Developing Industry-Oriented Teaching Materials for Industrial Safety Management

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Abstract

BACKGROUND

The flaw in traditional teaching methods results from its lack of close relations with industry. In comparison, industry-oriented education provides an approach for learning industrial perspectives (Wikipedia, 2010). Accordingly, the development of teaching materials for occupational safety and health education based on industrial perspectives would foster the safety professionals required by industries.

PURPOSE

The purpose of this study is to develop teaching materials for industry-oriented safety management. Specifically, we investigated the chapters and contents of various industrial safety management teaching materials based on industrial perspectives.

METHOD

Using a teaching materials review feedback form, 10 field experts reviewed the outline and content of the teaching materials. The reviewers assessed and categorized each chapter as either “accepted,” “to be revised,” or “deleted,” and provided their recommendations for revision.

RESULTS

The results showed that the content of the teaching materials, 16 sections were accepted by all the reviewers; 4 sections were accepted by 90% of the reviewers, with the remaining 10% recommending revisions; 1 section was accepted by 80% of the reviewers, with the remaining 20% recommending revisions; and 3 sections were accepted by 70% of the reviewers, with the remaining 30% recommending revisions.

CONCLUSIONS

Furthermore, the results of Pearson product-moment correlation and Spearman rank correlation analyses showed that the reviewers’ assessments regarding the outline and content of the teaching materials were significantly correlated (r = .880, p = .001; rho = .877, p = .001). This verifies that the teaching materials developed in this study possess industry-oriented characteristics.

KEYWORDS

Industry-oriented, safety professional, industrial safety management.

Introduction

Background and Purpose

Recently, university education has received copious criticism and numerous requests to reform resulting from rapid domestic social changes. Subsequently, curriculum reform has particularly attracted attention. Compiling teaching materials is a vital part of curriculum reform that profoundly affects the implementation of school curricula (Hwang, 2002). Tzeng (1996) contended that in addition to high-quality teachers and equipment, schools require high-quality curricula and teaching materials to cultivate talented students.

Jou (2005) indicated that from a micro-perspective, textbook teaching materials direct the implementing logic of teaching activities, critically influencing the learning opportunities and academic achievement of students. From a macro-perspective, textbooks are “an intersecting point of culture, education, publishers, and society,” in addition to “consumer goods, a medium of academic knowledge, and a guidance of ideology and culture.” Textbooks can positively or negatively influence society, the nation, and the world.

The problems that occur in the workplace are disparate compared with the problems students encounter in classrooms. Thus, learning to solve problems in the classroom does not necessarily prepare students to solve problems in the workplace (Jonassen, Strobel, & Lee, 2006). In general educational environments, teachers impart basic principles by using the traditional teaching method, subject teaching, in which subjects are taught based on knowledge required by the related discipline. Therefore, the flaw in traditional teaching methods results from its lack of close relations with industry. In comparison, industry-oriented education provides an approach for learning industrial perspectives (Wikipedia, 2010). Accordingly, the development of teaching materials for occupational safety and health education based on industrial perspectives would foster the safety professionals required by industries.

The purpose of this study is to develop teaching materials for industry-oriented safety management. Specifically, we investigated the chapters and contents of various industrial safety management teaching materials based on industrial perspectives.

The Contents of Industrial Safety Management Teaching Materials

Engineering, education, and enforcement management have long been applied to prevent industrial and traffic accidents. Safety engineering involves establishing a safe environment by applying scientific principles, and safety education improves the safe behavior of employees; safety management involves applying managerial functions to ensure that the environment and behaviors of employees remain at a satisfying level.

However, disputes concerning safety engineering practices arise because safety engineering is intended to eliminate hazards by applying scientific and engineering principles, particularly on whether safety engineering is a well-defined engineering discipline, the differences between safety engineer and safety professional, and educational requirements of becoming a safety engineer (Mroszczyk, 2009).

