

The Mode of Theoretical Knowledge and Practical Knowledge Combination: The Significance of Internship

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Abstract

In China, the conflict of university talents training program and market demands is increasingly attracting public attention. In order to satisfy the markets, the graduates should have abilities of combining theoretical knowledge with practice. Aiming at the issue of combining theoretical and practical knowledge, this paper takes construction management major students in HNCU as the case to expand research. Based on quantitative study, this paper extracts 3 themes and 10 subthemes through recorded sentences and paragraphs. With further definition of each theme, this paper constructs a theoretical mode consisting of 4 stages in exhibiting the combination processes of theoretical and practical knowledge. Internship provides the platform for students to touch authentic context. Students participating in internship must learn to face random matters which less likely to happen during their traditional theory study. So in these 4 stages, internship plays key role in pulling and pushing the combination of two kinds of knowledge.

Keywords: Theoretical knowledge, Knowledge combination, Internship

1. Introduction

The last two or three decades have seen an expansion of universities' involvement in the development of the existing workforce through means such as part-time in-service courses. The high development of information technology calls for new working style, which in turn requires the doers have abilities both on solving standardized tasks and coping with emerging problems under different contexts. For training qualified workers, universities should focus on sustainable expertise construction and reconstruction (MacLeod, 1996). Some high practice-based majors, such as construction management, are urgently needed to explore the path to combine theoretical knowledge and practical knowledge to meet variable environment. In order to fulfill the combination, some scholars built a simple combination processes: through knowledge dynamics (Hager & Gonczi, 1996), the holders can not only accumulate existing formulized knowledge, but also explore the possibilities of combining accumulated knowledge with certain context. So, combination process includes both knowledge accumulation and different knowledge combination. As for graduates, we can draw that they should satisfy two requirements: first, they must have knowledge accumulation (we consider it as the knowledge structure for every graduate); the other is the ability to combine knowledge with context (we consider it as dynamics for every graduate). In China, the university educational system is seriously affected by classical educational ideology, so knowledge transferring attaches great importance on DAO (theory) while ignoring SHU (practice), and receivers are only required to know basic rationales. Besides, confined by facilities, some universities cannot provide enough platforms to accommodate students to touch authentic environment. For the insufficiency in China's educational system, this paper thinks taking internship is an effective channel to experience authentic context, and it is beneficial to improve the dynamic ability of combining two kinds of knowledge. In order to explain the mechanism of knowledge combination, this paper introduces a case from a regional university in central part of Chinese mainland. Based on interviews with students from construction management major in that school, this paper adopts qualitative research method to build a mode of combination of theoretical knowledge and practical knowledge with the aid of internship, in order to explain the mechanism of two kinds of knowledge combination.

