the model, a matrix structure is proposed to show how to design the course structure according to the learning results, which provides a reference for universities to develop appropriate courses with characteristics. However, it is limited by the author's research ability. In the development of supply chain management undergraduate courses in this paper, the learning results of students come from previous research literature and related documents, and refer to the opinions of enterprises and scholars, but there is no systematic and in-depth study of social needs and expert opinions, which may lead to a certain deviation from the actual learning results. In future studies, we can try to make a quantitative analysis of social needs and expert opinions on the basis of the research conclusions of this paper, and combine with the development of this discipline to form more accurate learning results.

Acknowledgement

This work was supported by the Education Planning General Project in Hubei Province (No. 2020GB141) ; The Logistics reform teaching and research project of China Society of Logistics (No. JZW2020154) ; The Key research project of Wuhan College (No. KYZ202003).

References

[1] Spady W. D. Outcomes based education: critical issues and answers[M]. Arlington, VA: American Association of School Administration, 1994.
[2] D Prideaux & A Lyons-Reid. Is participation in curriculum change sufficient? Towards a culture for change in medical education[J]. Focus on Health Professional Education, 2000, 2(1), 58–66. https://search.informit.org/doi/10.3316/aeipt.118711.
[3] Harden R.M., Crosby J.R. & Davis M.H. AMEE Guide No 14: Outcome-based education: Part 1:An introduction to outcome-based education[J]. Medical Teacher , 1999, 21(1):7-14.
[4] Churi P, Mistry K, Dhruv A, et al. Alchemizing education system by developing 5 layered outcome-based engineering education (OBEE) model[C]//2016 IEEE 4th International Conference on MOOCs, Innovation and Technology in Education (MITE). IEEE, 2016: 338-345.
[5] Bai J, Xie Y R, Li W, Wu L H. Research on Structure Model of online Open Course Resources based on OBE Concept in the era of "Internet Plus" [J]. China Audio-Visual Education, 2017(01): 64-70.
[6] Wang X X, Liu W T. MOOC course design and case analysis based on OBE concept [J]. Journal of Distance Education, 2017(06):104-110.
[7] Gammelgaard B, Larson P D. Logistics skills and competencies for supply chain management [J]. Journal of Business logistics, 2001, 22(2): 27-50.
[8] The Association for Operations Management (APICS). APICS Supply chain manager competency model[R/OL]. [2021-01-15]. https: //I aphl. org/ resources/ publications/ competency- model- apics-supply -chain-manager-r05/
[9] Ballou R H. The evolution and future of logistics and supply chain management[J]. European Business Review, 2007. 19(4):332-348.
[10] Bak O, Boulocher-Passet V. Connecting industry and supply chain management education: exploring challenges faced in a SCM consultancy module[J]. Supply Chain Management: An International Journal, 2013, 18(4): 468-479.
[11] Bandyopadhyay J K. Developing a model for a supply chain management major in a United States university in the new millennium[J]. International Journal of Management, 2004, 21(1): 67-76.
[12] Hong J T, Xu Y M, Li X. Research on the Competency of International Logistics and Supply Chain Talents Based on ISM and MICMAC Analysis [J]. Supply Chain Management.2021(12):85-98.
[13] Shou Y, Wang W. Multidimensional competences of supply chain managers: an empirical study[J]. Enterprise information systems, 2017, 11(1): 58-74.
[14] Van Hoek R I, Chatham R, Wilding R. Managers in supply chain management, the critical dimension [J]. Supply Chain Management: An International Journal, 2002, 7(3): 119-125.
[15] Killen R. Teaching strategies for outcomes-based education (2nd Edition) [M]. Cape Town: Juta and Company Ltd, 2007.
[16] Otter S. Learning outcomes in higher education[M]// J. Burke (Ed.). Outcomes, learning and the curriculum. London; New York: Routledge, 1995: 273-284.
[17] Ministry of Human Resources and Social Security of the People's Republic of China. National vocational skills standard (supply chain management) [S/OL]. [2021-01-15]. https: // px. class. com. cn/ search/index/index.