To settle these disputes, our teaching material focuses on safety management and safety education. Safety leadership, safety culture, and safety performance are core issues of safety management (Clarke, 2000; Mearns et al., 1997; O'Dea & Flin, 2003). Safety professionals play critical roles and functions in safety management (Cooper, 1998; Hale, 1995; Swuste & Arnoldy, 2003; Wu, 2011); therefore, increased attention should be paid to the professional competence of safety professionals and the content and curricula by which they are educated (ASSE, 2004; Chang, et al., 2012; Daud et al., 2010; Ferguson & Ramsay, 2010; Nakayama, 2012). Our teaching material contains six chapters: safety leadership, safety culture, safety performance, roles and functions of safety professionals, the competency of safety professionals, and safety curriculum.

Syllabi for Industrial Safety Management

Syllabi are a part of the discipline plan that state the titles, brief contents, and hours of courses (Yang, 1984). According to Kang (1994), syllabi simply provide a material outline of the contents of a given discipline. Therefore, industrial safety management syllabi must briefly describe the content and number of hours of a given subject. Based on the aforementioned industrial safety management content, we provide a list of unit titles, teaching objectives, and teaching hours.

Methods

Participants

The aim of this study is to develop industry-oriented teaching materials for industrial safety management. Accordingly, the reviewers of the teaching material must be able to identify whether the material is industry-oriented. Therefore, we invited five managers of industrial safety departments from Science Parks in Hsinchu and Central and Southern Taiwan to participate in the study. We also invited four university professors from the Department of Occupational Safety and Health to review the teaching materials and provide their comments regarding the subject matter. Additionally, considering the role of government in policy and research support (Ali, 2008), we invited a government industrial safety director to participate in the review. Thus, the study comprised 10 reviewers.

Research Tools

We provided the reviewers with a feedback form to examine the industry-oriented teaching materials for safety management. The review form contained two main sections: basic demographic information and comments. In the basic information section, the reviewers provided their gender, age, work experience, highest academic degree obtained, and the major of their highest academic degree. In the comment section, the reviewers evaluated each chapter as acceptable, modifications required, or to be deleted, and provided suggestions for adjustments.

Procedures

To conduct the study, we first informed the reviewers of purpose and procedure of the current study by e-mail, inviting them to participate. The review process included two stages: a review of material outlines and review of material content. In the outline review stage, we provided the reviewers with a set of material outlines and a review feedback form. After examining the comments of the reviewers, we modified the outlines and prepared the teaching material content. In the content review stage, we provided the reviewers with a draft of the teaching materials and a review feedback form. Again, after examining the comments of the reviewers, we modified the content, completing the teaching materials for industrial safety management.

Data Analysis

We adopted the statistical package for social sciences (SPSS 21.0) to complete a data analysis. The analysis involved the following steps: (a) illustrating the demographic data of the reviewers and the results of each assessment round by using descriptive statistics; and (b) conducting a Pearson product-moment correlation and Spearman rank correlation analyses to examine the correlation between the assessments of the reviewers on the outlines and content of the teaching material.

Results and Discussion

Demographic Data

We conducted two rounds of questionnaire surveys; the first round focused on revewing proposed outlines and the second round focused on reviewing the content of the teaching material. Both surveys were reviewed by the same 10 reviewers.

All 10 reviewers were men; five of the reviewers manage industrial safety departments, four are university professors in the Department of Occupational Safety and Health, and one is a director in the government industrial safety sector. The average age of the reviewers was 48.30 years (SD = 5.250) and the average years of work experience was 19.10 (SD = 6.297). For the education attainment of the reviewers, six (60%) had master's degrees and four (40%) had doctoral degrees. For the major of the highest academic degree obtained, five reviewers (50%) majored in industrial (occupational) safety and health, three (30%) majored in science, technology, agriculture or medicine, one (10%) majored in environmental engineering, and one (10%) majored in education.

Review of the Teaching Material Outlines

The teaching material we developed included six chapters: safety leadership, safety culture, safety performance, roles and functions of safety professionals, competency of safety professionals, and safety curriculum. Each chapter includes the following content: (a) Chapter 1, safety leadership: introduction, and the definition, dimensions, and evaluation of safety leadership; (b) Chapter 2, safety culture: introduction, the definition, dimensions, and the evaluation of safety culture; (c) Chapter 3, safety performance: introduction, the definition,

dimensions, and the evaluation of safety performance; (d) Chapter 4, the roles and functions of safety professionals: introduction, the roles and functions of safety professionals, and evaluations of safety roles and safety functions (titled the evaluation of roles and functions in the draft); (e) Chapter 5, the competency of safety professionals: introduction, the definition, dimensions, and the evaluation of the competency of safety professionals; and (f) Chapter 6, safety curricula: introduction, safety knowledge systems, and the development and content of safety curricula.

