

A Study of Establishing a Web Model of Historical and Geographical Information for Youths through ‘Collective Intelligence’ -Junior Maphistory e-encyclopedia

Mi-Hyang BANG

Korea Advanced Institute of Science and Technology
Korea

As clearly suggested in the case of Wikipedia, collective intelligence is predicted to develop into the most important platform of knowledge and information in the future society. But it just remains at the level of activities for group projects in the present frame of education and so it doesn't lead to creating collective intelligence.

This study looks into an ‘information repository model of collective intelligence’ that makes it possible to deliver an education process a priori of Shared Knowledge Reservoir to “Junior Digital Nomad”, who is definitely and will be in existence, and that further enables them to be active there in reality. Based on this storage model, it suggests a practicable web system model; Junior Maphistory e-encyclopedia, which is appropriately consistent with the features of Web 2.0 and can grow into a general historical and geographical information service.

Keywords : collective intelligence, education content, Web 2.0, e-encyclopedia

Introduction

Time, a weekly American newsmagazine chose 'you' as the person of the year 2006. Services that symbolize collaboration and shared information through collective intelligence such as Wikipedia have explosively grown as individuals became active as an information producer. As clearly indicated in the example of Wikipedia, collective intelligence on the Internet is expected to produce very important and valuable information repositories in different fields and efforts are being made to combine factors of collective intelligence in many existing areas.

The Internet, a place of information delivery and communication which is the most significant in modern life, will appear as a sea of information filled with collective intelligence to junior who will play a key role in the future society.

Therefore, a web model of education through collective intelligence is not only crucial as educational value itself, but also absolutely needed as a prior educational place where youths can experience collaboration environment and collective intelligence to come and create their results.

According to "What is Web 2.0?" presented by Tim O'Reilly in 2005, World Wide Web has been entering a new stage and described seven essential principles of the change as Web 2.0.

Since then, how much the concept of Web 2.0 is accepted has been used as an indicator to estimate and forecast how much each web business model can succeed. Many Internet businesses are changing to combine the trends of Web 2.0 and establish more successful business model. The concept of e-Learning 2.0 emerged in the area of education content as well, where they are trying to embrace the change of Internet business model led by the idea of Web 2.0.

You need to actively accept the trends of Web 2.0 that were verified through real examples and judge their appropriateness in order to make collective intelligence model for educational purpose and then a successful example.

Thus this study will consider collective intelligence in formal education field, its

characteristics for being an area that can accept Web 2.0 or e-learning 2.0, and its usefulness in education field, select the area of 'local historical and geographical information, and propose 'a Web model of historical and geographical information for youths (the rest is Junior Maphistory e-encyclopedia)

Plus, it will consider why 'local historical and geographical information' is suitable for creating collective intelligence model. And in order to verify that a Junior Maphistory e-encyclopedia is a successful web model, it will diagnose how Junior Maphistory e-encyclopedia is compatible with the features of Web 2.0 and e-Learning 2.0. The compatibility of Web 2.0 and Junior Maphistory e-encyclopedia is especially focused on 'users as information producers and collaborators' and 'long tail in value added geographical information.'

Lastly, it proposes the direction of 'participants' motivation', 'their sociability', 'a usefulness in education field' and 'a methodology for creating collective intelligence', and suggests a practical web system model for successful Junior Maphistory e-encyclopedia.

Based on the study, this paper recommends 'Junior Maphistory e-encyclopedia' for an education content model for harnessing collective intelligence in accordance with Web 2.0, and aims to make it work well substantially in the field by successfully managing it and further develop into a general historical and geographical information e-encyclopedia that Internet users are free to use.

Education Content Model of History and Geography Based on Web 2.0

Web 2.0 and Environmental Change in Education Content

According to "What is Web 2.0" published by Tim O'Reilly in 2005, World Wide Web has been entering a new stage and described seven essential principles of the

change as Web 2.0.

Since then, how well the principles of Web 2.0 are implemented has been used as an indicator to estimate and forecast how much each web business model can succeed. Web 2.0 has now been influencing a general society, related industries, offline companies beyond Internet industry, and education content area as well, and so changing the established Value Chain.

As everyone has their own understanding of Web 2.0, they have a different understanding of change in education content depending on its use and purpose. Education content, which is founded on Web 2.0, however, has the following features. A Canadian researcher, Stephen Downes calls the changed education content environment ‘e-Learning 2.0.’

