THE DEVELOPMENT OF TECHNICAL COMMUNICATION MODULE FOR TVET STUDENTS IN CHINA

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Abstract

This paper outlines technical communication (TC) in the context of China and relates it to the TVET curriculum in facilitating the employability skills of graduates. We also identify that TC skills are essential to graduates as they deal with complex professional issues in the global working context. We embed TC skills into the English subject and explore their value in the work-related curriculum for TVET students. Although it is impossible to detail the vast array of professional settings and practices in China, this paper proposes a module for engineering students in TVET institutions as an introductory TC program that offers a clear definition of TC and its related skill clusters, along with professional disciplines, and best facilitates students learning achievement and employability.

Keywords: Curriculum, Employability, Technical Communication, TVET

INTRODUCTION

The most significant challenge for education in the 21st century is that professionals are unprepared to communicate technical information efficiently through writing and speaking in the professional context (Davis, 2010; Reave, 2004). Possessing excellent technical skills is not enough for engineering students who also need to communicate well in the global workplace (Boiarsky, 2004; Williams, Ieee, & Ieee, 2000). Although the English instructors teach the four basic English language skills in schools, TVET graduates still perform poorly on TC in economic globalization because of separation of the industry and curriculum in China (Y. Chen, 2018; Guo, 2019; Han, Liu, & Gao, 2016; Li & Liu, 2016; Xu & Wang, 2006). The origins of TC as a profession field in China lay within outsourcing services and standardization model practice (S. Chen, 2015; Ou, 2013; Xu & Wang, 2006), which prevailed through to the beginning of this century, some researchers (S. Chen, 2015; Ping, 1999; Xinliang Yang, 2004; Xinxin Yang, 2010) proposed a range of localized programs such as English for Specific Purpose (ESP) to meet the needs of job market. Nowadays, TC broadly focused on developing integrated literacies, such as language skills, technical skills and interpersonal skills (Clokie & Fourie, 2016; Jamaludin, Alias, DeWitt, Kenayathulla, & Razzaq, 2019).

   This paper aims to outline specific TC skills that are compatible with employability for TVET students in China, which are the required skills by employers and beneficial for students'

sustainable development. The following sections discuss the changing job market and the resulting challenges for TVET graduates. Then, this study defines TC and relates it to the pedagogy and industry needs in the context of China. Next, the issues of TC pedagogy in China's TVET institutions are under discussion. Given that work-related curriculum facilitates skills development, this paper proposed a preliminary TC module based on the cognitive apprenticeship theory, TC model together with Taba's curriculum development model to improve students' TC skills.

LITERATURE REVIEW

The changing employability skills

The 21st century employability for TVET graduates are life and career skills, learning and innovation skills, and information search and technology skills. Graduates are required a broad set of interdisciplinary skills and the ability to work effectively to handle complex global challenges (Limuna Ismail, Kamis, Ghani Che Kob, Zee Kiong, & Bekri Rahim, 2017).

Some researchers have studied the job shift in the near future and found that employment increases in the service sector. Hiring increased rapidly in the so-called interaction work, and the face-to-face contact supports professions, business management, and administrative matters (Dobbs & Madgavkar, 2014; Johnson, Manyika, & Yee, 2005). Another finding also showed that jobs in Asia have shifted from labor-intensive sectors to knowledge-intensive sectors (Dobbs & Madgavkar, 2014). They even addressed that few skilled workers in developing countries promote the further growth of traditional labor-intensive manufacturing sectors and that many job-seekers are deficient in education and training to escape the most low-productivity, low-income work (Dobbs & Madgavkar, 2014).

The ever-changing development of the society and industry are always call for updating competencies to suit the changes. Thus, studying the required skill clusters is a significant theme in the field. A study noted that the fully automated production in the manufacturing industry, which depends on advanced technology, is expected to demand a variety of skills in IR 4.0 (Janis & Alias, 2017). Some researchers have identified five clusters of major competencies and skills (state of the art knowledge competencies and skills; manufacturing competencies and skills; IT competencies and skills; computer science competencies and skills; robotics and automation competencies and skills) as well as four clusters of non-technical competencies (personal, social, professional and methodological competencies and skills) (Janis & Alias, 2017). Compared with previous skill clusters, although the need for technical or hard skills is under discussion, the need for high-skill workforce for IR 4.0 has been consistently supported by the literature, which often refers to generic skills clusters such as interpersonal, teamwork, and communication skills (Birkholz, 2001; Jalaludin & Inkasan, 2014; Limuna Ismail et al., 2017; Murgor, 2013; Tryggvason, Thouless, Dutta, Ceccio, & Tilbury, 2001). Having this understanding is significant in preparing future workers who will be high-skilled talents in IR 4.0.

