Analysis of Elementary Teachers' Readiness for Smart Learning in Korea

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Abstract. The study aims to analyze the "smart learning readiness" of elementary teachers in Korea. The readiness for smart learning in our study was measured by multiple facets of elementary teachers' perceptions and practices in the classroom. We sent out the survey to teachers in Seoul and its suburban areas of South Korea, and 422 completed surveys were analyzed. The results showed that 1) the physical readiness of smart learning environments, in terms of the availability of smart devices/media, was low; 2) the professional development opportunities for smart learning were insufficient, and teachers wanted to know how to use smart technologies, devices, programs, and how to design smart learning environments; 3) teachers' expectation level for smart learning was not so high, and less experienced teachers expressed higher expectation than more experienced teachers; and 4) the biggest obstacle to implement smart learning was a lack of sufficient time for teachers to research and prepare for instruction.

Keywords: Elementary Teachers; Smart Learning Readiness; Smart Technologies; Professional Development

1   Introduction

The rapid development of Information and Communication Technology (ICT) has changed every aspect of our life. Over the past 20 years, the digital revolution has changed the way we play, work, and learn. Schools are not an exception to these changes. Yet, the changes from technological advances in schools are often slower than that of other parts of our society. Indeed, it is well known that innovations in schools are hard to achieve. Possible reasons might include the reluctance of school teachers to adopt any sort of changes or reforms, and the rigidness of schools and conservative educational systems [1].

In Korea, the government has since 2011 been driving efforts toward Smart Learning [2]. Based on Korea's strong IT infrastructure, Korean government envisions "anytime, anywhere, ubiquitous education to meet every student's needs." To realize its vision, the Ministry of Education has set action plans that

include the following topics; 1) developing and distributing interactive digital textbooks in schools, 2) fostering online learning and evaluation systems and infrastructures, 3) free use of educational contents, and cultivating safe environments for those contents, 4) developing smart learning and teaching competencies of teachers, and 5) setting the foundation for cloud services in education. The Ministry of Education defines SMART education as being *S*elf-directed; *M*otivated; *A*daptive; *R*esource-enriched; and *T*echnology-embedded education. In other words, SMART education is not just smart technology-utilized education; rather a reform of educational systems is envisaged that includes educational contents, methods, evaluation, and environments utilizing ICT and networked resources, so that every student can be a global leader who is maximizing his/her potential[2, 3].

Despite these ambitious plans under the national SMART education paradigm, it is not yet certain whether schools and teachers are quite ready for SMART education. To this end, this study aims to analyze the current state of schools and teachers' readiness to adopt, adapt, and implement smart learning.

In particular, we believe elementary schools and teachers are critical for this smart learning innovation due to a couple of reasons. First, elementary schools have more freedom to experiment with innovations than later schooling, since they are further away from university entrance competitions in Korea. Second, younger students are born with, and are more familiar with new technologies (i.e., digital natives). Thus, elementary teachers need to keep catching up with new technologies, and be able to utilize those new technologies in their teaching and learning practices to motivate students and hold the attention of students, who regard it as natural to have instant feedback and immersive interactions in their everyday life.

We designed a survey study to find out to what extent elementary teachers and their school environments are ready for smart learning, and what factors might influence the degree of readiness of the elementary teachers for smart learning in Korea. Due to a page limitation, we will only report partial results from the full survey data.

2   Literature Review

Technology integrations in the classroom have been a hot topic of research interest in the field of educational technology. Well known critical factors that hinder effective technology integration in the classroom include availability and access to computers [4, 5]; teacher beliefs and attitudes [6, 7, 8]; availability of curriculum materials [9]; and technical, administrative, and peer support [9, 10, 11]. Although the availability and access to hardware and Internet in the schools have been a less issue than other obstacles these days, new development of smart technologies requires schools to keep updating and upgrading their technical and

technological resources. It leads to a need for ongoing training and support for teachers. Teachers need to keep updating their knowledge and skills of smart technologies and smart learning.

In this study, we investigate "smart learning readiness" in regards to what extent the general barriers of smart technology integration in the classroom have been overcome or remained at the present schools. In other words, we explores to what extents teachers are ready to integrate smart technology in their everyday teaching practices.

3   Research Method

3.1   Subjects

The survey on elementary teachers' smart learning readiness was developed by the authors, and sent out to 450 elementary teachers in Seoul and its suburban areas of South Korea, in the Fall semester of 2013. After cleaning incomplete surveys, a total of 422 responses (346 female and 76 male teachers) were used for statistical analyses. The respondents consisted of 313 BA degree holders, and 109 MA/Ph.D degree holders. Of the respondents, 15.4% had been teaching for less than 3 years, 24.9% had been teaching for 3~5 years, 27.2% had been teaching for 6~10 years, and 32.5% had been teaching for more than 10 years in schools.

3.2   Survey Instrument

The readiness for smart learning in our study was measured by multiple facets of elementary teachers' perceptions and practices in the classroom, including: teaching and learning environments for smart learning in schools, expected outcomes of smart learning, perceived obstacles to smart learning in the classroom, and professional development opportunities for smart learning.