Table 1. Shift to e-Learning 2.0 (source: e-Learning Consortium, Japan 2007)

Legacy e-Learning	e-Learning 2.0
organized learning	personalization
top-down	bottom-up
push type	pull type
leading teacher	participating learner
delivering knowledge from teacher to student	teacher>student, delivering knowledge from student to community
professional instructor	assembly of knowledge
learning course, learning program	learning molecule, learning connection
copyright, intellectual property	social property, sharing
limited freedom	extended freedom, openness
particular application (LMS/LCMS)	web application such as Blog and Elgg ¹⁾
high investment and management cost	low investment and management cost

As shown in Table 1, the features of Web 2.0 brought about a change in making and teaching online education content, and in educational environment. They are also showing social change where learners become co-participants by sharing and opening education information.

Since education content is oriented towards participation, sharing, and openness which Web 2.0 aims for, it is expected to supplement the following three problems that the existing contents have had.

First, teaching style of e-Learning will change from knowledge delivery by video lecture online, which has been pointed out as its limit so far, to user participation with strengthened feedback. Most of education contents have mainly consisted of the way a teacher gives knowledge to students through video lecture online and there have largely been linear layout of lecture contents, which has limited learners' chance of taking active and leading participation until now.

That's why the opportunity itself has been insufficient for learners to take part in a lecture and to get feedback on their work, which is social interaction between learners and teachers, between learners and e-Learning system, and among learners themselves, has been neglected. E-Learning related organizations and specialists have also pointed out this problem with current e-Learning.

Jacobson and others (2004) divided current e-Learning paradigm into Type I and Type II as seen in Table 2. Current e-Learning are not getting out of Type I. Lee, in-sook(2004) argues as well that majority of current e-Learning systems emphasize initiative and learner-centered learning in theory but that they still are not getting away from the model in which instructors provide information and learners accept it in practice.

But the environmental change in education content surrounding Web 2.0 is predicted to develop education content from the past knowledge-delivered content through the present learner-participating content to the future learner-initiative learning.

Table 2. Division of Current e-Learning Paradigm (Jacobson, 2004)

	Type I e-Learning	Type II e-Learning
paradigm	delivery-centered	learner-centered
case	teaching centered on learning method and technology	learning centered on problem-solving
learning content	explicit content	implicit content
content	displaying learning content concretely	not displaying it in detail
learning method	showing and speaking	learning by activity
role of system	content delivery, learner motivation, performance evaluation, control of the whole learning process	scaffolding, providing cognitive tool and appropriate feedback, supportive collaboration, background of learning activity
learning motivation	intentional learning	unconscious learning
	arousing a will to acquire explicit content and making it continue	acquiring knowledge naturally by participating in problem-solving activity
role of learning	watching and accepting a content passively	choosing a problem for themselves and joining in collaborative learning
method to lead learning	drill by external motivation	inducing learner's choice

Second, learning platform and content type in e-Learning will be changed with the change of teaching method to keep up with the change of learning method in e-Learning.

As the platform of e-Learning, the existing LMS/LCMS on which learning grades and activities of students and e-Learning contents are managed will change into new one, on which learners can take an active part in a series of learning activities, and its content will be modified by learners who will participate in the production of e-

learning contents by online authoring tool.

Table 3. Stages of e-Learning Progress (source: www.strabase.com)