2. Literature Review

Theory is an inherent part of how we interpret and understand the world around us, and the knowledge transferring is through inherence and creation in the form of code. Generally speaking, traditional education emphasizes the teachers' guidance and related coded knowledge (or explicit knowledge) transferring to import coded knowledge to students (Eraut, 2000). For the standardized and coded knowledge transferring mode, traditional education is always seen as theory education, and the quantity of theory determines students' knowledge accumulation. While practical knowledge pays more on skill education, i.e., "how to do" ability. Unlike the highly abstracted theory, practical knowledge is tightly connected with unique context and highly task-based, so it is the reflection of authentic working situation (Lave, 1996). Generally, practical knowledge is less likely to be coded, but it can be illustrated as a process: decision, planning, implementing etc. (Kieran Setiya, 2009). The practitioners of practical knowledge must have the comprehensive abilities of rethinking, criticizing and sensing (Bereiter et al., 1993). Because of the dynamic ability requirement, practical knowledge cannot be taught in classroom, so a complete knowledge structure containing practical knowledge and theoretical knowledge must be hierarchical, multi dimensional and dynamics (Ian M. Kinchin, 2011). However, theoretical knowledge and practical knowledge are very different in attributes, especially in obtaining method and application modes, the scholars are searching for the best means to integrate them into same educational system. The holders of theoretical hierarchy emphasizes that different educational purpose needs different kinds of knowledge, and theoretical knowledge and practical knowledge are two hierarchies of the same educational system (Jo Corlett et al., 2003). Christensen (2011) thinks theoretical knowledge and practical knowledge are the results of knowledge fulfillment, so it is necessary to build a sharing mechanism in two kinds of knowledge. As for educational knowledge adoption, educational researchers prefer more on theoretical knowledge, while educational parishioners propose to combine them (Samo Pavlin et al., 2010). Besides, knowledge acquirement is one step to form expertise for future use, universities need to further design mechanisms to motivate the students to combine scattered knowledge together (Nina Katajavuori et al., 2006). Even more, some scholars divide a given course into theoretical and practical components to suit for the course function, in order to meet the student demand in various knowledge structure (Karl Maton, 2009). For detailed solution, Martin Niss (2012) builds a three-stage mode to divide course's knowledge components: the question description and analysis, the alternative formation and the alternative effectiveness appraisal. Nowadays, in China's context, more and more jobs need the graduates have both theoretical foundation and practical skills, so the universities need to train two kinds of knowledge into one person (Belinda Dello Iacovo, 2009).

Construction management is a disciplinary endeavoring in coordinating construction project's material, manpower, money, machinery and environment (4M1E) through knowledge from engineering, management, law and economics. For its characteristics in comprehension and application, scholars pay much energy on digging out the best knowledge management method. Many construction engineering educators and construction industry leaders realize the value of establishing effective, working industry-university partnerships. The degree to which construction engineering graduates are prepared to perform well in practice can be enhanced by effective industry-university cooperation on such matters as the construction education mission and objectives, curriculum, course content, faculty qualifications and development, resources, co-ops and internships, and other issues (Robert K. Tener, 1996). Bolivar A. Senior (1998) presented simulation and gaming, case-based instruction, and internships as most important approaches to infusing practical components into construction education.

The literatures gave detailed analysis on the features of theoretical and practical knowledge, the knowledge acquirement methods and the function of different knowledge categories on students' expertise. However, existing studies did not give detailed internal structure of whole knowledge system, so the mechanism of different knowledge interaction is not clear. We should firstly know sources and the relations of two kinds of knowledge, and then can find out the approaches to combining them together. So, building a mode containing the sources, the relations and the combining processes of two kinds of knowledge is essential in explaining the mechanism.

3. Method and Data Analysis

Qualitative research is a method of inquiry employed in many different academic disciplines, traditionally in the social sciences. Qualitative researchers aim to gather an in-depth understanding of human behavior and the reasons that govern such behavior. When related theory is not matured, the qualitative method explores why and how of decision making. Hence, smaller but focused samples are more often needed than large samples. Qualitative researchers typically rely on participant observation, field notes, semi-structured interview, unstructured interview, and analysis of documents and materials to collect dates. In our study, we choose focused sample to test the relations of two kinds of knowledge and their combination processes.

3.1 Backgrounds

HNCU is a regional university in central Chinese mainland. As for the disciplinary setting, this school has advantages on training students in architecture, construction, urban planning and civil engineering. Graduates are required to have certain theory foundation and practical skill. For 4-year training program, this school assigns 8 weeks to students to take internship in the end of third year of university program. In this school, 525 students take the major of construction management.

3.2 Sampling

According to qualitative study, we focused the sample to the third-year construction management major students of HNCU. In order to measure the students' knowledge structure and the function of internship on knowledge combination, we organize an semi-structured interview on the students who finished their internship.

There are 3 ways for the students to take internship: by students or their families social relationships, by school's recommendation, by some teachers employment. But all selected internship sites must be reviewed by supervisors assigned by school, in order to guarantee internship is closely correlated to theoretical foundation. All students are required to make paper form records, detailing what they did during internship.

