

Trends and Revitalization of Smart-Learning in Elementary and Middle Schools

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Abstract: Today, the demand for smart-learning is increasing along with the rapid supply of smart devices. Nevertheless, the current plans for revitalizing smart-learning in school education are absolutely insufficient at the national level. Therefore, this research sought to examine the meaning of smart-learning, analyze its trends and search ways of revitalizing smart-learning. The proposed plans for revitalizing smart-learning include infrastructure building, software support and increasing the capacity of human resources. Through concrete discussions based on these measures of revitalizing smart-learning, practical actions for the sake of advancement of school education are highly anticipated.

Key words: Smart-learning, elementary school, middle school, national level, human resources, South Korea

INTRODUCTION

As the information society evolves into the Web 2.0 era, a new educational trend rises as an object of attention. That is the birth of smart-learning which resulted from the fusion of wireless communications and the internet. Today, mobile networks create various social issues along with the rapid spread of the smart phones. Social relations built on Social Network Services (SNS) are creating a new social ecosystem apart from the traditional stereotype of human relationships. Additionally, as the internet became accessible at anytime and anywhere, information can be swiftly accessed whenever needed. The democratization movements of North Africa and Islamic area of the Middle East, crying out for freedom to escape from the authoritarian iron fist rule can be interpreted as arising from such social networks (Bingham and Conner, 2010).

The properties of the environment of smart-learning which resulted from the fusion of wireless communications and the internet include mobility, rapidity and practicality. Such smart-learning environment provides education with an interesting task. Today, education pursues integrated problem recognitions and resolutions based on actual situations and the context (Bell, 2010). Therefore, a new device and the mobile-based smart environment make the students learning more attractive. In other words, the learner is provided with practical and live learning opportunities, instead of a knowledge-oriented classroom environment. As the Korean curriculums are stressing on the importance of creativity, the significance of smart-learning is growing rapidly. This research is focused on analyzing the trend of

smart-learning based on case-studies and finding ways to vitalize smart-learning in schools based on the analysis. The subjects of this research are as follows:

- First: what is smart-learning?
- Second: what is the trend of smart-learning?
- Third: how can smart-learning be vitalized?

THE MEANING OF SMART-LEARNING

Learner's self-conductance: Smart-learning has a wide range of meaning and includes the existing attributes of e-Learning and u-Learning. Korea's President's Council on National ICT Strategies defines the meaning of smart-learning as (PCNIS, 2011). Smart learning is an intelligent personalized learning system for the empowerment of 21st century learners. It is the power to revolutionize the education system such as educational environment, educational content, teaching methods and assessment.

PCNIS suggests the properties of smart-learning as: self-directed, motivated, adaptive, resource free and technology-embedded. This suggestion is interesting because PCNIS extended the interpretation of smart-learning from a technology aspect into a broader aspect.

On the other hand, KERIS (Korea Education and Research Information Service) defines the concept of smart-learning based on smartness (KERIS, 2011). Especially, smartness includes the learners smartness in addition to a smart device and the individualization of learning service. This means, smart-learning should be done by the learner himself (or herself). KERIS defines

smart-learning, focused on smart learners as follows. Smart-learning is a learning method which the learner develops self-initialized and creative learning capability while he/she utilizes smart devices and social networks to examine his/her needs and establish a learning process to achieve optimal results.

Mobile learning support: From a different level, smart-learning has close relationship with the generalization of mobile environment. Therefore, the concept of smart-learning becomes clearer as the meaning of mobile learning is understood. If e-Learning is seen as a broader concept, mobile learning can be seen as a subset of e-Learning. However, mobile learning has some characteristics differentiating itself from the existing e-Learning. compares e-Learning and mobile learning as shown in Table 1.

