

An Exploratory Analysis of ICT Competencies for Educational Policymakers

Minkyung Kim

Inha University, Korea
tsk1122@naver.com

Luyu Zhang

Inha University, Korea
zlyzly1994@naver.com

Ji-Yeon Ahn

Inha University, Korea
poolver2@gmail.com

Ji-Yeon Lee

Inha University, Korea
leejy@inha.ac.kr

This study was conducted through secondary data analysis as the first step of a project to analyze the competencies required by policymakers for educational informatization and develop a competency model. After reviewing research data on specification of competency standards, including methodological reports related to competency modeling, core competencies were derived, and based on this, the ICT competency system of education informatization policymakers was proposed at a preliminary level.

Keywords: educational policymaker, ICT competency modeling, job competency, literature review

I. Introduction

In the ever-changing educational environment, such as the 4th industrial revolution and COVID-19, the required competencies for educational policymakers differ according to the changing environment, so a clear competency model of educational policymakers for future education needs to be developed, and the existing training curriculum for educational policymakers needs to be improved in accordance with this environment. In fact, it was found that the core competencies and educational training system required in Korea's e-learning business industry were very insufficient, and in-depth discussion about the duties and professionalism required of school administrators in Korea's educational reality was lacking(Choi, 2020; Park, 2019).

However, it is difficult to find existing studies that clearly state the working definition of educational policymaker, so it is necessary to present operational definitions through literature related to related jobs/position such as educational administrator and scholars.

In addition, similar to educational policymakers such as ICT educational policy, informatization policy, and ICT informatization policy are often used in relation to ICT policy, so it is necessary to present clear terms, and ICT competencies according to specific jobs and positions should be categorized.

This study attempted to analyze the core competencies required for policymakers in the field of educational informatization through literature analysis because there is a limit to measuring and deriving specific performance of educational policymakers due to the absence of an ICT competency model for educational policymakers in APEC member countries.

Therefore, through the organization chart of five APEC member countries (Indonesia, Malaysia, the Philippines, Vietnam, and Thailand), the job or position in charge of each ICT-related policy task was checked, and ICT core competencies for educational policymakers were derived based on ICT-related literature analysis.

II. Theoretical background

In order to define the ICT core competencies of educational policymakers, the concept of educational policymakers should be clarified, and competency modeling should be performed after examining the competencies performed by them.

1. Competency Modeling

Competency is a term similar to ability, and it refers to “the knowledge, skills, and attitudes required for major parts of an individual's work, and is defined as a systematic structure of behavioral characteristics shown through excellent performers in each task”(Kwak et al., 2017). In other words, competency is a reconstruction of an individual's ability required for effective work and excellent performance, and can be said to be an indicator that can be a criterion for presenting similar work performance.

The competency model is derived and organized, which refers to a specific combination of knowledge, skills, and characteristics required to effectively play a role in an organization, and is used as a human resource tool for selection, education, training, development, and evaluation succession planning(Kim et al., 2011; Jung et al., 2001). Heo et al. (2020) classified the competency model into 'core competency', which is a necessary competency for anyone, 'leadership competency' required for members of a specific organizational class, and 'job competency' composed of job common competency and job expertise.

Competency modeling is defined as a process of systematically identifying and describing the knowledge, skills, and attitudes necessary to successfully perform a specific role in an organization(Kim et al., 2011).

Kwak et al. (2017) summarized the competency modeling methods defined by representative scholars of competency research as follows <Table 1>.

Table 1

Defining competency modeling methods

Scholars	Competency Modeling methods	Resource
Dubois(1993)	job competency evaluation method, modified job competency evaluation method, generic model customization method, generic model overlay method	Kwak et al. (2017)
Spencer and Spencer(1993)	reference group use method, expert panel shortened method	
Lucia and Lepsinger(1999)	new model development method, verified model utilization method	

2. ICT (Information and Communications Technology) Competencies required by educational policymakers

Educational policy is a public policy and is defined as an educational guideline developed by the state or public organization for educational activities for citizens or education-related groups and beneficiary groups (Jung, 1996).

Educational policymakers refer to those in charge of this educational policy, but there is a significant lack of research on the concept of educational policymakers, what their duties are, and what expertise is required for educational policymakers to perform their duties. Also, there are educational administrators, educational experts, and education professionals with similar meanings, but these are also not clearly defined.

Educational administrator is a general concept, not a legal concept, and is defined as those who are directly involved in educational administrative activities. In previous studies in the field of educational policy, the term expert was often used in the empirical dimension without defining the concept of expert. Most of the studies referred to education officials and scholars (professors, education researchers) as educational experts (Byun, 2019; Hwang et al., 2019). As such, the terms that refer to practitioners related to educational policy are used as common concepts such as experts and administrators, so they need to be clearly defined.