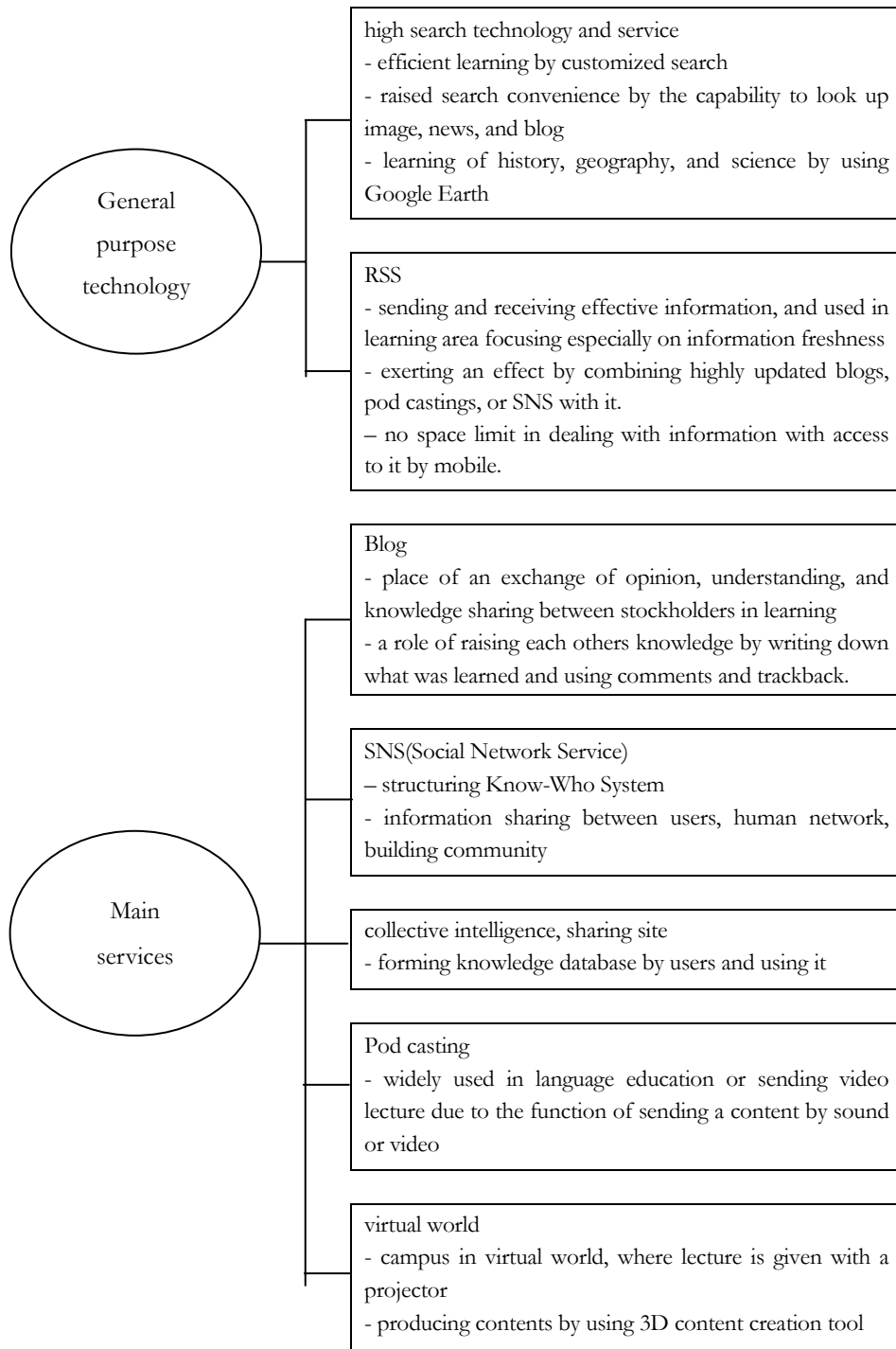
1994	1997	2002	2004	2007
WEB	LMS	MLE	PLE	CWE
Web Page & Homepage Grown System	Learning Management System	Management Learning Environment	Personal Learning System	Collaborate Working Environment
Homemade System	Standard Packages	Integrated Solution	Lifelong e-Portfolio	Web Desktop & Applications

The recent key point in the change of e-Learning platform as seen in Table 3 is the change of the environment where learners participate in education and generate Blog for sharing use in personalized space which is provided by the platform. The change is heading towards one where the e-Learning platform provides web authoring space and applications for content authoring, so participants can make creative e-Learning contents for themselves.

The applied form of Web 2.0 in education content is seen in Table 4 lately. New services that combine Web 2.0 and e-Learning are recently getting attention.

These services have information sharing and openness, not its monopoly in common. The representative examples are edublog(<http://edublogs.org>) using Blog in education, Elgg(<http://elgg.org>) using SNS(Social Networking Service), Wikispace (<http://wikispaces.com>) based on Wiki, Studicious(<http://stu.dicio.us>) introducing notes that teachers and students collaborate on, ReadWriteThink Printing Press(<http://readwritethink.org>) that provides a platform for you to produce newspaper and pamphlet. Besides, TCC(Teacher Create Contents) deriving from UCC and experimental services grounded on SSC(Student Create Contents) are open as well. Nuvvo(www.nuvvo.com) is an online marketplace, where TCC produced by individual instructors is traded in. It attempts to change the circulation of e-Learning

Table 4. The features of Web 2.0 shown in education content



content and introduces Skype using VoIP to support e-Learning through sound and video communication by group.

Plus, e-Learning contents, which showed linear displays mainly with video lectures by popular instructors and curriculums, are extending to blogs, wikis, notes, and broadcasting. These sites show that UCC, the key word of present Internet trend change, is located in the center of new e-Learning business models.