As shown in the Table 1, mobile learning includes the properties of practicality, instantaneity, ubiquity, individuality, cooperativity, informality. Let us discuss about such properties of mobile learning one by one. Firstly, mobile learning has practicality (Fig. 1). This means, the learner can carry a device such as smart phone or tablet computer and study at the actual place as needed. Secondly, instantaneity means that required information can be attained and composited on site. Third is ubiquity, meaning that learning can be done whenever needed at anytime and anywhere. Mobile learning with these three properties is considered highly useful in school education where learning in practical context is extremely important. Forth is individuality and cooperativity. Individual learner can select and composite information according to the individual's demand and state. Furthermore, collective intelligence can be formed

through participating and sharing information in various social network activities. Lastly, mobile learning has informality. Real world has a nature of complex systems and the problems cannot be solved by segmented knowledge from well-organized textbooks. The principles and methods of solving problems should be amended and replaced depending on the time and place. Therefore, it is necessary to utilize the informal mobile learning to create more meaningful knowledge and information. The contents of mobile learning properties can be organized as follows:

Meanwhile, wireless network is the core factor that allows mobile learning to have the above-stated properties. Wireless network communication makes it

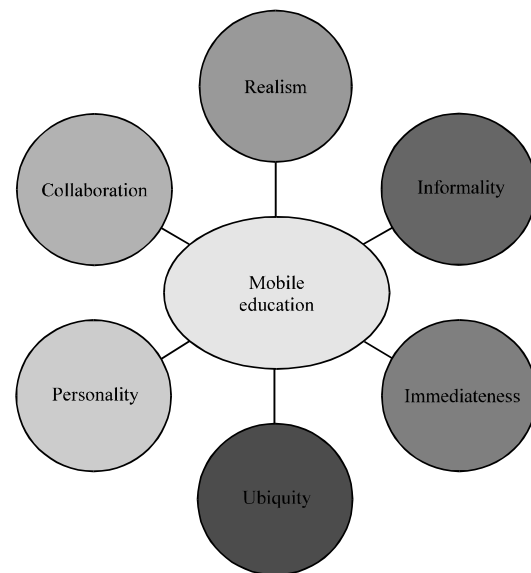


Fig. 1: Mobile learning

Table 1: Comparison between e-Learning and mobile learning

Classification	e-Learning	Mobile learning
Feedback related to time	Time delayed asynchronous	Asynchronous and synchronous
Feedback target	Public or standardized teaching	Personalized teaching
The environment in which the feedback occurs	Simulation and laboratory-based experiments	Direct experiments in real life and on-site
Teacher-learner communication	Asynchronous	Synchronous
Learners communication	Using e-mail or chat	Instantaneous communication at anytime
	Personal area	No geographical restrictions
	Group meeting through a separate time	Flexible group meeting possible at anytime
Working with groups	Individualized or demand-driven group research	Collaborative group work takes place simultaneously
Device	Computer	Mobile device
Content type	Multimedia	Object
Forms of participation	Interactive	Voluntary
Relations with network	Form of hyperlinks	Connected
Relationship between users	In network	Connected
Forms of learning	Distance education	Situation learning
The learning process	More formal	Informal
Learning situations	Simulated form	A more realistic situation
Major learning theory applied	Hyper-learning	Constructivism, situation-based and collaborative learning
Location of lecturer or learner	Lecturer exist in classrooms or in online labs	Learning is possible even on-site or while moving

Table 2: Properties of mobile communications

Condition	Properties
Present	Ubiquity
	Reachability
	Security
	Convenience
Future	Localization
	Instant connectivity
	Personalization

Geum (2004). A study on the revitalization of mobile content. Korean broadcasting Institute

possible for the learners to learn at various places using mobile devices. In Table 2, Durlacher Research, a market research agency, suggests the properties of mobile communications at present and in the future.

Today, as smart devices are popularized, the above listed future properties of mobile communication are rather realized at present. Furthermore, the properties of mobile communication suggested by Durlacher Research largely overlap the previously stated properties of smart-learning. As researchers synthetically analyze the definition and the properties of smart-learning, the concept of smart-learning can be defined as follows.