The sampling process has two stages: the first is to check all paper form records, examining the students' working contents and related work posts. For the unqualified records, we eliminated them from sampling. After this stage, we got 98 samples. The second stage is to inquiry information from students' supervisors, checking the truth of submitted paper form records. After these two stages, we finally select 47 students as the interviewees (Table 1).

<Table 1 about here>

3.3 Data collection

According to qualitative analysis clue, we take the processes as shown in figure 1 to organize data collection and data analysis.

<Figure 1 about here>

The topic framework is constituted as recommendation of Patton (1990): all interviewers must have some acquaintance of construction management major, such as what courses the interviewees have finished, to what extent the interviewees have theoretical foundation. The semi-structured questionnaire is designed with the reference to Robert K. Tener (1996), Bolivar A. Senior (1998), Eraut (2000), Nina Katajavuori et al.(2006), etc.. all interviews are required to give their judgment within questionnaire, and describe their experience in scoped titles. The whole interview process is recorded by audio recorders. After the interview, we check the audio records with the interviewees' paper form records from internship and examine the consistency of two records.

3.4 Data analysis

The data is from the records from internship and interviews. Though researchers widely use principle component analysis to extract themes, we can not extract any principle component in this case. Because of limited samples and focused case, we take keywords categorization as the main analysis method. The theme definition is based on keywords analysis. We summarized the interview information and the records from internship, and put highly correlated paragraphs and sentences together, categorizing them under the same theme. We only choose the keywords which repeatedly appear more than 1/3 of the total. Based on the repeated analysis, we make out table 2, table 3 and table 4 to illustrate different themes (the number in bracket is the times appeared in records).

<Tables 2-4 about here>

From the 3 theme tables, we know that interviewees recognize the significance of internship on bridging theoretical knowledge and practical knowledge. As shown in tables, we can further divide the theme into 5, 3 and 3 subthemes. Now we give explanation of 3 themes and 11 subthemes according to related sentences.

The significance of internship

Almost all students think internship is very useful in acquiring knowledge, especially in bridging the theoretical and practical knowledge. Through internship, they can authentically feel the process of combining two kinds of knowledge, and get to know the defects and scarcity in their own theory study. Based on further analysis, this theme can be divided into 5 subthemes:

Practical knowledge perspective: reflecting the attitudes on knowledge formation for students after their internship experience. From related sentences analysis, students admit that practical knowledge is very different from theoretical

knowledge and internship is good means to touch authentic context, they generally form good attitude on internship and its function on acquiring practical knowledge.

Communication skills: reflecting internship providing more opportunities for students to communicate with other stakeholders, making students' coded knowledge transfer into tacit knowledge. For lots of skills required, construction management need more on tacit knowledge, so internship plays the role in aiding knowledge transferring.

Behavioral mode: reflecting the formation of stable behavior choice when students are facing matters. This stable behavior mode is the result of combination and optimization of theoretical knowledge and practical knowledge. Because construction management actually is the product of comprehensive knowledge combination, students must learn to form a comparatively stable behavior mode to simultaneously copy with matters.

Experience: reflecting the features of practical knowledge. In order to acquire practical knowledge, doing more practice is the only choice, so when students are confined in universities, the platform of internship is a very probable option to acquire practical knowledge.

Group study: reflecting the gathering study mode of practical knowledge. Not like systematic knowledge, practical knowledge is based on specific context, and it is easily affected by many factors. So, individuals need to communicate and cooperate in the practical knowledge study. If a student can get the chance to take internship, he can actively sense the direction of integrating owned knowledge, and get more chance to take part in group study.

The relations of theory and practice

This theme indicates that the students totally understand the process of building whole knowledge structure. Because whole knowledge structure contains theoretical and practical parts, the students should not only know the relations between two kinds of knowledge but also know how to combine them into problem solving. With the aid of qualitative analysis, this theme can be divided into 3 subthemes:

The combination of theory and practice: reflecting the students sense the importance to combine two kinds of knowledge and actively search for the combination channel.