ICT is a compound word of information technology and communication technology, and it refers to methods of information collection, production, processing, preservation, and delivery using hardware and operation of information devices, software technology necessary for information management, and technology. And representative ICT media include smartphones, tablet PCs, various mobile contents and e-learning (Kim, 2020).

ICT is an essential skill required for teachers in the education field of the knowledge-based society of the 21st century, and the literature related to the development of core competencies necessary for nurturing teachers is steadily increasing in order to improve the professionalism of teachers who use it effectively (Han et al., 2006; Jo et al., 2004; Ko & Jang, 2021; Lee et al., 2003; Lee, 2019). The ability to use ICT for future education is a competency required not only for teachers but also for learners. Ahn (2002) mentioned that most of the subjects of use appear as learners in classes using ICT, and suggested that learners' ability to use ICT is essential to achieve effective classes using ICT. The following <Table 2> summarizes the ICT core competencies of teachers and learners suggested through previous studies.

Table 2

ICT Core Competencies of Teachers and Learners

Subject	Core competency	Sub-element	Resource
Teacher	information collection activity	location identification, access, reading, collection, evaluation, storage, management	Jo et al. (2004)
	information analysis and processing activity	writing and editing of word processing materials, processing and analysis of spreadsheet data, production and editing of multimedia materials, creation and editing of presentation materials, production and management of web page materials	
	information transfer and exchange activity	presentation, delivery, communication, exchange	
	information ethics and security	understanding the knowledge information society, prevention of unsound information distribution, intellectual property rights protection, personal information management, netiquette compliance	
Learner	understanding of information and Ethics	postures and attitudes of information utilization, correct information selection and utilization	Jang and Jung(2009)
	computer basics	understanding hardware and software, learning how to use the operating system, using utility programs	
	software utilization	advanced features and utilization of word processors, for various educational purposes use of programs, use of presentations	
	computer communication	sharing information with e-mail, retrieving and utilizing information	
	comprehensive activities	collaborative project learning	

In this way, the core ICT competencies of teachers and learners could be confirmed through previous studies, but research studies on ICT competencies required for workers related to education policies that establish and realize education policies is insufficient.

III. Methods

In this study, the ICT competency of educational policymakers is derived by examining the ICT competency by job/position through literature research or educational policy reports.

1. Research Procedures

In this study, along with Korea, we checked the organization chart of the Ministry of Education of 5 APEC member countries (Indonesia, Malaysia, Philippines, Vietnam, and Thailand) to check the job or position in charge of each ICT-related policy task, and to determine ICT competency for educational policymakers. To derive competency keywords for each job/position through literature research and policy reports related to ICT, the keywords were extracted and organized.

2 Data Collection Methods

In this study, literature research related to ICT was first considered in order to derive ICT competency for educational policymakers. The method of collecting domestic literature is through keywords such as 'ICT', 'Information and communication technology', 'ICT application ability', 'E-learning', 'Competence', and 'Capability modeling' through the Korea Research Information Service (RISS) website and Google Scholar. The titles and abstracts of the searched papers were reviewed, and literature related to the subject of this project was selected. For the method of collecting overseas literature, keywords such as 'E-learning', 'Competency', and 'ICT' were entered through Google Scholar, and the final literature was selected through the same method as domestic literature collection. In addition, to review the

organizational charts of Korea and the five APEC member countries, first look at the departments and organization charts through the official website of the Ministry of Education and local offices of education in each country, then select ICT-related departments and jobs and review the specific introduction to the departments and jobs again.

IV. Results

In this study, in order to find out the general competencies and professional competencies of educational policymakers before deriving ICT competencies, the competencies of public institutions, including educational institutions were checked, and job competencies of ICT-related workers were confirmed. As for the competencies by position, the 'leadership competency' required for members of a specific organizational hierarchy of public institutions was identified, and the competencies for each job was presented by dividing it into the job general competency that appears in general and the job professional competency that can confirm the informatization capability of each job(Heo et al., 2020). The core competencies organized by job/position are shown in <Table 4> and <Table 5>.

Table 3

Core competencies by position (Heo et al., 2020)