Smart-learning can be defined as a practical self-conducted learning which utilizes convenient mobile computers based on wireless networks to overcome the limit of time and place and instantly fulfill individual or cooperative learning activities. In other words, smart-learning is elevating the level of learner-oriented self-conducted studies, utilizing smart devices based on advanced information and communication technology.

THE TREND OF SMART-LEARNING

Target of trend analysis: Today's smart-learning can be seen as an embryonic stage. Recently Korea has set up a national-level strategy to vitalize smart-learning and entered the stage of practicing it. This research proposes the trend of Korea's smart-learning. In the recent years, Korea is operating a research school for u-Learning based on mobile network, before smart-learning is propagated to individual schools. This research analyzes the trend of smart-learning based on Korea's u-Learning research school's action results and based on the analysis, propose a way to vitalize smart-learning. Practical measures are suggested based on the operation results and proposals freely stated by each school. The list of u-Learning research schools appointed by the Ministry of Education, Science and Technology in the period of March, 2009 to February, 2010 is shown.

List of u-Learning research schools appointed by the ministry of education, science and technology:

Seoul A Elementary School	Choongnam D Elementary School	Kyungbuk H Elementary School
Gyeonggi B Middle School	Incheon E Middle School	Jeonbuk G Middle School
Cheongju C Foreign Language High School	Wonju I Technical High School	Jeonnam F High School

It includes 3 elementary schools, 3 middle schools and 3 high schools (MEST, 2010a-i).

OPERATION RESULTS OF EACH

Seoul A Elementary School: Education infrastructure for u-Learning environment was established by setting physical and human foundation in the hospital school, classrooms and homes of patient students. Continuity of learning is maintained by setting of customized patient students u-Learning system. Adaptability to school life has increased through peer group personality programs. Continuous feeling of fellowship, confidence and emotional stability were sustained through u-Learning friends and u-Learning classes.

With appropriate timing and hours of classes along with suitable courses of studies an institutional strategy was provided for patient students to advance to higher levels without a problem. This also gave the students confidence in proceeding their studies without excessive burden. Application of peer programs positively changed the perception and consciousness (care for the physically handicapped, understanding of different persons and recognition of problems) of an average student regarding the patient students in hospital schools who have behavioral disorders, developmental disabilities, autism disorder or childhood cancer.

The relationship with home room teachers and the peer mentors fostered social abilities as well as the effectiveness of illness treatment of the patient students who live under medical treatment and merely have contact with people outside.

Choongnam D Elementary School: One of the most favorable u-Learning environment was realized with the supply of PC and MID, upgrade of research class environment, u-Learning classrooms set up, wireless internet set up, sharing environment set up, operation of blog, RSS and internet cafe and the utilization of Choongnam cyber school and U-LSS. The teachers

u-Learning mind was improved through research class operation and on-campus trainings. Student trainings improved the ability to utilize the u-Learning tools and devices. Also, comprehension and support for research schools could be obtained through parents training.

Generalized model of u-Learning research study for creativity was developed and the generalized resource for various study applications of u-Learning and research studies has been made. As a result, u-Learning can be easily approached by general schools in different study forms. With the application of u-Learning research study model for the purpose of enhancing creativity, a new education manner that is applicable for future society was raised. This newly developed item of u-Learning research study process can be applied generally.

The result of the research study of u-Learning showed that the academic ability of the subject class positively changed in comparison with the standard class and the measure for creativity was statistically increased. The result of the application of various u-Learning education methods, the interest of the subject class regarding the research curriculum increased compared to the standard class. This result established the foundation for applying the u-Learning education method to other curriculums.

Kyungbuk H Elementary School: Although, the wireless network was set up based on the AP in the 1st year, the connection rate was low due to AP interference and deterioration. Thus, in the 3rd year, it was reassignment u-Learning server, TPC upgrade, etc. Education environment was improved and community that was made by u-Learning made link among school, family and region. u-Learning training activities spread u-Learning mind and increased the learning abilities.