In addition, questions were included in the survey that asked about teachers' previous experiences with ICT integrated instructions; personal use of smart technologies and devices; understanding of smart learning-related policies and research; support from school administrators; attitudes toward computers, ICT integrated teaching and learning in the classroom; and teachers' perception on general education. However, the analyses of these questions were not reported in this paper.

4   Results

4.1   Physical Readiness of Smart Learning Environments in the Classroom

We asked teachers whether the following smart devices are equipped in their classroom for smart learning, and how often they use them. Computers (for teacher use), TVs (for projecting the teacher's computer screen), and printers are prevalent in most schools; but computers for student use, including Tablet PC or Smart Pads, are still rare to find in a regular classroom. Technology use in the classroom seems to still be limited to teacher-directed teaching practices. In addition, for the question asking whether teachers perceive that their classroom is ready for smart learning, 66.5% (n=278) of respondents answered, "No".

Smart learning does not necessarily mean 1:1 computing. However, recent smart technologies and smart devices/media can allow self-directed, motivated, adaptive, and resource-rich teaching and learning, i.e. SMART education. In particular, interactive digital textbooks require individual smart devices [3]. Thus, it seems that schools are not quite ready to take full advantage of smart technologies.

Most respondents (97.1%) said there is a computer lab in their school; but more than a half (56.5%) responded that they only use the lab 1~2 times per month. Furthermore, 70.0% of respondents reported that there is a computer lab assistant; but their main role is often limited to maintaining computers (70.0%), and introducing/explaining how to use devices and technologies. Only a small number of teachers (5.6%) reported that their computer lab assistant might help them to support ICT integrated instruction, or the development of instructional materials. It is important for teachers to have technical support in the computer lab; but they also need instructional support from technical experts. This means technical assistants need to be trained, and develop expertise in the instructional use of technologies, to support teachers. Also, if each classroom is to be equipped with individual smart media devices, teachers will need technical support in their classroom, as well as in the computer lab. Schools should be aware of these technical support needs in advance, when they move toward smart learning environments.

Table 1. A list of smart devices available in a regular classroom

Rank	Smart devices	N	%
1	Computers for teacher use	416	99.3
2	TV	410	98.1
3	Printer	393	94.0
4	Electronic Board	13	3.4
5	Computers for student use	9	2.3
6	Tablet PC or Smart Pads	8	2.1

4.2   Professional Development Opportunities for Smart Learning

More than a half of teachers (67.9%) responded that they have never had professional development on smart learning. In Korea, professional development (PD) for elementary teachers is quite systematic; there are many topics teachers can choose from, and there are required hours that teachers should complete. However, it seems that PD on smart learning is not yet readily offered to teachers. Of the respondents, only 22.6 % said the opportunities for smart learning PD that they have been given were sufficient. Specific topics that teachers want for PD include: how to use educational software, programs, and Apps for smart learning (44.4%), how to design smart learning environments (28.7%), how to use and maintain smart devices/media (18.7%), and how to use smart learning for student evaluation and management (8.2%).

Online professional development can be a good way to offer smart learning PDs to vast numbers of teachers across the country. It is important for teachers to experience smart learning by themselves as a learner, especially if teachers are not digital natives.

4.3   Expected Outcomes of Smart Learning in the Classroom

The survey asked to what extent teachers agree on the expected outcomes of smart learning in the classroom, using a 5-point Likert scale (5 being strongly agree). On the total score of the expected outcomes, the respondents gave 3.33 on average (SD = 0.599). Items for the expected outcomes of smart learning consist of instructional outcomes, Q&A and feedback between teachers and students, communication, interaction, high-ordered thinking skills, such as problems solving and critical thinking, motivation and satisfaction, and knowledge sharing. Teachers expect smart learning will close the gap between excellent students and underachievers. Also, smart learning will be able to solve the problem of educational gap, as well as digital divide among students.

Group differences were analyzed by gender, level of academic degree, and teaching experience. There was no difference of smart learning expectations between men and women teachers (t=0.794, p>.005), and between BA and MA/Ph.D degree holders (t=0.138, p>.05). On the other hand, there was statistically significant difference among groups of different teaching experiences [F(3, 418)=1.713, p<.001]. Tukey's post-hoc test showed that teachers with less than 3 years of teaching experience (i.e., younger teachers) had higher expectations for smart learning than teachers with more than 6 years of experience.

4.4   Perceived Obstacles to Smart Learning in the Classroom

Teacher-perceived obstacles that hinder the implementation of smart learning in the classroom are as follows. First, the survey results revealed that teachers are busy doing miscellaneous work, which is not directly related to classroom teaching. As a result, teachers did not have much time to research and prepare for their instructional practices. This finding resonates with the earlier studies [7], [10].

Second, there are adequate instructional models, curricula, software, and educational materials for smart learning. These are not readily available to teachers. Therefore, teachers feel that they try to change their teaching and learning methods and materials on their own, without sufficient support and guide from the government or educational offices in a district.

Third, it is not so easy to maintain and update expensive smart learning devices/media in the classroom. In the main, the responsibility for managing smart devices and media in the classroom is up to teachers. However, they are not skillful at mending and fixing the devices and media.

