Asia Pacific Education Review
2007, Vol. 8, No.3, 500-520.

A Review of Human Competence in Educational Research: Levels of K-12, College, Adult, and Business Education

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The purpose of this study is to review the main perspectives or issues dealt with in the research on considered to be key competences, in order to develop a fuller understanding of how human competence functions. As a result of this review, two themes considered as having important implications for the actual practices can be identified: that there exists an holistic nature with different aspects of a given competence and that influences of a contextual and cultural nature are factors which affect the operation of human competence. By incorporating four characteristics and three domains of competence with the review conducted in this study, we began to appreciate what the research on human characteristics related to key competences has achieved and what is needed for future research.

Key words : competence, key competences, human ability

Introduction

Responding to the increasingly diverse and rapid changes in our global and knowledge-based contemporary society, many countries, stimulated by the initiative of the OECD (2000), have tried to consolidate their human resources in order to cope with these challenges. In line with this effort, competence has been considered as an important concept to describe human ability, one which is necessary for dealing with new challenges in our current society. Consistent with this, many researchers and educators have tried to understand what competences are most critical for meeting these demands (Rychen & Salganik, 2003).

Although such efforts to identify key competences have become prevalent, the directions of those efforts does not seem to go toward appropriate understanding of the nature and characteristics of each competencey. Rather, key competences seem to serve as an instrument to deal with external demands brought into a given situation. For example, in the education sector, the discussion of key competences has been conducted for the purpose of providing a list of school leaving requirements and educational objectives, sometimes with a more long-term goal to innovate an educational curriculum. In the economic area, a primary focus has been on evaluating or managing

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key competences in responding to new and changing situations in the workplace (Rychen & Salganik, 2003). Further, specific situations in which each country is fallen in influenced how key competences have been identified and served for specific innovations and plans demanded in the country.

Such different demands on the roles of key competences seem to lead to keeping our interests away from establishing a knowledge base which can provide the means of capturing the essential aspects of each competency and particular conditions in which competence can be developed properly. Such aspects and conditions of key competences have not been fully considered even when the concept of competence is defined or when components of a particular competency are drawn up in a specific situation. As a result, competence seems to be interpreted as whatever is intended to develop in many training and educational settings, thus, in most cases, focusing the surface level of successful performance such as procedualized techniques or fragmented knowledge or skills.

Thus, the purpose of this study is to examine important issues and main trends found in the educational research on human characteristics related to key competences as a way to understand the essential nature of competence and to figure out important considerations for competence to develop. By drawing on the educational research on human characteristics such as, for example, critical thinking, self-regulation, communication and so on, we expect to apply some important insights from the educational research into understanding how competence functions and develops.

This review starts with a brief discussion of the concept of competence and three important domains of competence. Then, the actual review of the educational research on human characteristics consists of four sections of key competences at the levels of K-12, college, adult, and business education. Each section will provide a brief overview of the research on human characteristics related to key competences, focusing on the main issues or topics in order to understand its nature and function. Then, we will discuss some themes commonly found from the review in terms of how competences have been characterized as human abilities and some issues needed to pay more attention for the future investigation.

Competence: Definition and Domains

Definition of Competence

We understand competence as "the ability to successfully meet complex demands in a particular context through the mobilization of psychosocial prerequisite (including both cognitive and noncognitive aspects)," one suggested by OECD (Rychen & Salganik, 2003, p. 43). This definition seems to incorporate the contributions made by the previous research, ones that depicted competence as individuals' autonomous and active involvement in dealing with environments (White, 1959) and as an underlying characteristic of an individual that is causally related to criterion-reference and/or superior performance in a job or situation (McClelland, 1973; Spencer & Spencer, 1993). As shown in OECD's definition and other conceptions of competence above, competence seems to have four essential characteristics of competence ('wholeness', 'mobilization', 'context-dependency', and 'learnability'), indicating that competence involves a holistic perspective to think of human ability as including affective and behavioral aspects as well as cognitive aspects of human ability (wholeness). Because of its emphasis on performance, competence emphasizes the interconnected operation of those different aspects of human ability (mobilization) in response to a demand of a specific context (context-dependency) with the possibility of being learnable through life experiences (learnability). At this point, we need to make clear the usage of different terms relating the concept of competence such as competence, competency, and competences. We use competence as the general quality of a person, referring to as "being competent with dealing with a given task." Rather, competency and competences (or competencies) indicate more specific elements to consist of individuals' general competence, connecting to such efforts to identify important components of successful performance.

Domains of Competence

A great deal of research has tried to provide some overarching domains to characterize the roles and functions of human competence. Based on such research, we found three domains of competence meaningful for further discussion: managing the self, relating to others, and

managing tools (Evers, Rush, & Berdrow, 1998; DiPerna, 2004; Harter, 1982; Rychen & Salganik, 2003; The Ministry of Education in New Zealand, 2007). The domain of managing self is related with individuals' autonomy, one that the OECD proposes as one of key competences for individual's successful life and a well-functioning society (Rychen & Salganik, 2003). This competency deals with personal identity, which enables individuals to understand the large contexts, to create personal life plans and projects, and to claim one's rights, interests, limits, and needs. In addition to identity, the Ministry of Education in New Zealand (2007) emphasizes self-motivation or a "can-do" attitude and Evers, Rush, and Berdrow (1998) discuss responsibility for managing self.

The domain of relating to others is associated with having active interactions with others. The OECD presents interacting in socially heterogeneous groups as another key competency (Rychen & Salganik, 2003). This key competency covers building an effective relationship with others, collaborating, and dealing with conflict. Those who are competent in interacting well with others are able to open other's opinions, open to consider the different roles in a variety of situations, and to be aware of other's feeling (The Ministry of Education in New Zealand, 2007). In this light, the OECD argues that empathy is the most important factor for having relationships with others (Rychen & Salganik, 2003). Evers, Rush, and Berdrow (1998) pay close attention to communicating with both individuals and groups for searching, gathering, and exchanging information in the business level.

The domain of managing tools is related with using tools for completing tasks or solving problems successfully. The term "tool" includes language, symbols, text, knowledge, and information beyond technology (Rychen & Salganik, 2003; The Ministry of Education in New Zealand, 2007). People who are competent in managing tools analyze what kinds of tools they need to know for the assigned jobs or problems and are willing to master necessary tools if they do not know how to use (Berman et al, 2006). In addition, they tend to find solutions independently and transfer their experiences to other situations.