Some researchers have conducted surveys of alumni and students on the mechanical engineering curriculum's current trend and future needs (Tryggvason et al., 2001). Their survey found that the two most important skills of graduates in the Department of Mechanical Engineering and Applied Mechanics are interpersonal and TC skills.

Other studies have been conducted from demand-side and job requirements. Today's professionals are required to be skilled in communicating and analyzing consumers' information, inquiring, retrieving evaluation and interpreting, which are essential to informed decision making in different complex working settings (Lannon, 2017). More recent empirical studies (Hossain, Alam, Alamgir, & Salat, 2020), have confirmed that graduates should be

equipped with a solid knowledge base of core subject-related technical matters and communication skills. Overall, development of TC skills is a predictable and inevitable trend in this era.

In short, relevant studies on employability and industry needs have shown that the biggest challenge for developing high employability is preparing professionals to have the ability to communicate technical information well through writing and speaking in the professional context (Davis, 2010; Reave, 2004). Given that universities tend to be more open to subject fields such as technical writing or technical translation, the industries are happy to put these graduates at work (Bordas, 2015). However, some studies have shown that employers are seeking technical or domain-specific knowledge from technical writers (Ding, 2010; Lanier, 2009). It is clear that the what the graduates learn in school still does not match the industry demand. Therefore, new research is called for solving the issue. Jackson (2015) discovered that the best practice to break through the main barriers of employability skill development in work-integrated learning is to improve the poor curriculum design. Therefore, the development of the design of a new work-related module will be most likely to bridge this gap.

Defining Technical Communication

Compared with general communication, whose only purpose is the transmission of information, TC may have a multitude of purposes besides the transmission of information and may alternatively be used to propose, argue, persuade, defend, coerce and instruct (Rus, 2014).

TC as an interdiscipline has different definition that varies from different fields. Some reviews map the global research related TC and identify the main characteristics of TC. Abidin et al. (2017) analyzed the evolution of TC and categorized it into information products, technologies, professional competencies, and personal traits requested by industry. Another study showed that themes mainly focused on rhetoric, genre, pedagogy, and diversity (Boettger & Friess, 2020). Rude (2009) outlined that the central research questions in this field fell into four categories, namely, disciplinarity, pedagogy, practice, and social change. This mapping illustrated its future was the diversity of programs. Rude even mentioned that discussing professional writing in English departments was essential and critical when it comes to the growth of TC. In the present study, TC is located in the field of pedagogy. Specifically, Davis (2010) addressed that TC pedagogy is to prepare professionals to communicate well through writing and speaking within professional contexts. The current study adopts the definition of TC proposed by Davis (2009).

TC Program within English Language Program in the Global Context

TC programs outside the U.S often vary depending on where in the university structure they are housed (Alred, 2001). According to Reave (2004) the objective the course is to help engineering graduates to meet the criteria of the Accreditation Board for Engineering and Technology in the U.S. and Canadian top universities. The contents of a TC program in engineering schools usually focus on technical writing, oral presentation and team communication. Rus (2012) studied a legal English textbook and concluded that guidance in developing research skills, writing skills, or presentation skills should be an essential part of the curricula. Burganova and Valeev (2015) proposed six criteria for the development of TVET students' TC skills in Russia, including the ability to organize theoretical knowledge of the professional communicative activity; ability to master the technique of business communication; ability to listen and hear the other party; ability for empathy; practical ownership of the means of professional communication realizing special knowledge; and

possession of language skills. According to Finland's experience, a TC program is implemented within project- and problem-based learning and situational learning (Heylen & Vander Sloten, 2013). A TC program breaks the language barrier for registered nurse in Australia (Müller, 2016). Japan has been innovating TC teaching and learning, which are not limited to traditional TC teaching methods. Some researchers have demonstrated how to author technical documents in English, and considered language learning with 3D printing in a creative factory classroom based on Content Language Integrated Learning and project-based language learning (Poudel & Roy, 2019).

In brief, TC programs in the above countries are within the English subject. Clearly, TC programs among these counties have reached a consensus on the objectives, which prepare professionals with good TC skills. The content of learning and delivery methods for TC varied across TVET institutions. However, many similarities are found in the teaching and learning of this course. For example, TC courses in Finland and Japan are based on project-based leaning module. Additionally, the development of technical writing, oral presentation and team skills is prominent in TC. In delivery of learning content, all institutions have applied formal lectures to introduce the principles of effective communication at work (written and oral) and have conducted collaborative learning activities. Therefore, in the process of developing a work-related TC module, the above findings should be taken into consideration.

Key Target Subskills of Technical Communication Pedagogical Programs

Cai and Zhang (2012) analyzed the concepts, contents and methods of TC modules. They proposed a framework of TC skills, including reading, oral presentation and technical writing skills. They also strongly called for the TC course to be a continuous talent training program.