Community-Based Learning Models were searched and the teaching-learning plans by different models were applied to the proposed class models in u-Learning environment. This way, academic achievement and self-directed learning skills were effectively increased. Application of community based Teaching-Learning Model suitable for u-Learning positively affected classroom lectures and other learning activities by arousing student motivation and interaction between learners. Deployment of remote collaborative learning with the branch schools provided high satisfaction to students by providing them vibrant learning contents of other areas.

Gyeonggi B Middle School: Through the endeavor of stabilizing the school's infrastructures and the systems, the students' satisfaction rate regarding u-Learning

education environment and the devices was increased. Through student and teacher training for u-School operation, the students and the teachers have better understanding of u-Learning education and have higher literacy ability.

The students' interest and understanding level in classes increased through the establishment of the u-Learning Professor Study Model that could be universalized in u-Schools. The customized self-initiated studies utilizing u-LSS brought meaningful outcomes in increasing the students' self-driven learning capabilities and scholastic achievement.

Incheon E Middle School: Previously, many students were suspended because of low awareness of hospital schools. Now, hospital schools are actively promoted to general people and parents through various mass media or inpatient students who take u-Learning classes in hospitals and the number of suspended students decreased.

Creating u-Learning contents are generalized among the first-line teachers with the supplies such as u-Learning public classes using the electronic blackboard and easy method of creating teaching-learning contents through school homepages. Problem-Based Learning (PBL) Model utilizing u-Learning was developed and applied and the self-initiated study capacity of the students of hospital schools has increased. Also, as a result of the survey of the teachers, Problem-Based Learning (PBL) Model utilizing u-Learning was selected and universalized as the Real Time Lecture Model.

In order to make up for the cases where the inpatient students cannot attend the real time classes, discussion class models using Wiki were developed and applied. Wiki utilizing Model was universalized as the discussion class model for hospital school students. Inpatient students of hospital schools could continuously sustain their friendship through peer mentoring program. The sense of emotional and social security aided their rehabilitation.

Inpatient students of hospital schools could take courses while they are hospitalized and could advance their grades in recognition of attendance. u-Learning classes became the appropriate learning method to advance their grades with without regards to the environment or time.

Jeonbuk G middle School: Setting an active educational environment, students are able to use any media by anytime, anywhere and any device. The community between the teachers and the students were vitalized through the u-Learning platform. Also, the parents could

monitor the students' various learning activities. As a result, the formation of the education community between the students, teachers and the parents was encouraged and they could restore faith in each other.

The quality of teaching and learning boosted as various class models were applied and the learning levels of the students could be consulted frequently. Diverse leaning space could be derived utilizing UMPC so that more Open and Dynamic Learning Models could be developed and applied. Through cooperative learning by groups, creative class model could be derived where the students could exchange their opinions for solving problems real-time.

Self-initiated leaning capabilities boosted because customized classes could be carried out through UMPC and diagnostic or formative evaluations could be executed instantly. Through cooperative learning by groups, large amount of contents accessible and more diverse leaning experiences could be provided. As a new study form of student participation was developed, the students were able to create and utilize various contents and feel a sense of accomplishment.

Cheongju C Foreign Language High School: Ubiquitous Multimedia learning environment was established such as the wire-wireless net remodeling in school in the 1st and 2nd year and the futuristic audio-visual lab in the 3rd year and the students could use UMPC to search and study anywhere anytime. However, its effectiveness was quite low because there were limitations in the speed improvement, UMPC was inconvenient to carry around and its internet connection was worse than those of the mobile phones on the market.

The teachers, students and the parents could better comprehend u-Learning as a result of public relations of u-Learning. By attending the trainings regarding UMPC and applied solutions, the teachers and the students could boost their abilities to utilize UMPC and to recognize how to access and utilize IT. However for a more professional application in class, deeper interest in u-Learning of the teachers and a stable infrastructure is demanded.