In this study, we use these three domains of competence as a framework to understand the roles and functions of human ability from K-12 to the business level. Instead of reviewing all abilities related with key competences, we chose several important abilities emphasized for successful academic achievements and job performance according to the domains. (see Table 1.) The review of literature that we conducted in this study shows that a great deal of educational research in the K-12 and college level has paid attention to higher order thinking, motivation, and collaboration as important abilities (Ennis, 1985; Thousand, Villa, & Nevin, 2002; Zimmerman & Paulsen, 1995). In fact, because such educational research has not been conducted from a perspective of competence, the important abilities in these levels are described by using the terms traditionally adopted in educational research. In this light, we select thinking ability, motivation, communication, and using technology in the K-12 level and critical thinking, writing, communication, and self-regulation in the college level in terms of competence. Regarding educational research in the levels of adult learning and business, there are a great number of studies on competence in terms of its definition and categories (Scribner, 1984; Spencer & Spencer, 1993). As many researchers suggest (SCANS, 1992; Sticht, 1988), we selected literacy, vocational core skills, social competence, and cultural competence as important competences in the level of adult learning. Taking the

Table 1

Important Abilities in Domains of Competence according to Educational Levels

Domains \ Levels	K-12	College	Adult learning	Business
Managing self	Motivation Self-regulation	Self-regulation	Social competence Cultural competence	Personal competence
Relating to others	Communication	Communication with multicultural understanding		Cooperative competence
Managing tools	Thinking ability Using technology	Critical thinking Writing	Literacy Vocational core skills	Job-specific competence

historical overview of competence into consideration in the business level (Athey & Orth, 1999; Rothwell & Lindholm, 1999), educational research on personal competence, job-specific competence, and cooperative competence are reviewed.

K-12 Learning Competence

At the K-12 level, competence begins to be embraced by educators as a new standard for curriculum design as one of a nation-wide innovation, especially in New Zealand, Canada, Australia, etc. For example, the New Zealand curriculum identifies five key competences such as thinking, managing self, relating to others, using language, symbols, and texts, and participating and contributing. The Quebec preschool and elementary education program in Canada also frames nine cross-curricular competences grouped in four categories in addition to the subject-specific competences. First, intellectual competencies are related to using information, solving problems, exercising critical judgment, and using creativity. Second, methodological competencies are related to adopting effective work methods and using information and communication technology. Third, personal and social competencies are related to constructing his/her identity and cooperating with others. Fourth, communication-related competencies are related to communicate appropriately with others.

Except for such nation-wide efforts to identify key competences required for K-12 students, little investigation has been made to examining the nature and functions of those competences under the umbrella of competence-based research. Thus, in this study, we selected five important abilities – motivation and self-regulation, thinking ability (critical thinking, creativity, and problem solving), communication, and using technology – for further investigation, ones that have been studied in the educational research relatively in a productive way. This section will provide a general discussion of these eight abilities, on which the later sections will proceed according to their particular research context.

Motivation and Self-Regulation

Motivation and self-regulation are those of human characteristics through which people can understand about themselves, leading individuals into engaging a given task. At the earlier stages of research, motivation was approached mainly in terms of inner forces, traits, volition, and will a phenomenon which is constrained by an individuals' basic needs or instincts. Later, in the 1970s, cognitive psychology emerged and emphasized the relationship of motivation to an individual's thoughts, beliefs, and emotions (Schunk, Pintrich, & Meece, 2002; Gramham & Weiner 1996). This research even went so far as to deal with the areas of meta-cognition and self-regulation. Such a comprehensive approach to motivation was an attempt to illuminate motivation as a complex process influenced by personal, social, and contextual factors (Schunk, Pintrich, & Meece, 2002).

Branching outwards from these motivational issues, the topic of self-regulation, has produced much in the way of fruitful research, when approached from a social-cognitive perspective of learning and motivation (Zimmerman, 1990). While research influenced by Zimmerman has tended to focus on the characteristics of self-regulated learners, this tendency shifted slightly since the mid 1990s, to focus more on self-regulated learning conceptualized as a process of learning guided by meta-cognition, strategic action (planning, monitoring, and evaluating personal progress against a standard), and motivation (Butler & Winne, 1995; Winne & Perry, 2000). Although specifying strategies for self-regulated learning are meaningful for teaching and learning (Perry, Phillips, & Hutchinson, 2006), Yowell and Smylie (1999) have criticized the research into self-regulation for overemphasizing its cognitive and instrumental characteristics, suggesting in turn that the social contexts in shaping self-regulatory capacities should be considered. They conceptualize self-regulation as the product of a reciprocal person-context relationship, and view this in terms of a Deweyan and Vygotskian perspective.

Communicative Ability

Communicative ability has been considered important because of its critical role in interacting with and relating to others. As mentioned about relating to others, one of the domains of competence, communicative ability involves conveying message in clear and appropriate language and expressing one's own opinions while showing respect for

others.

The major research on communication has extended the research focus away from the individual inner structure of language or behavioral aspects of communication into the cultural considerations required for effective communication in reality (Chomsky, 1965; Wiemann & Backlund, 1980). More recently, cultural considerations within a particular context have been highlighted as some of the most critical factors in effective communication such as knowledge about people and the relationships with them, and participation in ongoing, dynamic interactions with others (Dannels, 2001). Accordingly, in K-12 educational settings, it is of importance for students to articulate their thoughts, to listen to others' opinions, and to have written discussions in terms of learning and communication in order to develop the capacity to express and defend knowledge claims and validity judgments in social situations.

Thinking Ability

At the level of K-12 education, thinking ability has been traditionally accepted as the most important ability for K-12 students to acquire for managing a given task. Critical thinking, creative thinking, and problem solving are representative intellectual abilities that are considered to be necessary at this level of development.