Resource	Position	Competency	Category	
Leadership Competencies by Hierarchy of Public Organizations(Kim, 2017)	Advanced Administrator	strategic thinking, vision presentation, insight, confidence building, management mind, goal setting, fairness, creating team, performance, coaching, motivation		
	Executive Officer	planning, executive ability, responsibility, business driving force, business network		
	Working Person	followership, passion, responsibility, interpersonal, relationship, teamwork orientation		
Competency by position in Incheon Metropolitan City(Kim, 2019)	Grade 4(Senior deputy director) *	policy management, change leadership	Policy/Thought competence	
	Grade 5(Deputy director)	policy direction recognition, responding to policy changes		
	Grade 6(Senior manager)	problem solving, acceptance of change		
	Grade 7(Manager)	report writing, analytical skills		
	Grade 4(Senior deputy director)	network construction and utilization, respect for diversity	Relationship competence	
	Grade 5(Deputy director)	establishment of communication channel, reconciliation of interests		
	Grade 6(Senior manager)	conflict resolution		
	Grade 7(Manager)	customer satisfaction, communication		
		Grade 4(Senior deputy director)	organization management, performance management	Business competence
		Grade 5(Deputy director)	promoting teamwork, team performance management	
Grade 6(Senior manager)		team work orientation, goal management		
Grade 7(Manager)		business expertise		
R&R-based core competencies by position(NHI, 2018)	High Industrial	insight	Thinking competence	
	Manager Level	systems thinking		
	Grade 5	creative thinking, logical thinking		

Resource	Position	Competency	Category
	Grade 6 or lower	analytical thinking, data literacy	
	High Industrial	change management, innovation	
	Manager Level	performance management, organization management	Business competence
	Grade 5	business agility	
	Grade 6 or lower	business adaptability	
	High Industrial	organizational integration	
	Manager Level	team management	Relationship competency
	Grade 5	communication skills	
	Grade 6 or lower	co-ordination	

* Grade 4: Senior deputy director, Grade 5: Deputy director, Grade 6: Senior manager, Grade 7: Manager

Table 4

Core competencies by job

Job competency	Competency		Resource
	category	sub-element	
Job general competency	expertise & intellectual qualities	self-development, learning and growth	Gyeonggido Office of Education(2022), Hong et al.(2020), Kwak et al.(2017), Kim et al.(2011)
	schedule adjustment & time management	schedule management ability	Choi and Jang(2010), Kim et al.(2011)
	facility management	safety and security management, facility equipment management	Kwak et al.(2017)
	sales & marketing	promotion	Choi and Jang(2010), Kwak et al.(2017)
	ethical awareness	morality	Hong et al.(2020), Kwak et al.(2017)
	work attitude		Kim et al.(2011)
	work ability & propulsion	achievement orientation, Policy implementation	
	organizational commitment & responsibility		Gyeonggido Office of Education(2022), Hong et al.(2020)
	interpersonal understanding		
	drive change		
	innovation orientation		

Job competency	Competency		Resource	
	category	sub-element		
Job professional competency		understanding social change		
		service operation analysis		
		learner management		
		organizing ability		
		scholarship ability		
		basic intelligence information	PC management, system installation, ability to utilize OA, write a research report, data management skills, internet ability	
		understanding of intelligence information	intelligence information policy, intelligence, information high-end technology, understanding and using regulations/laws, intelligence information good functions, intelligence information dysfunctions, understanding computer hardware	Choi and Jang(2010), Kim and Lee(2020), Kwak et al.(2017)
	intelligence information ability	collecting and utilizing information, software utilization, searching for data review, data management		
	intelligence information problem-solving	recognize problems and share goals, creative problem-solving skills, analytical thinking skills, deriving alternatives	Choi and Jang(2010), Gyeonggido Office of Education(2022), Hong et al.(2020), Kim and Lee(2020), Kwak et al.(2017)	
	intelligence information project management	research project management, planning, process management, communication skills, interpersonal relationship ability, collaboration ability, self-regulation ability, research performance management, research performance evaluation, spread of research performance		
	intelligence information planning	intelligence information vision, intelligence information long-term strategy development	Choi and Jang(2010), Hong et al.(2020), Kim and Lee(2020), Kwak et al.(2017)	
	intelligence information leadership	intelligence information diffusion, intelligence information execution, intelligence information competency development assistance	AI-Hunaiyyan et al.(2012), Hong et al.(2020), Kim and Lee(2020)	

V. Conclusion

The major research results are summarized as follows.

First, although it was intended to confirm the clear definition of educational policymaker through existing studies, it was difficult to make a clear definition due to the lack of research that specifically presented the concept of educational policymaker. Therefore, in order to materialize the ambiguous concept, this study examined studies on educational policy-related workers such as educational administrators and scholars, and although the definition of the term educational policymaker was not clear, it could be confirmed closely through the concept of related workers. This study is the first step in a long-term project that aims to analyze the competencies required for policymakers in the field of educational informatization for educational policymakers in APEC member countries and to develop a competency model. Therefore, based on this study in the future, it is necessary to define educational policymakers through various tasks such as steady literature analysis and future interviews with ICT-related practitioners.