The u-Learning teaching-learning strategy that supports self-regulated studies was applied in classes and the students were encouraged to use UMPC for their learning. As a result, their interest level and their amount of study have increased because they were more interested and focused into the diverse leaning methods. Moreover, they showed enhancement in their abilities in self-regulation and management of their study time.

The UMPC that was used as the study tool can play and create various types of multimedia contents but the

small visible screen was inconvenient to use contents that were made as big sizes. Also, due to the small memory capacity, the speed was extremely low when large application programs were run which led to absolutely insufficient contents.

Wonju I Technical High School: With the u-Learning infrastructure, students were provided with study opportunities and learning experiences regarding diverse contents with no constraint on time and space. The 32AP were installed in the school and the wireless network environment was relocated every research year following the location of the study and brought more stabilized environment compared to the early implementation. However, as a stable wireless network environment is an absolute element for stabilized teaching-learning conditions, it is recommended to implement a new way of wireless network connection which can actualize the true u-Learning that compensates connection defects and overcome the limitation of the location of connection.

U'Lams was provided as the solution for the student's learning management but the contract period for expired during the 1st and 2nd year of the usage which brought difficulties in operating the research school. As an alternative solution, u-LSS server was set up and utilized within the school. It facilitated the features of U'Lams as well as the agent feature, multipoint video communication capabilities, a variety of learning models, function to change interfaces and enhancements. Consequently, the research schools could be operated in a more effective manner.

Through large-area class activities and online learning activities, students' understanding of u-Learning and its literacy improved and the learner-centered learning activities were actively carried out. While the teachers developed and applied Teaching-Learning Models, their expertise in lessons has improved, the importance of the ability to prepare and design classes and verified the practicality of u-Learning teaching-learning.

The Teaching-Learning Model using UMPC and electronic blackboard were applied in Korean, English in math classes whereas specialized classes were carried out in school-work links based on the u-LSS site. It is shown that the online learning activities in the cyber environment alone has some limitations in problem solving and essay test and the ubiquitous environment of u-Learning and face to face classroom learning should be mixed for effective learning. Fun activities that could not be in a regular classroom course were available through a variety of extracurricular activities utilizing UMPC.

Jeonnam F High School: Compared to the early stage of implementation, more stable maintenance was sustained for the wireless lan set up throughout the school and UMPC utilized u-Learning environment was established. By providing continuous training opportunities for u-Learning and UMPC utilized classes, the teachers and the students gained better understanding of u-Learning and developed intimacy with u-Learning environment. As well, the teachers gained more professionalism in teaching.

Regarding the infrastructure, the students and teachers were more satisfied in the 2nd year (specified by the Ministry of Education, Science and Technology). However, continuous improvements in the performance of UMPC devices and u-LSS features are demanded. Positive results are shown in the satisfaction levels regarding u-Learning of the students and the teachers as well as the effectiveness of u-Learning.

As a result of developing and applying the teaching-learning model using UMPC to the subjects of Ethics, politics, physics and English, the students' academic performances were positively affected by the u-Learning classes which provided various activities. u-Learning teaching-learning activities allowed searching for learning materials using UMPC and instantly share and feedback between teacher-student and student-student. This had positive impact on the self-directed learning ability of the students.

DEMANDS OF EACH SCHOOL

Seoul A Elementary School:

- It is absolutely necessary to have strong foundation of Learning Management System (LMS) where cyber-learning and video lessons can be carried out smoothly
- The curriculum requirements need to be differentiated in consideration of the cases of health disorders and mental disorders
- Standardized guideline for approving various forms of attendance (set semester period, class time, standard for approving attendance, leaning contents that can be recognized as attendance) of the inpatient students of hospital schools need to be set up
- In general schools, sufficient education for understanding disabled students should come in priority

Choongnam D Elementary School:

- To set the foundation for social u-Learning, interconnection of schools and the elevate agencies including administrative agencies are needed

- Easily accessible study contents need to be developed and distributed
- Standardized U-LSS System is needed
- Continuous application of u-Learning research classes and its universalization are needed
- For the establishment and smooth operation of u-Learning environment in regular schools, active administrative and financial support is needed

Kyungbuk H Elementary School: Upgrade in u-Learning devices such as TPC, expansion of wireless internet zone in government offices and public institutions and HSDPA-style wireless Internet system with no AP limitation are required. u-Learning Support System (u-LSS) is needed to alter the menu in accordance with the characteristics and levels of classes.