The significance of theoretical knowledge: reflecting the students admit the basic function of theoretical knowledge, and they stress good theoretical foundation can shorten their practical knowledge study period and strengthen their understanding of practical knowledge rational.

Knowledge application: reflecting the students' attitudes on their knowledge structure and related behavior choice. Though two kinds of knowledge are separated in their education processes, the authentic context requires them to skillfully combine both into guide the practice.

Knowledge development appraisal

This theme focuses on students' appraisal on their future jobs after they are motivated by factors arising from internship. Related sentences indicate that most students know that though practical knowledge can be directly put into practice, it is firmly confined to given situation, so practical knowledge is not widely applicable as theoretical knowledge is. Furthermore, without theoretical knowledge as the base, practical knowledge has no potential to sustain. So, the option should be consolidating theoretical foundation and simultaneously taking part in practical jobs to quicken the combination of two kinds of knowledge. Based on the theme, this paper refines 3 subthemes:

Knowledge level: reflecting the students knowing their own knowledge structure after internship. Related date shows that most students can clearly find their knowledge is insufficient, both in theoretical and practical. In this process, internship helps them to remedy the insufficiency.

Self management: reflecting the students taking corrective actions to compensate insufficiency in their knowledge state. With the aid of internship, students change traditional education mode of passively acquiring knowledge to positively explore the channels of combining theoretical knowledge and practical knowledge.

Motivation enhancement: reflecting the attitudes the students hold when they realize their insufficiency. Not like traditional motivation from teachers or schools, with the deep touch with truth, students feel they can master the knowledge in facing of reality.

4. The Combination Mode

Based on date analysis and theme refinement, we can construct a mode as showing in figure 2. This figure shows the combination processes of theoretical and practical knowledge with the aid of internship.

In the initial stage, the student has separated theoretical and practical knowledge. For lacking of platform, two kinds of

knowledge cannot find the conjunction point. Generally, in Chinese traditional education system, we can take the first 1-3 years program in the university study when not containing internship or other practical courses as the initial stage.

The second stage is the introduction of internship. With the introduction of practical situations, students are active (or positive) in searching for clues to solve authentic matters. This process help students build correct behavior mode and attitude to practical knowledge, making them accept new environment, which are very important to step into practical environment. So, this stage demonstrates that internship functions as a puller in seducing the combination of theoretical and practical knowledge.

After internship (which is illustrated in stage 3), students can basically analyze their own knowledge level, taking communicative study under given context and applying acquiring knowledge to detailed matters. So, they can fulfill the combination of theoretical knowledge and practical knowledge. Therefore, related knowledge level is significantly improved because it contains the knowledge from initial stage and knowledge dynamics from the second stage.

Because internship is only a trial before graduation, students will only partly own the knowledge for authentic contexts. So, another significance of internship is to motivate students knowing their knowledge insufficiency and think over related measures to make up the insufficiency. So, we can declare that internship plays as a pusher in strengthening the combination.

If motivated properly, students will greatly improve their knowledge ability on a given context, and learn to consider initial knowledge structure, so as to explore more possibilities on the combination of two kinds of knowledge as to improve their whole knowledge structure (shown in the stage of appraisal).

<Figure 2 about here>

5. Conclusion and Suggestions

In China, the contradiction of purpose of university training program and market demands is increasingly attracting public attention. What and how universities modify their graduates training program are critical problems for both university administration and academic researchers. In order to satisfy the markets, the graduate should have abilities of combining theoretical knowledge with practice. Aiming at the issue of combining theoretical and practical knowledge, this paper takes construction management major students in HNCU as the case to expand research. Based on quantitative study, this paper extracts 3 themes and 10 subthemes under numerous sentences and paragraphs. With further definition of each theme, this paper constructs a mode consisting of 4 stages in exhibiting the combination processes of theoretical and practical knowledge. Though all students have their own knowledge since beginning, most knowledge is scattered, and the students cannot understand how to apply the scattered knowledge into practice, especially under various contexts. Internship period is a part of university program, it provides the platform for students to touch authentic context. Students participating in internship must learn to face random matters which less likely to happen during their traditional theory study. They are required to combine two kinds of knowledge into practice. So in these 4 stages, internship plays key role in pulling and pushing the combination.