Based on reviewing the existing literature on TC skill clusters (see Table 1), in this study, the operational definition of TC skills refers to technical writing, oral presentation, and cooperative skills.

Table 1
TC skill clusters in the literature

Research Highlighted skills	Cook (2002) (technical writing)	Davis, M. T. (2010) (Engineering)	Rasul et al (2013) (Manufacturing Industry)	Jackson, D (2015) (business)	Lanier, C. R.(2009)	Clokie, T. L. Fourie, E. (2016) (business, IT,Media Arts, engineering, Marketing, Public Relations)
Technical writing skills						
Information analysis		✓	✓	✓	✓	✓
Editing skills	✓	✓			✓	✓
Design skills	✓	✓			✓	✓
Graphical presentation skills	✓	✓		✓	✓	✓
Ethical value	✓	✓				
Technology skills	✓	✓	✓	✓	✓	✓
Critical skills	✓	✓		✓	✓	✓
Rhetorical skills	✓	✓		✓	✓	✓
Oral presentation skill						
Public speaking skills		✓		✓		✓
Meeting	✓	✓	✓	✓	✓	✓

Giving feedback				✓		✓
Cooperative skills						
Works cooperatively with others	✓	✓	✓	✓	✓	✓
Influencing team members	✓		✓	✓		✓
Work with cultural diversity	✓		✓	✓	✓	✓
Handle the conflict	✓		✓	✓		✓
Others			Listening and reading skills			Researching skills

Issues of TC in China's TVET

Through globalization, China has been playing an important role and has experienced a dramatic economic growth, however, China is hungry for TC lying in its shortage of technical writers and English speakers (Tegtmeier, Thompson, Smith, Scroggs, & Dragga, 1999), because much of the instruction provided in vocational colleges is irrelevant to practice needs. China's hunger for TC is evident—for textbook, journals, technical expertise and English instructors for TC (Tegtmeier et al., 1999; Yu, 2011). Ding (2010) and Han (2011) showed concrete evidence on the needs for TC in China's job market, which showed that English rather than Chinese was often the working language in import–export businesses and transnational corporations, thus, China mostly needs TC in English. Recent studies have shown that TC is increasingly needed in the manufacturing field because of the more frequent economic and technological exchange with outside (Y. Chen, 2018; Han et al., 2016; Li, 2019; S. Yang et al., 2018b). However, past research has not adequately addressed the development of manufacturing graduates' TC skills through courses in China's TVET institutions (Deng, 2017; Hao & Shi, 2017; L. Li, 2019; Lv, 2013; S. Yang et al., 2018; L. Zhang & Zhang, 2016).

The current existing literature has shown that TC-related courses in TVET institutions in China failed to narrow the competency gap (Ding, 2003; Ding, 2010; Duan, 1999; St Amant, 2001; Han, 2010). The research group of China's National Institute of Education Science (CNIES) (2016) addressed that manufacturing education in TVET institutions poorly develops graduates' TC skills which has hindered the manufacturing industry from moving toward an international market. Shi (2015), Ou (2013) and S. Chen (2015) agreed that the TVET graduates' TC skills were too low to support the industries. Evidently, China may be replaced by the ''young developing'' countries of South Asia and Africa because of the failure of TVET in providing high-skilled workers over the next two decades (Dobbs & Madgavkar, 2014). A similar study showed that the U.S. India, and some areas in Africa have better outsourcing services in the market than any other countries in the world because they are strongly supported by the technicians with good TC skills (S. Chen, 2015). Only a few schools provide the TC course in foreign language department but those students lack the good understanding of technical information and products, and cannot meet the market needs (Ding, 2010; Guo, 2019; Xu & Wang, 2006). Feng (2015) revealed that college English courses for manufacturing students in most China's TVET institutions, which are regarded as irrelevant to TC skills because these courses focus on grammar but neglect English application abilities for technical reports, seminars, product instructions, interpretation of production processes, charts and data.

Developing the Technical Communication Module

This paper reviewed relevant theories and frameworks. And a broad conceptualization is presented in Figure 1. In the preceding section, the issues that plagued the implementation of TC in China's TVET institutions have been presented. TC argued to be urgently needed in China, especially in the manufacturing industry (Y. Chen, 2018; CNIES, 2016; Deng, 2017; Feng, 2015; Han et al., 2016; Li, 2019; S. Yang et al., 2018a). Linking previous findings to the current study, these elements are used as the foundation to explore further the best practice to introduce TC in China's TVET.

In designing the pedagogical module, Cook's TC Model, which is a theoretical framework for TC pedagogy that is based on six layered literacies, namely, basic, rhetorical, social, technological, ethical, and critical literacies (Cook, 2002), is found to orient the direction of pedagogical goals for the English subject. Based on this model, the definition of TC is located in a quite specific skill framework. It contributes to planning curriculum objectives and content.