Critical thinking has been defined as reasoned and reflective thinking concerned with what to do or believe (Ennis, 1985), and is appropriately propelled by reason (Siegel, 1988). As a result of trials conducted originally to define critical thinking, researchers developed a consensus that generally states that critical thinking is no longer considered simply in terms of thinking skills, rather it is defined as including one's disposition to think critically (for example, Ennis, 1985; Glaser, 1985; Halpern, 1999). There has been much research on the transferability of critical thinking skills and teaching methods for critical thinking. From this research, the most controversial issues may be whether critical thinking should be taught separately from the content of existing subject-matter with the purpose of teaching critical thinking, be fused in instruction in existing subject-matter areas, or be taught as a combination of the general approach with infusion (Ennis, 1985). As evidenced in Ruggiero's (1988) and Facion's (1990) studies, there might exist the general principles of critical thinking that can be applied to other subjects. However, as Facion has stated, applying critical thinking skills in different contexts requires domain-specific knowledge. It implies that although the general principles of critical thinking exist, teaching critical thinking should be embedded in the specific domain areas. At the K-12 level, some researchers have explored effective classroom techniques for teaching K-12 students to become good thinkers by engaging them in thoughtful learning whilst engaged in the school curriculum (Swartz & Parks, 1994; Perkins, 1994). Some other scholars have examined the relationship between collaborative learning and some major theoretical and empirical approaches to fostering critical thinking (Dennis & Mary, 1996).

Creativity was understood in terms of personality, identified in the same traditional way as IQ was measured in the earlier research on creativity (Guildford, 1950). However, research has incorporated the creative person's way of thinking, experiences, feelings, and the deeper structures and processes that are activated in the work of creation (Rothenberg, 1979), even expanding its focus into the development of traits of personality that are considered important for creativity (Mansfield, Busse, & Krepela, 1978). More recently, in the 1980s and 1990s, social psychological frameworks provided another perspective with the research on creativity focusing in terms of the role of social, political, and cultural factors in fostering individual creativity of students in K-12 context (Amabile, Hennessey, & Grossman, 1986; Thousand, Villa, & Nevin, 2002).

Problem solving has also been touted as a higher order ability that involves thinking operations of analysis, syntheses, proportional reasoning, logical deductive thinking, and evaluating, with an emphasis on the state of modulating and controlling one's resources (Goldstein & Levin, 1987). As the research on critical thinking has clearly elucidated, one of the critical issues in the research on problem solving is on the transferability of problem solving competence. The earlier research on problem solving devoted a great deal of attention to developing general principles in performing problem solving. However, recently, problem solving competence has been understood as a process concerning specific subjects, one that should permeate in the actual teaching of the subjects themselves and provide contexts in which the concept and relevant skills can be learned (Anderson, Boyle, & Reiser, 1985; Chase & Simon, 1973; Chi, Feltovich, & Glaser, 1981). Thus, problem solving has

been increasingly viewed as being a process or context in which each subject can be learned.

Using Technology

Early research related to technology in the field of education focused on students' learning from technology (Jonassen et al., 2003). From this perspective, technology is considered as a tool from which learners are able to acquire objective knowledge and information (Reiser, 2001; Saettler, 1990). Since educational media such as films, slides, overhead projectors, and educational television were used in K-12 education at that time, learners tended to be passive as knowledge-receivers from technologies rather than being active performers. Even when computers were introduced in classrooms in educational institutes during the 1980s, learners usually performed drills as their primary means of learning from technology (Becker, 1985). After the 1990s, however, the relationship between K-12 learners and technology became more interactive and therefore learning became more meaningful (Jonassen et al, 2003). According to recent research on technology, including the Internet, provides school children with not only a specific context to support learning through doing, but also serves a learning environment where social interactions between teachers and students occur actively (Labbo, Reinking, & McKenna, 1998; Palloff & Pratt, 1999). In the light of this, many researchers suggest that the appropriate use of technology can support the development of learners' problem solving skills as well as knowledge construction (Jonassen et al, 2003; Khan, 1997)

Competence at The College Level

At the level of college education, the concept of competence has been discussed mostly in connection to job-specific abilities, especially in the areas of nursing (Watson et al., 2002), medicine (Morrison & MacNeily, 2006), and counseling (Yager & Bienenfeld, 2003). However, competences required for college students across all academic disciplines including academic competence have not been paid enough attention except in a few studies (Berman & Ritchie, 2006; Diperna, 2004; Jones et al., 1995).

Jones and her colleagues (1995) identified college graduates' essential skills as writing, communication (speech and listening), and critical thinking. Diperna (2004) categorized academic competence into academic skills (reading, writing, mathematics, and critical thinking) and academic enablers (interpersonal skills, motivation, study skills, and engagement). Rather than limiting to academic skills or ability, Berman et al. (2006) expanded the scope of competence for college students into dealing with innovation and change with additional three categories of competences such as managing self, communicating, managing people and tasks. In addition, influence by the societal change toward the cultural diversity, there has been growing demand of multicultural understanding for college students especially in the areas of nursing, medicine, and counseling (Dunn, Smith, & Montoya, 2006; Sargent, Sedlak, & Martsolf, 2005).

Out of competences identified critical for college students so far, four competences (self-regulation, communicative ability with multicultural understanding, critical thinking, and writing) will be examined in this section because they have been not only considered as important abilities but also investigated more productively than other competences. In connection to the three domains of competence, self-regulation is classified under the domain of managing the self because it deals with self-understanding, although it also involves cognitive or meta-cognitive strategies to be self-regulated. For the domain of relating to others, communicative ability with multicultural understanding will be discussed. Finally, we consider critical thinking and writing as important tools for completing a task according to the characteristics described in the earlier section, categorizing under the domain of managing tools.

Self-Regulation

A commitment to academic success at the college level places special demands on students because guidance from instructors is often limited to a few written assignments and tests during the semester. Under these circumstances, students who are self-monitors, that is, who can monitor their own academic learning and performance accurately on a daily basis, are at a great advantage. Further, today's information-rich environment can be huge resource for students who are able to seek information from diverse sources, think critically about what they find, and select and

integrate knowledge. Thus, to foster independent, self-motivated, self-regulated thinkers and learners at the college level seems to be a major task for higher education. The question is how students can become such proactive, resourceful learners and how best to foster and develop such qualities in students (Zimmerman & Paulsen, 1995).