The verification tools used in schools have some limitations therefore, more reliable verification tools and Methods are needed for accurate verification of the research. The application of u-Learning community based studies in this case was limited to the 4th-6th and sixth grade social studies and Korean language and results showed that the self-initiated learning capabilities of the target students increased. It is required to expand the operation into other subjects and to continue subsequent researches on various forms of u-Learning community based studies.

Gyeonggi B Middle School:

- In order to realize the substantial meaning of the u-School, stability of the school infrastructure and the setting up of community infrastructure is required
- In order to spread and universalize u-School Models, teacher-friendly environment including the development of u-Learning Study Support System that can ease the usage and increase the effectiveness of learning
- The system at the national level is needed for the development of sharing of u-Learning contents
- In order to increase the effectiveness of u-Learning, component schools should be granted with greater autonomy to restructure their curriculums

Incheon E Middle School:

- First-line schools need to have u-Learning learning center equipped with state of the art equipment
- The hospital schools need to designate partner schools by school levels: elementary, middle and high school
- The hospital schools need a system to manage learning autonomously

- HSDPA Wireless Internet System with no limit of the AP is required
- To run hospital schools with classrooms, teachers should be assigned to hospital classes by different subjects
- A measure to improve the speed of real-time video classroom is needed

Jeonbuk G Middle School: u-Learning platform should be able to provide the teachers with the service to easily set up a class community and share various contents. Systematic teacher training is indispensable for forming u-Learning minds. Establishment of u-Learning education environment should come first so that the various learning models can be naturally applied to on-site classes.

Establishment of u-learning educational environment such as the Learning Management System, various evaluation system and activities in class or after school should come first. Various contents will be developed in UMPC first. Establishment of u-Learning infra wherever students can access internet should come first so that the u-Learning can be generally applied. Establishment of platform and providing learning contents should come first so that the u-Learning will succeed.

Cheongju C Foreign Language High School: The upgraded performance of UMPC devices and the expansion of the space to utilize wireless internet is needed. Establishment and operation of professional LMS system are required. High-quality contents need to be basically available.

Trainings for hands-on staffs of u-Learning research schools, lectured by professional institutions or experts are desperately needed during the operation of the u-Learning research school. For that reason, sufficient support of professional institutions and provision of larger amount of information can lay more effective research process and results.

Wonju I Technical High School: For stable settlement and utilization of u-Learning, infrastructure for wireless network connection outside of schools and homes should be established by policy. Through policy and effort, the u-Learning mind should be planted in everyone, not just in the teachers and the students who are the principal agents of education.

In order to generalize the u-Learning Teaching-Learning Model developed by the research school, it should be amended and modified through conferences with other professionals and on-site teachers. u-LSS

server was located and operated within the school so each school could perform a variety of study activities. If this is generalized at the local education office level, different study methods that are suitable for each school can be realized.

Jeonnam F High School:

- Smoother wireless internet connection and faster speed is required. Also, the development of UMPC devices with upgraded performance and the supplementations of u-LSS features are needed
- Expansion of wireless internet environment is necessary
- Various u-Learning trainings on and off-line are needed
- A national level research on textbooks modified to suit u-Learning should be done
- Development and distribution of various, high quality contents are needed

MEASURES TO VITALIZE SMART-LEARNING

On the basis of the trend analysis of u-Learning, the measures to vitalize smart-learning can be suggested as classifications of: infrastructure construction, software support and increase in the human resource capacity and support systems.

