A Knowledge Management Approach to Evaluation of Ability and Environment for Graduate Research

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ABSTRACT

This paper proposes a model of knowledge creation and knowledge validation for the research of postgraduate students, and then introduces an evaluation method on research ability and research environment based on this model. The paper reports the results of statistical analysis, using the data obtained by a questionnaire survey at a graduate school of computer science and technology. Among several discoveries, the great differences in the evaluation of research environment between teachers and students, and in the self-evaluation of research ability between female students and male students are noteworthy. It was confirmed that the proposed model and the evaluation method are effective for supporting research of graduate students.

KEYWORDS

Graduate Research, Knowledge Creation Model, Questionnaire Survey, Research Ability, Research Environment

1. INTRODUCTION

Evaluation of higher education institutions is usually done by objective and quantifiable indicators, such as the number of research papers, the amount of research funds, the securing of excellent students, and the employment situation of students, etc. The reason why the objectivity of evaluation must be ensured is to use it for public decision making, such as determining the amount of subsidies from the government.

On the other hand, however, it is difficult to evaluate the improvement of students’ abilities and the effect of research environment on ability improvement. Most of the literatures on the evaluation of educational institutions are the evaluation of courses and teaching (Dunegan & Hrvinak, 2003; Rahman, 2006), and the knowledge survey of the increase in knowledge amount of students (Feldman, 1998; Fink, 2003). However, the importance of graduate education is not only the increase in the amount of knowledge but also the increase in abilities of knowledge management and creation. This is exactly the motivation to promote this research.

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Knowledge management is a management method to systematically manage the process of discovering, accumulating, exchanging, sharing, creating, and utilizing knowledge as an asset of an organization such as a company (see, for instance, Davenport et al., 1998; Alavi & Leidner, 2001). Recent trends in knowledge management are described in detail in Dwivedi et al. (2011) and Iqbal & Mahmood (2012).

A number of studies on implementing knowledge management in school environment have been reported (Zhao, 2010; Leung, 2010; Chu, Wang & Yuen, 2011; Cheng, 2012). Studies that examined the SECI (Socialization → Externalization → Combination → Internalization) spiral, which is an organizational knowledge creation model proposed by Nonaka and Takeuchi (1995), in the educational sites are found in Joia (2002) and Wu, Lee & Shu (2013). These studies analyzed the strength and weakness of the SECI spiral model in training teachers and in transferring knowledge.

As knowledge management models for individual graduate students, although not as famous as the SECI model, some academic knowledge creation models were proposed in Wierzbicki and Nakamori (2006). Evaluations of these models were reported in Tian et al. (2009) and Sun et al. (2016). Whereas the SECI spiral is a knowledge creation model by a group, these are models of individual knowledge creation supported by a group.

In this research, basing on the above-mentioned models, we develop a normative model of knowledge management in graduate research, and try to quantify the abilities of students and the efforts of teachers, which are hard to evaluate quantitatively. Therefore, this paper first proposes a knowledge management model to promote knowledge creation and validation in postgraduate research. Then, the paper reports the analyzed results of a questionnaire survey on the research ability and research environment using the evaluation table derived from the model. This questionnaire survey was conducted from October to December 2016 at the School of Computer Science and Technology, Wuhan University of Technology in China.

One of the purposes of the survey is, in addition to the verification of the proposed model, to grasp the special situation of the respondents and support the promotion of better graduate school education by the self-evaluation of student’s growth and the evaluation of research environment provided by faculty. This paper reports two major discoveries in this survey. One is that the teachers were proud of the research environment they provided, but the students did not appreciate it. The other is that female students gave considerably lower self-assessment scores than male students.

Including other findings, we decided to feed back the analysis results to the graduate school teachers to use them for future education. In this way, the knowledge management model and the questionnaire on research ability and research environment based on it can contribute to graduate research.

This paper is organized as follows. Section 2 introduces a model of knowledge creation and validation for graduate research, called the three-stage EDIS spiral. Then, Section 3 introduces a list of questions that is based on this model, and a survey carried out a university in China. The results of data analysis will be given in Section 4, which shows the usefulness of the three-stage EDIS spiral model. Section 5 discusses the findings by this research, and Section 6 gives some conclusions and possible future research.

2. A KNOWLEDGE CREATION MODEL FOR GRADUATE RESEARCH

This section introduces a model of knowledge creation and validation for graduate research. But, before introducing it, we will review two existing knowledge creation models that form the basis of the proposal.

2.1. Existing Knowledge Creation Models

A famous organizational knowledge creation model called the SECI spiral (Nonaka and Takeuchi, 1995) is a theory that knowledge increases by changing its epistemological and ontological (or
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