As mentioned before, the research on self-regulation has come to incorporate the cognitive, metacognitive, and motivational aspects into the nature of self-regulation itself (Garcia, 1995; Wolters, 1998). In college settings, disciplinary differences represented by domain-specific knowledge have been recognized as an important element of self-regulated learning, one leading to questioning the assumption that the functions of cognitive strategies and adaptive motivational beliefs would be similar across situations and contexts (Vanderstoep, Pintrich, & Fagerlin, 1996). Self-regulation was studied with other important aspects of college learning such as writing and teacher feedback. Zimmerman and Risemberg (1997) have argued that self-regulation interacts reciprocally via a cyclic feedback loop through which writers' self-regulation process functions, representing a complex system of interdependent processes. Finally, different learning contexts such as online teaching-learning environments were also considered to trigger different styles of self-regulation (McManus, 2000).

Communication with Multicultural Understanding

Communication skills are viewed to be foundational to college students' fundamental academic skills and are considered to be critical to their success in college (Allen, 2002). Supporting this, the recent studies suggested that students who develop good communication skills are more likely to stay in school and complete their degrees than students who do not develop such skills (Mashburn, 2000; Newton & Wells-Glover, 2000).

As already mentioned in the field of K-12 education, having communicative competence is not limited merely to possessing knowledge about language understanding of those people they are interacting with, or the accompanying social skills. Rather, it also includes understanding the cultures of the interlocutor, one's own reactions or stereotypes in regard to cultural phenomena, and local and global cultures within which we all operate. Challenged by the recognition of the society as a multicultural and multilingual one, the cultural aspect of communication has been highlighted in the context of college teaching to an increasingly greater degree (Sue, Arredondo, & McDavis, 1992). In addition to understanding others and their cultures, knowing about oneself in terms of how one's own stereotypes related to cultural phenomena became an important factor for successful communication (Beamer, 1992). Taking this process even further, in the context of teaching ESL students, considering the nonnative speakers' local culture as well as the (various) cultures of the target language has been put forward as the possible basis for developing a model of appropriate communication with foreigners (Alptekin, 2002).

Critical Thinking

As mentioned in the section on K-12 education, the nature of critical thinking has been characterized as including critical thinking skills and dispositions. Accordingly, as Giancarlo and Facione (2001) have stated, developing the disposition toward critical thinking in students became an important issue in teaching critical thinking. Because a characteristic such as disposition is "built not only by demanding and rewarding it, but by modeling it" (p. 53), building a critical thinking ability requires the culture of college classrooms and the kinds of disciplinary activities that value critical thinking. In this sense, a growing number of researchers began to think of the issue of how to promote critical thinking in the context of the culture of college education such as classroom assignments, classroom discussion methods, teachers' feedback to student assignments, and teacher-student interaction styles (Halx & Reybold, 2005; Robertson & Rane-Szostak, 1996; Tsui, 2002).

Another issue regarding critical thinking in the higher education setting was how to integrate general critical thinking skills into a given academic discipline, something that has already been mentioned in the context of K-12 education. Out of a long debate as to whether critical thinking should be taught as general thinking skills or domain-specific thinking skills, critical thinking research has seemed to move its emphasis from finding the abstract and general principles of critical thinking into learning and teaching it with a consideration of actual contexts in which critical thinking skill is enacted (Facion, 1990; Halpern,

1999; Hatcher, 2006; McPeck, 1981; Ruggiero, 1988). This transition implies that transferability of critical thinking skills or these principles across contexts and disciplines might be possibly achieved by teaching the general skills or principles within an actual context of particular academic areas in which students can actually use and apply those skills and abilities.

Writing

Developing the writing ability of college students has been a challenge for higher education. By looking at which aspect of writing has been emphasized in the writing research, we can infer how college education has attempted to deal with this challenge of preparing college students to acquire advanced writing skills.

Overall, the focus of writing research has moved from planning about writing to work on individuals' mental processes and writing strategies, and then, most recently, to the consideration of the culture or community in which writing practices occur (Bazerman, 1981; Bizzell, 1982a; Emig, 1971; Faigley et al., 1985; Faigley, 1986; Flower & Hayes, 1981). While the first two elements of writing, planning for writing and writing strategies, directed us to acknowledge the cognitive dimensions of writing and to see the learner as an active processor of information, the later focus turned our attention to how a society uses writing rather than how the individual learner uses cognitive resources (Jones et al., 1995). Bizzell (1982a) believed that composition models need to explain the social factors as well as the cognitive factors, asserting that these factors need to be integrated to present a fuller picture of the composition process. As Bazerman's (1981) study demonstrated how differences in each academic discipline influence the expectations of the writers and readers, writing needs to be considered as a series of situated practices and activities that occur within a range of contexts and involve a range of student and teacher populations. However, considering the contexts of academic disciplines doesn't necessarily mean teaching students to follow the writing tradition set out in a particular discipline. Rather, as Bizzell (1982b) has argued, the practice of teaching writing in college contexts needs to "initiate students into academic discourse in such a way to foster a productive critical distance from the social processes whereby knowledge is generated and controlled" (p. 197). Echoing this notion, Lavelle and Zuercher (2001), examining college students' perceptions of writing experiences, suggested ways to facilitate writing at the college level such as designing a high quality writing climate to include deep writing tasks, placing on emphasis on not only revision and meaning, scaffolding, and modeling but also the writing situation providing cues, messages, interventions, and artifacts.

Competence at The Adult Learning

For many years, competence at the adult level was mainly related to the knowledge and skills necessary for managing job-specific tasks required within the context of particular workplaces such as business or the military. However, the growing internationalization of economies and rapid changes brought about by new technologies require adults to develop the ability to manage themselves in the midst of such changes as well as to update their skills to manage job-specific tasks. Moreover, increasing concern about social cohesion and developing democratic citizenship demand the development of the knowledge base, skills, and attitudes to interact effectively with a diverse range of people in a variety of contexts.

Thus, in this section, we examine how key ideas and conceptions of adult competences have changed over time, from the aspects of managing tools, relating to others, and managing the self. Among the many essential competences at the adult level, we will specifically focus on four competences (literacy, vocational core skills, social competence, and cultural competence) that have been regarded in the literature as critically essential functions for a successful adult life. What is notable in this section is that, in contrast to the previous sections, human ability or characteristics required for a successful adult life have been investigated directly from the perspective of competence.

Literacy

One of the primary abilities required for adults is literacy. Traditionally, literacy has referred to the minimal skills in reading, writing, and computing required in various tasks environments (Sticht, 1988). For instance, adults with higher levels of literacy tend to use their literacy skills more

often in work settings and perform job related specific tasks better.