Though the case is based on construction management major in a regional university, the explorative mode can represent the features of applicable majors in China's universities. As for administrative suggestions: first, the universities should create more internship opportunities for students, especially adopting internship authentically reflecting future work conditions; second, the universities should endeavor on appraisal of theoretical knowledge selection, eliminating or updating some theoretical knowledge which cannot give efficient guidance on practical requirement; and third, the universities should put more efforts on training students knowledge management abilities, especially the abilities of absorbing and applying knowledge, so as to make students fully mobilize their internal and external knowledge elements.

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Table 1. The descriptive statistic of sample

Items	Features	Sample	Percentage
Gender	Female	22	46.8%
	Male	25	53.2%
Theoretical scores ranks	The first 30%	20	42.6%
	The middle 40%	24	51.1%
	The last 30%	3	6.4%
Internship experience	None	19	40.4%
	One time	18	38.3%
	2 times or more	10	21.3%

Internship site	Construction party	27	57.4%
	Designing party	2	4.3%
	Owner party	2	4.3%
	Engineer party	5	10.6%
	Consulting party	8	17.0%
	Others	3	6.4%
The posts	Cost management	18	38.3%
	Site management	12	25.5%
	Internal affairs management	8	17.0%
	Consulting management	5	10.6%
	Others	4	8.5%

Table 2. The significance of internship

Theme	Related sentences
Practical knowledge perspective	I can basically form the construction management thoughts during my internship period. (17)
	I can get in touch with lots of construction management staff and their working environment, which I hardly understand during my theoretical knowledge study. (20)
	I can learn a lot in my internship. I can easily see many construction management members communicate with other experts. These communication skills can not be learned in classroom. (26)
	Internship provides me opportunities to know authentic working environment and skills. For the first time I filled the bidding documents, and calculate the bill of quantities. If I didn't take internship, I will be so blind on these jobs. (37)
Communication skills	There are many communications in construction management, such as the communications between designer and constructor. These communications are project-specific, so it's hard to learn in words. (17)
	It is so important to communicate with owners. Some owners are not construction experts, so we need to explain our intention to them, and advice them to accept our design. (16)
Behavioral mode	At the beginning of internship, I used to utilize my construction management theory to copy with matters. But now I changed my solving clues. I will first do more study on the problems themselves, and then think over to find the solutions. Internship changed my behavior mode. (31)
	When I was in my school education, I paid so much attention on technological issues; I even believed every thing has its technology connotation. But now I will paid more time on stakeholders' demands. Only after I know their demands clearly, I will seek for technological solutions. (17)
Experience	I have some scattered practical experiences. After internship, I can integrate the experiences together and find that my ability to maneuver scattered knowledge increased. (28)
Group study	I always mimic others behavior during my internship(29)
	I can learn a lot skills by seeking for matured workers(27)

Table 3. The relations of theory and practice

theme	Related sentences
The combination of theory and practice	I have built the whole impression of construction management jobs through internship, it will be very beneficial for my future job. (23)
	When I recollect the theory that I studied before, I find it is even more interesting. (16)
	I surprisingly found that the theoretical knowledge appeared in construction management jobs, though it was randomly appeared. If I can do practical jobs during theoretical knowledge study, all things will be much easier. (19)
	Internship makes me to improve abilities on telling theory distinction; I can tell you what theory is more useful in practice. (39)
The significance of theoretical knowledge	I cannot cope with my internship job if I have no theoretical knowledge, because cannot understand the rational of construction management issues. (19)
	I prefer to do the jobs where I have more advantage on its theory. (40)
	I met lots of troubles during my internship. Now when I recollect the internship process, I find that what troubled me most is where my theory lacks. (34)
Knowledge application	When I met problems, my solving clue is to think whether I have learned in my class, then to seek for help from others. (19)
	I can easily touch the cases where theoretical and practical knowledge met. If I need help, I will seek to the ones who have strong theory foundation and long time working experience. (21)
	I think if I work longer, I can put my theoretical knowledge into practice. (33)