Fourth, not all teachers are willing to implement smart learning in the classroom because of several reasons, such as a lack of instructional support, a lack of time for researching and preparing instruction, a required change of a familiar teaching style, and personal and organizational psychological resistance to adopting new learning methods in the classroom. In particular, whenever a new method comes up, a teacher applying it in the classroom is not assured of whether the new method will positively affect the effectiveness of education, compared to traditional teacher-centered instruction.

Fifth, some teachers felt that they are not ready to use and adapt smart devices and media in the classroom, because they do not have sufficient competencies to use smart technologies, knowledge of smart media functions, prior knowledge on teaching and learning in smart learning environments, and previous experiences of taking full advantage of smart technologies.

Table 2. A list of perceived obstacles to implementing smart learning in the classroom

Rank	Perceived obstacles to smart learning	N	%
1	A lack of time for instructional research and preparation, due to unrelated miscellaneous work	124	30.2
2	A lack of adequate instructional models, curricula, or software for smart learning	87	21.2
3	Difficulties in maintaining and updating smart devices/media	85	20.7
4	A lack of willingness to implement smart learning	57	13.9
5	Teachers' lack of ability to use smart devices/media	37	9.0

There was no difference of perceived obstacles between men and women teachers (χ^2=10.380, p>.05). However, there was a statistically significant difference

between BA and MA/Ph.D degree holders (χ^2=12.599, p<.05). BA degree holders felt that a lack of time for research and preparation, and a lack of adequate instructional models are bigger obstacles; whereas, MA/Ph.D degree holders saw a skill-shortage of teachers as a bigger obstacle than others.

5   Conclusion

Korea is well known for its strong IT infrastructure across the nation and advanced smart technology workforce. A recent national survey showed that 69% of students of all age (85% of middle and high school students) in Korea possessed their own smart phone [12]. Nevertheless, the results of this study showed that schools are not quite ready for smart learning or SMART education, as defined by the government, and by research. As for all other reforms in education, smart learning innovations cannot be achieved by a single part of the educational system. All key stakeholders, including students, teachers, parents, administrators, community members and the government, should share a common vision for smart learning, and have the chance to freely discuss the pros and cons of smart learning and education in the school. This study has only tapped into the bigger question, by asking teachers what they think and perceive about smart learning. We believe in the high potential of smart learning for better learning and teaching. Classroom-based practical research, as well as theoretical research, should therefore be carried out on topics such as the development of good smart learning materials, instructional models, strategies, methods; PD for teachers and administrators; evidence that shows the effectiveness of smart learning on students' cognitive, affective, and motivational level compared to traditional instructions, and so forth. The implementation of smart learning in the classroom does not simply mean the utilization of smart devices and media. In order for students to experience smart learning, teachers need to design smart learning environments which include not only physical environment but also instructional and emotional learning experiences.

References

[1] Ertmer, P. A., Ottenbreit-Leftwich, A. T.: Teacher Technology Change: How Knowledge, Confidence, Beliefs, and Culture Intersect. Journal of Research on Technology in Education,| 42(3), 255－284 (2010)
[2] Ministry of Education, Science and Technology.: Smart Education Driving Strategies and Action Plans, Republic of Korea (2011)
[3] National Center for Digital Textbook, Korea Education and Research Information Service, http://dtbook.edunet.net (Korean site) ; http://www.edunet4u.net/engedunet/bs_01_01.html (English site)

[4] Barron, A. E., Kemker, K., Harmers, C., Kalaydjian, K.: Large-scale research study on technology in K-12 schools: Technology integration as it relates to the National Technology Standards. Journal of Research on Technology in Education, 35, 489-507 (2003)

[5] Norris, C., Sullivan, T., Poirot, J., Soloway, E.: No access, no use, no impact: Snapshot survey of educational technology in K-12. Journal of Research on Technology in Education, 36(1), 15-27 (2003)

[6] Ertmer, P. A.: Teacher pedagogical beliefs: The final frontier in our quest for technology integration? Educational Technology Research and Development, 53(4), 25-39 (2005)

[7] Hew, K. F., Brush, T.: Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research. Educational Technology Research and Development, 55, 223-252 (2007)

[8] van Braak, J.: Individual characteristics influencing teachers' class use of computers. Journal of Educational Computing Research, 25(2), 141-157 (2001)

[9] Becker, H. J., Ravitz, J.: The influence of computer and internet use of teachers' pedagogical practices and perceptions. Journal of Research on Computing in Education, 31(4), 356-384 (1999)

[10] Cuban, L., Kirkpatrick, H., Peck, C.: High access and low use of technologies in high school classrooms: Explaining an apparent paradox. American Educational Research Journal, 38(4), 813-834 (2001)

[11] Sandholtz, J. H., Reilly, B.: Teachers, not technicians: Rethinking technical expectations for teachers. Teachers College Record, 106(3), 487-512 (2004)

[12] Ministry of Education: Smartphone Ownership Rate of Elementary, Middle and Highschool Students in Korea. Press release, Ministry of Education (2013.07.29)