However, in recent years, the literature on literacy has begun to emphasize the social nature of adult literacy. Such an approach to adult literacy has led to the competence movement, which places an emphasis on literacy for managing tasks well in the workplace as well as being an essential tool for participating in effective social dialogues in everyday life (Scribner, 1984). The focus of this movement is on the effective use of language, technology, and mathematical skills in multiple situations (e.g., in the family, the workplace, and civic life) (CEC, 2005). For instance, in knowledge and information-based societies, the OECD suggests that literacy is required for adapting existing symbolic tools and social relations to new situations (Rychen & Salganik, 2003).

In addition, studies on literacy have increasingly underscored the aspect of managing the self in the context of adult literacy. This aspect of adult literacy was drawn from the competency-based approach to adult education, which focused on competence in reflecting on the self, developing one's personal identity, and acting autonomously and effectively (Sticht, 1988). From this perspective, literacy implies not only an emphasis upon skills in reading, writing, and computing but also on a broader range of abilities to comprehend new perspectives with openness, undertake self-assessment, and actively construct one's own life in the light of the requirements of our society (Sticht, 1988).

Vocational Core Skills

Vocational core skills are another essential competence required at the adult level as well. Indeed, vocational core skills have traditionally been referred to the basic skills necessary for managing tasks in the workplace (Smith & Marsiske, 1994).

However, the situations of the workplace characterized by increased competition in the current society have challenged adult workers to acquire a minimum level of competence in interacting with others effectively. For instance, scholars, including Marshall and Tucker (1992), have divided the components of vocational core skills into not only the ability to apply skills effectively to complex and real-world tasks, but also the ability to communicate effectively, the ability to work well with others as well as independently, and a high capacity for abstract, conceptual thinking. As another example, the Secretary of Labor's Commission on Achieving Necessary Skills (SCANS, 1991, 1992) identified the vocational core skills required for most jobs from the perspective of not only the ability to manage tasks (such as information, resources, and systems) but also the ability to relate to others (such as interpersonal skills needed to work on teams or to serve customers) (SCANS, 1991, 1992). The social nature of vocational core skills is often dealt with in terms of 'generic skills' (Bikson & Law, 1994; Cappelli, 1992; Natriello, 1989), ones that are transferable across work contexts with the added effect of enhancing workers' flexibility, adaptability, and autonomy (Marshall & Tucker, 1992).

However, the idea that vocational core skills are 'generic' and can apply across jobs is controversial. Some studies on vocational core skills have increasingly emphasized the need to assess core skills in a context-specific way (e.g., Engstrom, 1992), assuming that the core skill places demands on adults which vary with the personal, social, situational, and cultural contexts of individuals (Baltes, 1993; Hull, 1993; Resnick, 1990). For example, someone who has learned to solve problems in business situations can hardly transfer this learning to other areas such as counseling, engineering or town planning without acquiring a large additional body of domain-specific knowledge. Therefore, the precise relationship between general and specific skills is still a puzzle to many researchers. For these reasons, it is argued that vocational core abilities are best conceptualized as both a set of broad, domain-general abilities and a set of domain-specific knowledge and skills (e.g., Hyland & Johnson, 1998).

Social Competence

Social competence is one of the adult competences which emphasize the aspects of managing the self and relating to others. The research on this field is relatively recent when compared to that on literacy or vocational core skills. From the perspective of adulthood, rooted in the developmental psychology tradition, becoming an adult refers to being able to follow the norms and interacting with others effectively with a diverse range of people (Jackson & Bijstra, 2000). This perspective describes social competence as a developmental construct, one that results from young

people's normal development (Englund et al., 2000), including 'reacting adaptively', 'cooperating and communicating with people from a different cultural background', and 'demonstrating respect and understanding for cultural diversity'(Dam & Volman, 2007). From this perspective, the elements of social competence mainly include social-communicative skills such as contacting with peers, friendships, and working and solving problems together (Englund et al., 2000; Schneider, Ackerman, & Kanfer, 1996).

As another perspective on social competence, the notion of 'citizen perspective' focused on the ability to function as a citizen in a responsible and adequate way in a democratic society (Dam & Volman, 2007). From this perspective, today's society requires its citizens to make their own choices, to impart self-direction to their lives, to develop their own identity and, in doing so, make a critical contribution to society (Boyd & Arnold, 2000; Kaplan, 1997). These challenges highlighted the significance of knowledge not only about their relationships with others but also about their place in the world and themselves (Boyd & Arnold, 2000). Accordingly, this perspective illuminated some of the typical elements of social competence as social participation, a democratic attitude, and knowledge of and insight into society (Print & Coleman, 2003; Rychen & Salganik, 2003; Gordon, 2003). Here, adequate participation does not mean merely behaving according to a fixed set of norms, but being able to deal flexibly with differences, other choices, and possibilities. In order for this to occur, reflection becomes a critical aspect of social competence, not only in directing one's own development but also society's (Dam & Volman, 2007).

Cultural Competence

As global interaction and cultural diversity have become more prominent, the ability to treat people from different cultural backgrounds considerately and with equality has been regarded as an important competence required of adults. In the current research, cultural competence has been regarded not merely as culture-specific knowledge but has also been viewed as a set of abilities to react to a number of culturally diverse situations. Such an approach to cultural competence underscored the social nature of cultural competence. In this sense, Taylor (1994) noted that cultural competence is "an adaptive capacity based on an inclusive and integrative world view which allows participants to effectively accommodate the demands of living in a host culture" (p. 154).

Current research has also generally favored the developmental viewpoint at the individual level when it comes to cultural competence. From the developmental perspective, cultural competence is viewed as a process constructed through the experience of internal discovery and external adjustment for better accommodating the intercultural environment (Bennett, 1993; Taylor, 1994). Faced with a new culture, adults discover cross-cultural similarities, differences, novelties, and difficulties, adjusting their actions, behaviors, perspectives, or even mindsets to help themselves work more effectively and comfortably (Davis, 1997). Taylor (1994) has suggested a five-stage process for becoming culturally competent: learning readiness, facing cultural disequilibrium, utilizing different cognitive approaches (reflective/non-reflective), developing learning strategies, and evolving an intercultural identity. In addition, Bennett (1993) has constructed a developmental model of intercultural sensitivity that includes six stages: denial of difference, defense against difference, minimization of difference, acceptance of difference, adaptation to difference, and the integration of difference.