In developing TC skill clusters, Cognitive Apprenticeship (CA) theory is found as an effective instructional strategy within a situated learning environment to obtain intellectual thinking and problem-solving skills (Stewart & Lagowski, 2003). CA is "a model of instruction that combines the elements of apprenticeship and schooling, which attempts to illustrate the processes of thinking within a learning activity visible to both the students and the teacher" (Collins, Brown, & Newman, 1987). The four dimensions of CA theory are content, method, sequence and sociology (Collins et al., 1987). The CA method facilitates students to integrate their practical skills into their future practice (Ali, Tahir, Said, & Tahir, 2015), which facilitate TVET students to transfer from classroom to workplace. Apprentices learn in the context of real work settings and attain occupational skills and other work-related skills, including communication, problem-solving, and allocating resources skills as well as the abilities to deal with supervisors or masters and a diverse spectrum of coworkers (Odora & Naong, 2014). Thus, the TC module guided by the CA theory can be applied to practice and improve students' oral presentation, technical writing, and collaborative skills in different contexts in the workplace.

Taba's (1962) curriculum planning model is found to be suitable in guiding process of design of this pedagogical module. The curriculum design includes eight phases, namely, the diagnosis of needs, formulation of objectives, selection of content, organization of content, selection of learning experiences, organization of learning activities, evaluation and checking for balance and sequence (Taba, 1962). These phases can combine with CA theory to create a good authentic learning situation for TVET students (see Figure 1).
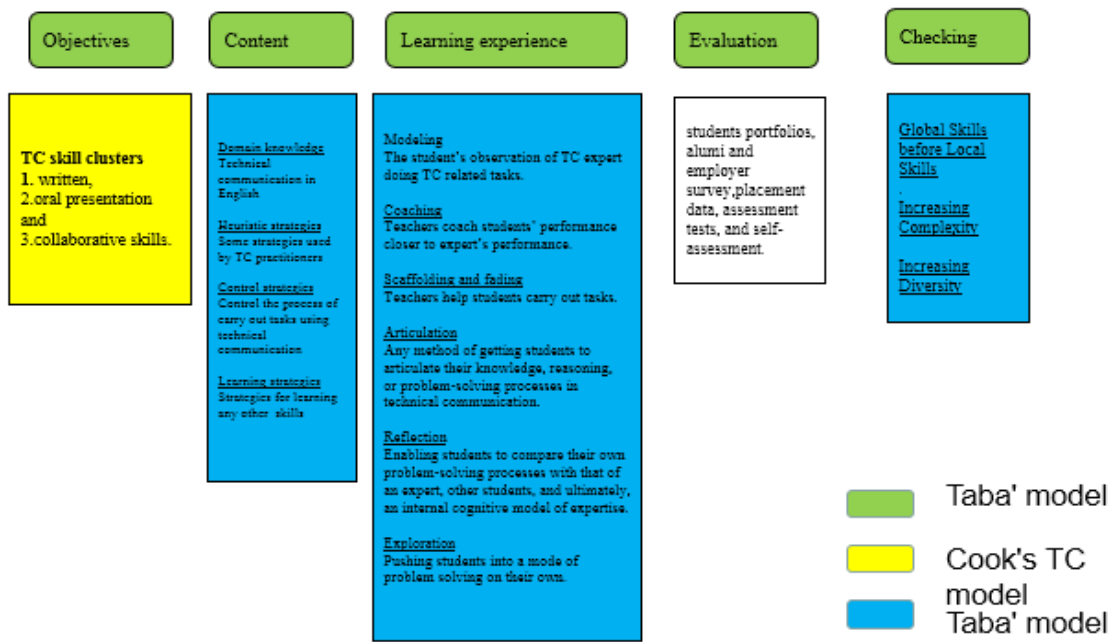
Figure 1. The Conceptual Framework of the Current Study

This study is significant given the lack of literature related to TC in TVET education. Further research can lead to significant contributions to TVET students, English instructors, TVET work-related curriculum, and the body of knowledge.

CONCLUSION

In this paper, we have demonstrated the urgency to develop TC skills between pedagogical programs and professional life. The definition of TC is briefly outlined in relation to the required employability skills. We reviewed how employability has changed to interact to industry needs. The description of issues of TC pedagogy calls for curriculum reform in China' TVET, the embedding of TC skills in the English subject, and a new module for TVET students. We posit that TC module as an intermediary in promoting technicians growing up to high-skilled talents can free up the disciplinary knowledge to focus on the specialist mechanism and also provide a bridge from tacit knowledge into explicit industry practice. The new TC module can further be promoted by joint curriculum development and complementary empirical studies. We believe that this view of work-related curriculum module is an essential component in fully facilitating students' work-integrated learning and would help develop the high employability skills of all TVET students.

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