Construction of infrastructure

Learning center for smart-learning: In order to effectively conduct real-time video classes and cyber studies, smart-learning center with all the environments is essential. The learning center should have a good assortment of electronic blackboards, mobile computers, video communication devices and a reliable network.

Support for construction and operation of platforms:

Support for the construction and the operation of platforms such as LMS server and file server for Smart-learning classes is needed. Also, the teachers should be able to use it easily. Appropriate support of taking actions and keeping maintenance should be provided upon the demand of the teachers.

Mobile device: PDA has excellent mobility but has small study screen and limited functions. TPC has performance equal to a laptop but its battery only lasts for short time. UMPC has both advantages of PDA and TPC but the speed is not satisfactory. Considering the above-stated features, the check points of the improved mobile device should include speed, battery life and smooth network.

Network speed: Slow network speed creates troubles in the study progress and the willingness of study. To prevent this, proper speed of network is necessary. To use the wireless internet in a proper scope, proper AP of proper performance should be installed and well-managed.

Software support

Stabilization of solution: In order to effectively carry out smart-learning classes, stabilization of software solution is needed. This includes works such as making up for the errors in video chatting solutions and improving features so that the teachers can modify the class menu in LMS.

Creating self-initiated learning environment: It is necessary to develop Self-Initiated Smart-Learning Class Models considering real-time and non-real-time cases. In addition, supervision and evaluation of smart-learning should be supported. Teachers and students should be able to easily manage and evaluate their learning progress. Furthermore, instructions and the tools to create new contents should be provided to the teachers and the learners to allow them to self-create and utilize the contents.

Acceptance of various learning forms: Institutional devices and programs should be constructed to make homeschooling possible. Various style of education such as online classes for students with unavoidable circumstances or socially neglected people should be accepted.

Adjustment in the amount of study and improvement in curriculums is needed: When smart-learning is generalized, the existing study method and amount should be adjusted. The study amount should be adjusted so that the classes are focused on the learner's activities. Also, researches regarding the improvement of the curriculums will be essential.

Reinforcement human power

Teacher trainings: Teacher trainings should be impelled in order to enhance their understandings of smart-learning and their capabilities to run classes.

Student trainings: Students need to be equipped with a certain level of information in order to run smart-learning classes without any friction. As well, information ethics education should be provided for the students so that they can properly use the information devices.

Operation of parent's community: In order to operate a smart-learning system that connects schools and homes,

cooperative communication with parents is compulsory. For this reason, operation of (web) community between schools and parents are required.

Support system

Cyber class designation: Cyber classes need to be designated and operated in order to support smart-learning when situations requiring cyber education come to a rise. Measures to allocate teachers who can run cyber classes in national schools and designated schools need to be considered.

Alignment and funding of relevant systems of smart-learning: In order to universalize smart-learning, related systems need to be aligned and stably operated. Appropriate funding will also be needed accordingly.

Need for public relations: Public relations for smart-learning are needed. Public relations will disperse and boost the interested of general teachers.

CONCLUSION

The purpose of this research is to comprehend and analyze the trend of the growing issue, smart-learning and to find the means to vitalize it. The information society of the 21st century demands new civic qualities of the citizens. These qualities are creativity and their participation in creating knowledge (Kay and Greenhill, 2011). Although, the purpose of education in the past was to have the learners actively participate in social problems with their own creativity, the ideal could not be realized due to the limitations in reality. However, such ideals can be realized in today's information-oriented society. The key point is to consider what can be done in what approach in order to utilize such informative environment effectively.

The research schools who executed smart-learning provide us with several implications. These implications can be explained in the categories of infrastructure building, software support and capacity reinforcement of human resource. Building of smart infrastructure, support of educative software, capacity reinforcement of related human resource and building support system are essential for vitalizing smart-learning. By doing so students can be provided with an opportunity for self-initialized studies based on the context and also smart-learning can be vitalized. The vitalization of smart-learning hereafter will have high correlation with the support and the success of the before stated four strategies and support.

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