Business Competence

Compared to both the K-12 level and college education, the field of business acted as an early engine for the research on competence and has had a tendency to develop it more in terms of its theoretical and practical aspects. During the 1950s, Flanagan (1954) focused on successful job performances and described a job analysis procedure using a Critical Incident Technique. His work was the basis of the competence research conducted at the corporate level and has had an influence on many outstanding researchers such as McClelland and Boyatzis during the 1970s and 1980s (Rothwell & Lindholm, 1999). In the 1980s, some researchers began to conduct an increasing number of studies on the notion of integrating competence with human resource management and development at the business level and a great number of competence models based on job-specific areas were also developed (McLagan, 1980). With

the synthesis of a variety of research on competence models in the 1990s (Spencer & Spencer, 1993), the notion of organizational core competence was introduced as an essential factor for making an organization competitive (Prahalad & Hamel, 1990). Since then, businesses have tended to build a learning culture within an organization and have attempted to encourage team work and Information Technology usability (Athey & Orth, 1999; Bassellier, Reich, & Benbasat, 2001; Murray & Donegan, 2003). This brief historical overview demonstrates that there are three approaches – personal competence, job-specific competence, cooperative competence – to competence at the corporate level, which match the theoretical framework (managing self, relating to others, managing tasks) of this study.

Personnel Competence

In the field of business, managing self refers to methods, skills, and strategies by which individuals can effectively direct their own activities toward successful job performance. Those who manage themselves in the corporate level tend to be competent to do goal setting, planning, scheduling, self-evaluation, self-intervention, self-development, etc. Thus, this section defines several competences regarding to managing self as personnel competence, which emphasizes the resources that individuals possess for successful job performance, including leadership competence and managerial competence.

After the development of social science as a field of study, people began to ask what traits leaders need to have and as a result of such questioning, developed a new theory, which has become known as trait theory. During the 1970s, several leadership theories suggested that leaders should consider a number of critical factors which affect and impact upon situational decisions, including motivation and the capability of their followers (Tannenbaum & Schmidt, 1958; Maier, 1963; Yukl, 1989). Since the 1980's, numerous alternative leadership theories have been developed. Like combination theory, some were interested in the ways in which the interaction of traits, behaviors, key situations, and group facilitation allow people to lead organizations to excellence. More recent work on leadership competence has placed a greater emphasis on cross-cultural and internationalized thinking, as well as shared and participative leadership styles. By integrating the more common components of leadership in the business area found from various competency models (Charan, Drotter, & Noel, 2001; McCauley, Moxley, & Van Velsor, 1998; Sarros, Gray, & Densten, 2002), we can draw three main categories and competences of leadership as follows; 1) self management (the ability to continue to control, supervise, and administer yourself, creative problem-solving, ethics, sound judgment, etc), 2) interpersonal skills (communication skills the ability to lead others, leveraging diversity, integrity, building trust, etc), 3) vision and organizational leadership (strategic thinking, developing operational plans and building the culture of an organization, etc).

As a second aspect of personnel competence, managerial competence focuses on people's practices and experiences in performing their jobs as a manager, including their specific "intentions to develop others, to lead others, and to improve teamwork and cooperation" (Spencer & Spencer, 1993, p. 54). Traditionally, managerial work has been explained as revolving around planning, organization, coordination, and control mostly from a functional perspective (Fayol, 1949; Mahoney, Jerdee, & Carroll, 1965). However, challenging this functional approach to management, many researchers have turned their attention to the wide variety of abilities that managers really need to possess for successful job performance such as technical skills, human resources management skills, and highly developed conceptual skills (Graham, 1983; Penley et al., 1991). In addition, the perspective of human resource management and development introduced a different way of viewing managerial work, one that described managerial competence as being composed of technical competences, business competences, and interpersonal competences (Bassellier, Reich, & Benbasat, 2001; McLagan, 1980).

Job-Specific Competence

Managing tools in the organizational settings refers to completing their work successfully using a variety of tools such as knowledge, skills, and technology. Since business tasks are closely embedded in a specific job performance, the term of job-specific competence would be most appropriate one to represent the meaning of managing tools the corporate level. Importantly, job-specific competence tends to share some characteristics with personnel competence in terms of an individuals' ability to perform

successfully at work. However, we would consider that this competence is more bounded into a specific job situation than personnel competence. In this section, we will review the research on entrepreneurship and technological competence as job-specific competence as examples.

The competences involved in entrepreneurship can be defined as related to all business activities. This competence area is described as having four important competences: 1) the ability to recognize and analyze market opportunities (Gibb, 1998), 2) the ability to communicate, identify mentally, persuade and discuss with customers, clients, suppliers in the business environment (Tolention, 1998), 3) the ability to establish linkages with other business persons and other stakeholders for mutual learning, collaborative undertakings, and other joint activities, aimed at achieving common objectives (Gielen, Hoeve, & Nieuwenhuis, 2003), 4) the ability to deal with the life world of entrepreneurship. Along with this line of thought, Onstenk (2003) has characterized a successful entrepreneur as one who possesses key enterprising skills (having motivation, the need for autonomy and independence, creativity and originality, taking initiative, and continually searching for opportunities) and the ability to develop new competences (Onstenk, 2003; Tolentino, 1998), such as having an international perspective and an eye for the implications, opportunities and threats inherent in a global business environment.

Another job-specific competence is Information technology (IT). IT is defined as computers and digital communication technology mediated by computer networks (Brynjolfsson & Hitt, 2000). Bassellier et al. (2001) also defined IT competence in business as "the set of IT-related explicit and tacit knowledge that a business manager possess that enables him or her to exhibit IT leadership in his or her area of business" (p. 164). These scholars have argued that managers who are competent in IT possess both explicit and tacit IT knowledge even though their main expertise is an area other than IT. Explicit IT knowledge means knowledge that can be taught and explained. This knowledge can be considered as specialized knowledge that is relevant for a particular job (Boyatzis, 1982). Bassellier et al. (2001) proposed five components of explicit IT knowledge; technology, applications, system development, management of IT, access to IT knowledge. Regarding tacit IT knowledge, Bassellier et al. (2001) proposed two components; experience, cognition. As to the notion of experience, they suggest personal use of IT, IT projects, and management of IT as the distinctive levels for measuring IT experience.