Second, Before confirming the ICT competencies of educational policymakers, through literature analysis, the competencies of each position in public institutions, including educational institutions, and the job competencies of ICT-related workers were examined. As for competencies by position, we first checked the basic competencies from managers to practitioners because we wanted to find the organization chart of the Ministry of Education of five APEC member countries and analyze who is in charge of policy and what kind of positions they have. As for the job competencies, it was possible to confirm the job general competencies that appeared in general and the job professional competencies including the intelligent informatization ability. Therefore, this suggests that it is possible to categorize general competencies and core competencies according to detailed tasks of policy-related workers by job/position to prepare a draft of competency analysis and competency model development required for policymakers in the field of educational informatization in the future.

References

- Ahn, S. (2002). A study on the effect of problem based learning to improve students' ability in using ICT. *Journal of the Korean Association of Information Education*, 6(2), 1-10.
- Al-Hunaiyyan., Al-Sharhan, S., & Al-Sharrah, H. (2012). A new instructinal competency model: Towards an effective e-learning system and environment. *International Journal of Information Technology & Computer Science*, 5, 94-103.
- Byun, K. (2019). The political behavior of the public officials in the education policy-making process in south korea. *The Journal of Politics of Education*, 26(3), 231-258.
- Choi, M., & Jang, E. (2010). A study on development of competency based curriculum according to job of e-learning workers. *Journal of Korean Association for Educational Information and Media*, 16(2), 277-313.
- Dubois, D. D. (1993). *Competency-based performance improvement: A strategy for organizational change*. Amherst, MA: HRD Press.
- Gyeongggi Provincial Office of Education. (2022). *Basic plan for the promotion of teachers' competency enhancement policy*. Teacher Competency Development Division.
- Han, K., Lee, Y., & Lee, J. (2006). An Investigation of teachers' knowledge and skills on the use of information and communication technology in classroom. *Journal of Korean Association for Educational Information and Media*, 12(1), 67-86.
- Heo, S., Ahn, B., Kim, J., & Lee, W. (2020). *Planning on development of KISTT's competency model*. Science Data School.
- Hong, S., Lee, J., Oh, S., Lee, W., & Park, S. (2020). *A study on the establishment of a system to support the growth of employment volume of educational staff*. Gyeongggi Institute of Education.
- Hwang, J., Park, K., & Kim, K. (2019). A study on the establishment and operation of national education committee: The delphi survey. *The Journal of Politics of Education*, 26(3), 205-230.

- Jang, E., & Chung, J. (2009). The analysis and efficient operation of ICT education in elementary school. *The Journal of Korean Association of Computer Education*, 13(1), 383-388.
- Jeong, I. (1996). *Education policy theory*. Seoul: Wonmisa.
- Jo, M., Kwon, H., & Lee, K. (2004). Analysis on the current status of using Information and Communication Technology (ICT) in elementary schools. *Journal of the Korean Association of Information Education*, 8(2), 227-240.
- Jung, J., Min, B., & Kim, J. (2001). *The art and science of competency models*. PSI Consulting.
- Kim, H. (2017). *Development of hierarchical leadership competency model for public organizations: A study on the main character of the samon hwasung fortress project* [Unpublished master's thesis]. Hanyang University.
- Kim, H. (2019). *Development of level 4 competency modeling and education evaluation task in incheon metropolitan city*. Incheon Metropolitan City Researcher Report.
- Kim, J., & Lee, J. (2020). A study on the exploration of national public officials' intelligence information competency in intelligence information society: Focusing on bloom's digital taxonomy. *Journal of Digital Convergence*, 18(7), 73-84.
- Kim, S., Kim, Y., & Oh, H. (2011). Development of planning and analysis competency model of e-learning instructional designer. *The Korean Journal of Educational Methodology Studies*, 23(1), 77-106.
- Ko, Y., & Jang, J. (2021). Teacher ICT use and its influence on students' perceived learning: A structural analysis. *The Journal of Educational Information and Media*, 27(2), 531-557.
- Kwak, J., Ko, E., & Kim, S. (2017). Development of e-learning competency modeling education roadmap for human resource in science & technology. *The Journal of Korean Association of Computer Education*, 20(1), 75-86.
- Lee, S., & Lee, K. (2003). Teacher's core competencies for utilization of information and communication technology in the knowledge-based society. *The Journal of Korean Teacher Education*, 20(3), 203-223.
- Lucia, A. D., & Lepsinger, R. (1999). *The art and science of competency models: Pinpointing critical success factors in organizations*. San Francisco: Jossey-Bess/Pfeiffer.
- Lee, Y. (2019). The composition of curriculum to improve ICT instructional media competency of early childhood teacher. *Journal of the Korea Academia-Industrial*, 20(12), 588-596.
- National Human Resources Development Institute for Public Officials. (2018). *A study on the systematization of core competencies and education based on R&R by position*. National Human Resources Development Institute for Public Officials.
- Park, S. (2019). Concept and development plan of school administrator professionalism. *Educational Administration Research*, 37(2), 61-87.
- Spencer, L. M., & Spencer, S. M. (1993). *Competence at work*. John Wiley & Sons.