Table 4. Knowledge development appraisal

Theme	Related sentences
Knowledge level	My knowledge is weak, especially when I was required to communicate with other parties. For example, when I do cost calculation, I need to analyze the building structure. I find it is less likely to learn both well in a short time. (24)
	I am pleased to find out that I have some basic knowledge of construction management. Though it is not systematic, I can integrate it in a short period through practical jobs. (18)
	I know I have mastered some knowledge, which is so necessary for my future job. I also know clearly what my weakness is. (17)
Self management	Before my internship, I am pushed by my teachers. But now I have clear plan for my further study. I will make some plan before my action, especially when skills are required. (16)
	I think it is very necessary to improve self-study ability, and build good personal attitudes. (18)
Motivation enhancement	I am so eager to learn as more as possible, especially the knowledge which is truly used in construction management. (25)
	I think it is worthwhile to endeavor in internship. I can consolidate my knowledge foundation, and my continuous education will be more efficient. (37)
	I think I have known the insufficiency of my knowledge, so my next step is to make up the insufficiency. (40)
	Of course, I greatly strengthened my confidence on my qualification and determination to be a good construction management member. (28)

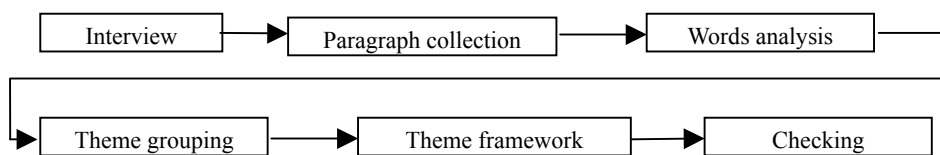


Figure 1. Analysis processes

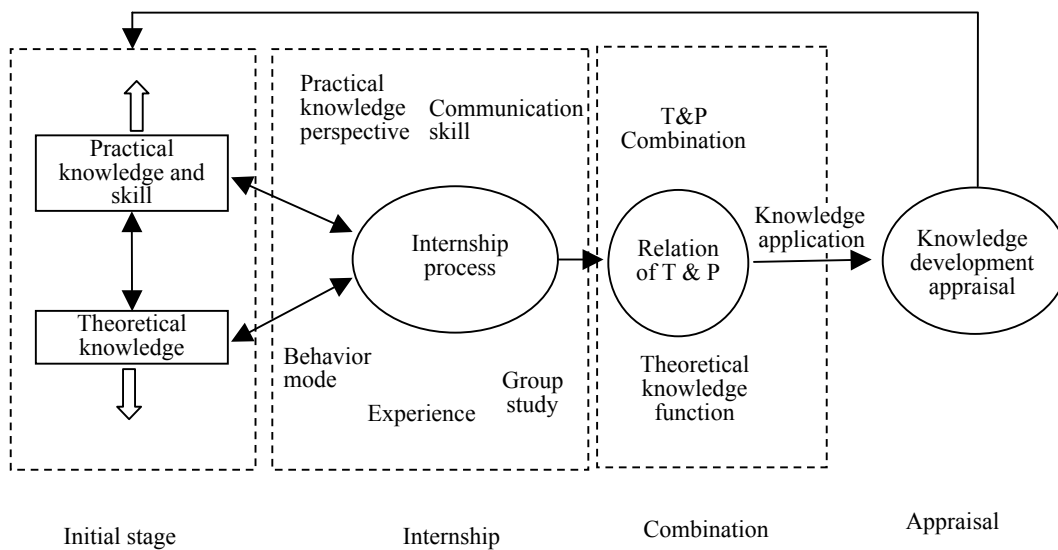


Figure 2. Theoretical knowledge and practical knowledge combination