Cooperative Competence

Relating to others in business refers to understanding and having active interactions with coworkers for successful job performance. Since the nature of the organizational settings tend to work together to achieve the same goal in a specific job, it is appropriate to name relating to others cooperative competence in this section.

As an important example of cooperative competence, communicative competence is viewed as being an essential contribution to high productivity in that it enables business people to read, write, speak, and listen within an organization (Hellwig & Phillips, 1982; Muchmore & Galvin, 1983; Rhodes, 1985). Traditionally, communicative competence had been understood as a single ability such as writing or listening (Baker & Ashby, 1977; Battison & Goswami, 1981; Francis, 1966). However, recently, the research on communication has moved its emphasis into the integrated aspect of communicative competence involving "the ability and willingness of an individual to participate responsibly in a transaction in such a way as to maximize the outcome of shared meaning" (Littlejohn & Jabusch, 1982, p. 29) Following the line of thought, Berman and Hellweg (1989) viewed communicative competence as an integrated ability that "encompasses elements of knowledge, motivation, skill, behavior, and effectiveness" (p, 104).

The communicative competence has been utilized to develop collaboration and efficiently solve conflicts among team members. At this point, we present the team and process competences as a second cooperative competence. The view of team and process competences is based on the psychological approach to learning and performance pioneered by McClelland (1973). Underlying this view is the assumption that the individual is the primary unit of analysis in understanding organizational performance (Athey & Orth, 1999). As mentioned above, many organizations are rapidly moving away from hierarchical management structures to flatter, more process-driven arrangements (Quinn, 1992; Lawler, 1994; Ashkenas, Ulrich, Jick, & Kerr, 1995; Galbraith, 1995; Overholt, 1997). Now, Athey and Orth (1999) explained that it is increasingly common to see

temporary, cross-functional teams organized around core processes as the dominant work structure. Consequently, they added that it is becoming more important to understand and develop cross-functional team and process capabilities as critical variables in achieving business results. In addition, most organizations are faced with a growing need to utilize people with critical skills and knowledge regardless of their physical or geographical location (Athey & Orth, 1999). This demand had led to the emergence of virtual teams comprised of people from diverse functional backgrounds, geographical locations, time zones, and cultures (O'Hara-Devereaux & Johansen, 1994).

Organizational core competence, prevalent from the 1990s, highlighted the aspect of organizational competence as a component of collective competence. Prahalad and Hamel (1990) argued that if core competence is about harmonizing streams of technology, it is also about the organization of work and the delivery of value. Recent studies have classified organizational competence as an independent competence distinguished from personal competence. According to Murray (2003), organizational competences can be defined by processes, systems, and practices (e.g., training methods, performance appraisal reviews, motivation techniques, change programs, technical processes), that enable any firm to turn personal competences into organization-wide competences – they may also be transformational by allowing the firm to change and grow simultaneously. Thus, this trend now has led to the consideration of what type of learning behavior is required to develop both personal and organization-wide competences, making an effort to establishing an environment in which a particular organization can also become a learning organization (Fiol & Lyles, 1985; Senge, 1990).

Discussion

Examining the underlying perspectives and issues in the research on human ability and characteristics required for the levels of K-12, college, adult, and business education, this paper has resulted in a deepened understanding of how to view the nature or function of key competences required for individuals' successful life. From the work in the above sections, two common themes considered as having important implications for the actual practices can be drawn. First, the research reviewed in this paper has been toward the direction of illuminating human ability as possessing a holistic nature composed of different aspects. For example, in the early stage of the research, human thinking ability such as critical and creative thinking mentioned in the sections on K-12 and college education were understood as cognitive or personality related aspects, respectively. However, the recent perspective of critical thinking has been expanded to include the disposition to think critically, one that points to the affective aspects of critical thinking. Similarly, the research on creative thinking began with an emphasis on the personality aspect of creative thinking, moving into its cognitive aspects and situational elements to affect creative thinking. The research on the affective aspects of human ability such as motivation and self-regulation have also grown to acknowledge the notion that motivation or self-regulation is a complex phenomenon that is influenced by personal, social and contextual variables.

Considering the holistic nature of each competence is also prevalent in the context of adult and business education. In adult education, the meaning of literacy, which traditionally has been identified as the skills for writing, speaking, listening, and computing, is now regarded as being part of the broader range of competences in performing simulations or problem-solving of real world tasks, as well as being inherent in attitudes such as reflection, risk taking, and openness to new perspectives. Similarly, social competence, which the earlier research had a tendency to regard as being somewhat limited to social-communicative skills, is now viewed as a set of integrative abilities including social skills, democratic attitudes, and insight into society.

In the area of business, leadership competence was traditionally understood as leadership traits. However, the research on leadership competence began to pay attention to the approach of incorporating traits, behaviors, key situations, and group facilitation. In the business area in particular, in which the simultaneous development of personal competence and organizational core competence has been a challenging issue, a holistic view of competence even needs to reach the level of incorporating personal competence and organizational competence.

The second trend identified in this review, that is, the consideration of contextual influence on human ability development such as cultural and contextual differences, has

also become a major challenge in understanding human ability and characteristics. In the area of K-12 and college education, for developing and nurturing writing competence, the narrow understanding of the writing process as one being mostly concerned with a writer's mental process or writing strategies has been questioned recently. When questioned in this way, the writing research became more aware of the audience or the expectations of a particular community to which the writer belongs as being important considerations. In the area of communication, cultural awareness or cultural understanding is now considered to be one of the most important elements of successful communication, especially in areas such as nursing, counseling, and education. Furthermore, the consideration of contexts also involves the awareness of the impact of a given immediate context in which a person is performing a task because a particular context itself influences the way individuals' competence operates. Especially in the business area, business competences depend on specific and immediate contextual demands. Leadership competence has been considered to depend on contingencies or situations. This context-bounded nature of competence seems to be natural in that organizations usually provide employees with a specific work context at all levels

These two main trends identified in this study may enrich the discussion of the concept of competence. As mentioned in the earlier section on the concept of competence, competence as human ability has four essential characteristics ('wholeness', 'mobilization', 'context-dependency', and 'learnability'). The first main trend mentioned above seems to clearly demonstrate the first characteristic of wholeness, the comprehensive nature of competence. Most of aspects and areas of competence dealt with in this study revealed its various faces, such as its cognitive, motivational, and also social ones. However, little research on how those aspects or elements of each competence are related or connected to each other in operation has been done, which is another aspect of wholeness. Without fully understanding the interconnections among the elements of each competence, we might fall into a tendency to deal with those elements or aspects one by one in the case of teaching and learning contexts without considering them as an integrated whole (Rychen & Salganik, 2003).