The reviewers proceeded with the review procedure based on the teaching material outlines and the review feedback form we provided. After the reviewers completed their assessment, they returned the review feedback form by mail in the provided stamped envelopes. The results of the statistical analysis indicate that nine of the sections were accepted by 100% of the reviewers, 14 of the sections were accepted by 90% of the reviewers (10% suggested modifications), and one of the sections was accepted by 70% of the reviewers (30% suggested modifications).

Overall, the reviewers offered positive feedback on the teaching material outlines. Except for the fourth section in chapter four, the evaluation of roles and functions (70% acceptance), the remaining sections and chapters obtained a high acceptance rate (greater than 90%). Based on the reviewer comments, we modified the title of the section into the evaluation of safety roles and safety functions.

Review of Teaching Material Content

The content of the teaching material developed based on the outlines contains 44,385 words; the number of words in each chapter is as follows: (a) Chapter 1, safety leadership: 7,307; (b) Chapter 2, safety culture: 6,068; (c) Chapter 3, safety performance: 6,769; (d) Chapter 4, the roles and functions of safety professionals: 7,503; (e) Chapter 5, the competency of safety professionals: 9,529; and (f) Chapter 6, safety curriculum: 7,209. The review outcomes indicate that 16 sections were accepted by 100% of the reviewers; four sections were accepted by 90% of the reviewers (10% suggested modifications), one section was accepted by 80% of the reviewers (20% suggested modifications), and three sections were accepted by

70% of the reviewers (30% suggested modifications).

Generally, the reviewers offered positive feedback on the content of the teaching material. Except the fourth section of Chapter 1, the evaluation of safety leadership (70%); the fourth section of Chapter 2, the evaluation of safety culture (70%); the fourth section of Chapter 3, the evaluation of safety performance (70%); and the fourth section of Chapter 5, the evaluation of the competency of safety professionals (80%), the remaining chapters and sections obtained a high acceptance rate (greater than 90%). Therefore, a “evaluation tool content” portion was added to these sections. Furthermore, the feedback from the reviewers included typo corrections and reference modifications to comply with the formatting guidelines of the American Psychological Association.

The Correlation between the Outlines and Contents of the Teaching Material

The results of Pearson product-moment correlation and Spearman rank correlation analyses show a significant correlation between the reviewer evaluations of the outlines and the contents of the teaching material ($r = .880$, $p = .001$; $rho = .877$, $p = .001$). Notably, reviewers provided positive feedback of the teaching material content when their feedback on the teaching material outlines was positive. An outline is the main framework of the teaching material that provides an overview of the subject content. Therefore, material outlines that adhere to teaching objectives enable the content of the teaching materials to fulfill the requirements of the teaching objectives. In other words, when developing industrial-oriented teaching material for industrial safety management, formulating an industry-oriented outline facilitates the completion of industry-oriented teaching content.

Conclusion and Suggestions

Conclusion

The purpose of this study is to develop industry-oriented teaching materials for industrial safety management. The reviewers positively evaluated the proposed teaching material, including content on safety leadership, safety culture, safety performance, the roles and functions of safety professionals, competency of safety professionals, and safety curricula, when reviewing the teaching material outline and content. We modified the outline and

contents of the teaching material after examining the reviewer comments. Furthermore, the results of the Pearson product-moment correlation and Spearman rank correlation analyses indicate that the reviewer evaluations of the outlines and contents of the teaching material are significantly correlated. Therefore, the proposed teaching materials are industry-oriented.

Suggestions

The objective of industry-oriented education is to foster the growth of the occupational safety and health professionals required by industries. Industries must continuously develop new techniques to acquire competitive advantages in competitive global environments. Accordingly, university occupational safety and health curricula and teaching materials must be continuously modified and improved to match industrial context. Developing teaching materials requires continual improvement; therefore, scholars may further implement teaching and evaluate and modify teaching materials in the future. In addition to teaching materials, the teaching approach is also a key factor in student achievement. Therefore, the industry-oriented teaching approach is a significant topic for future research.

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