The characteristic of mobilization places a special emphasis on the state of competence in operating, orchestrating, and coordinating one's personal attributes and available resources in responding to a specific demand. In order to reveal this aspect, we may need to undertake a deeper investigation into the dynamic process of competence in operation. However, what has been mostly done by the research on human ability across all the levels is to identify important elements of competence and examine the impact of those elements on achievement variables, rather than to observe how available resources and competence elements are being operated to make successful or unsuccessful performance possible. Therefore, we are presented with an important future agenda with which future investigations into competence can be conducted.

For context-dependency, as mentioned above in the second theme, most of the research on competence-related human characteristics we reviewed went further from the assumption that general principles or skills are effective across contexts into the realms of considering domain-specific knowledge, disciplinary differences, or cultures of oneself and other people. For example, in communication with others, cultural awareness has been widely endorsed and is currently put forward as a key element for expertise across all levels of K-12, college, and adult education, as well as the world of business. In the same sense, the affective aspects such as motivation and self-regulation are seen as situated, facilitated, and constrained by various contextual factors, and are not as an individual phenomenon but as a person-context interaction. The appreciation of this context-dependent characteristic of competence might help us understand effective skills or techniques and their relationship to contextual demands or cultural appropriateness. Interestingly, adult competency tends, in general, to focus on the generic abilities that can be applied across most contexts although some job-related competences can be more effectively formulated within a specific context in which individuals perform a job. This indicates the way in which conceptualizing competence at different levels of human development is also a phenomenon in which the contextual demands at a particular level can have an influence.

The last characteristic of competence, learnability, seems very natural to us because, without assuming the potentiality of learning, there is no need for investigating a given competence. However, in other areas of education,

concentrated efforts to develop a fuller understanding of what kind of experiences help a person to develop a certain competence appear to be largely lacking. Given that the new K-12 curriculum of New Zealand (The ministry of education in New Zealand, 2007) identified 'participation' as one of key competences, educational researchers and educators need to pay more attention to designing and providing proper educational experiences for students to participate in. As McMillan (1987) has argued, a theoretical description of the nature of learning experience that leads to a development of a given competency will be an important asset in providing valuable implications for instructional practices.

Along with the four characteristics of competence, the three domains of competence also serve as a framework to provide a possible future research agenda. The first of all, each competency needs to be considered as one that can accomplish all the functions or goals (managing the self, relating to others, and managing tools) expressed in the three domains. Although we are accustomed to classifying a set of competences into a number of organizing categories, the actual operation of any competency will not limit itself to functioning under the category to which it is classified. For example, communicative competence is categorized under the domain of relating to others, so that it involves effective communication strategies, empathetic attitudes, and multicultural awareness for the purpose of the better understanding of others. However, understanding others requires more than knowledge about others and their cultures or empathy toward others. Rather it also calls for individuals' command of symbolic and cognitive tools as well as understanding the self. Understanding about the self is especially significant in that barriers against effective communication with others come from one's own stereotypes, beliefs, or the experiences of one's counterpart. This phenomenon of interdependency upon each other among the domains of competence signifies an essential way to understand the operation of each competency.

A final research agenda the authors of this paper would like to explore is whether the issue of the self needs to be regarded as the most fundamental aspect of competence. Considering the historical context within which the topic of human competence has developed, it seems natural that the discussion of competence has been made in connection to performance, especially by using the expression of 'managing' self or tools, one that we adopted in this study. However, when competence is described in this way, we have a tendency of interpreting it as managing things outside one's self. Even in the approaches taken regarding the domain of managing the self, this tendency seems evident. Motivation, self-regulation, social competence, and leadership have been discussed under the domain of managing the self because of the way these characteristics enable individuals' responsible and reflective participation in a given task. However, the issue of personal identity for the purpose of better understanding of the self, another main feature of managing the self, has received little attention. According to the OECD (Rychen & Salganik, 2003), it is of importance for individuals to define who he/she is and to build a personal identity, because identity is closely related with values and beliefs and has an influence on personal decision-making, selections, and responsibility. As an active agent in participating and performing, the individual needs to develop an identity based on deep understanding of themselves, a foundation on which individuals' autonomy, reflection, and responsibility will be established for dealing with the demands of life. In this light, it is necessary to appreciate the role of personal identity to understand the operation of competence in the research on competence.

Conclusion

This paper incorporated four characteristics and three domains of competence with an accompanying review on competences at the K-12, college, adult and business education levels. In doing so, the authors began to develop a greater and more nuanced appreciation for what the research on human characteristics related to key competences has achieved and what is needed to advance future research. Although the selected competences for this paper do not cover all competences considered to be necessary for each level, this study hopefully provides a number of helpful perspectives to guide us better understand the nature and function of human competence. The main themes found in this review helped flesh out and illuminate the comprehensive and complex nature of each area of competence. In addition, the recent research interest in cultural and contextual factors expanded the research topics and methods from merely focusing on individuals' competence and further into the realm of acknowledging the

social and cultural factors as well as contextual demands embedded in individual performance. These two perspectives seem to indicate what needs to be considered when attempting to nurture a given competence through education. Therefore, what is needed is an education program in which different aspects of a particular competence are identified and their interrelated nature is then used to feed into the contents and methods of the program (whilst simultaneously maintaining a consideration of contextual and cultural influences), rather than merely teaching each aspect of the given competence separately and independently. This will serve as an important principle that will help deal with the problems that beset the previous efforts aimed at developing competence-based education made during the 1970 and 1980's; efforts which have been criticized for their tendency to reduce a given competence into a simple composite of separate elements.

However, despite the advances made in our understanding of the nature of human competences, greater efforts need to be made to examine the dynamic state of competence in actual operation and the role and functions of personal identity in operating individuals' competence. Moreover, such efforts will also need to focus on what kinds of experiences provide educational opportunities in which a given competence can develop to its full capacity, so as to establish educational programs as meaningful contexts for developing human competence with the simultaneous considerations of managing self, relating to others and managing tools.

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Received November 10, 2007
Revision received December 9, 2007
Accepted December 13, 2007