As the features of Web 2.0 are on the rise, S&N(Sequencing & Navigation) model of SCORM 2004 that has been studied and developed are becoming the focus of attention again. It is LOM(Learning Object Model) utilizing various asset of the existing education contents, which provides e-Learning content with complex form with strengthened feedback.

In addition to this, attempts are being made to create a new added value through Mash-up of e-Learning content. For instance, a learner can share with other users the notes and memos that he or she inputs in the existing lecture video by using tools provided on media screen.

Lastly, education content are placed in the inefficient economic structure due to constant supply of content in a top-down way on professional grounds and lasting upgrade to come up with fast development of technology. But as the Web evolves, a top-down approach will move on to a bottom-up one and the content manufacturing structure will be changed.

Education content market in Korea has been growing at a high rate every year. The supply scale of education content and its digital content is also increasing rapidly. However, owing to the unwillingness to pay for content, duplicate development, a lot of competition among companies, and the professional property of education content, famous instructors have constantly produced and provided expensive content in general.

As technology develops at a fast speed, education content itself has to keep up with its rate even though the course itself is not changed. Under such a situation, content producers have taken on increasing cost burden. But if you can use collective

intelligence, key concept of Web 2.0, in education content, it is expected to change such an industrial frame.

As examined earlier, the changes of e-Learning education method, platform, and content are revealed in a variety of services and these new attempts have two big things in common.

One thing is keywords such as participation, sharing, and openness that are consistent with Web 2.0. They are trying to harness collective intelligence, core concept of Web 2.0, through collaborative intelligence combining recently spotlighted UCC with education content.

According to Pierre Levy, Collective Intelligence is a form of universal distributed intelligence, constantly enhanced, coordinated in real time, and resulting in the effect mobilization of skills. The basis and goal of collective intelligence is the mutual recognition and enrichment of individuals.

For Levy, collective intelligence is a transcendent language and a useful tool for humans in the present to go through a new revolution and evolve into the next stage. The concept of collective intelligence today follows that of Pierre Levy, who paid attention to the Internet as a place of surrealistic communication.

Collective intelligence can basically be judged by ordinary people and is based on the assumption that it will make better judgment than the total of any individual's ability or some brilliant specialists. It is under the supposition that since all of us have prejudice, more people review things, fewer bugs they have. The premise means that humans create democratic knowledge unlike anti-rationalists and elitists and plus are willing to share it and open-minded for public interest.

Tim O'Reilly talked about collective intelligence in AOP Conference , "They also harness the collective intelligence of users: this is the essence of Web 2.0. Google gets smarter with every click that we make, we tell them what's important." Since then, collective intelligence has received a new value with the introduction of Web 2.0. It is therefore natural and meaningful that attempts are being made to combine factors of collective intelligence in education content in terms of not only industry but also

pedagogy.

Collaborative learning in the process of leading collective intelligence is a teaching and learning method for boosting interaction, communication and cooperation among learner so that both each individual's and the whole learners' aim of learning can be achieved as greatly as possible at the same time. Many studies came out that collaborative learning has a highly educational effect not only in cognitive aspect but also in affective aspect. Research on Wiki's educational effects has been making much progress lately as well. Experiments show that when wiki system is used in collaborative learning, each member's sharing of knowledge enables a group's ideas to spread widely and develop elaborately, and group's knowledge to be collected more correctly.

The other thing is an aspect of Niche market represented by long tail business. Big e-Learning content services such as LMS/LCMS and video lectures have mainly taken up the market and been heading toward accepting the features of Web 2.0, but long tail business models in education content are being produced by finding a niche market that can provide new services that are Web 2.0-oriented and experimental, and occupying it in advance.

Accordingly, the stream of change in education content shows the following things; models of new education content have to create collective intelligence based on participation, sharing, and openness. It is required to have educational value and needs to deserve long tail business.

Users as Information Producers and Collaborators

If the value of collective intelligence is maximized with the focus on the universal value of mankind and the human-centered approach, Junior Maphistory e-encyclopedia is a web model of history and geography about the regions where every school is located throughout the country, and can create highly valued collective intelligence that can vitalize local cultures, make local education independent,

heighten learners' awareness of their local identity and enhance learners' willingness.

Junior Maphistory e-encyclopedia is a web service model, where a series of learning activities are done when each school gives students an assignment to look into their local geography according to education course. The educational process in the field goes through the following work flow.

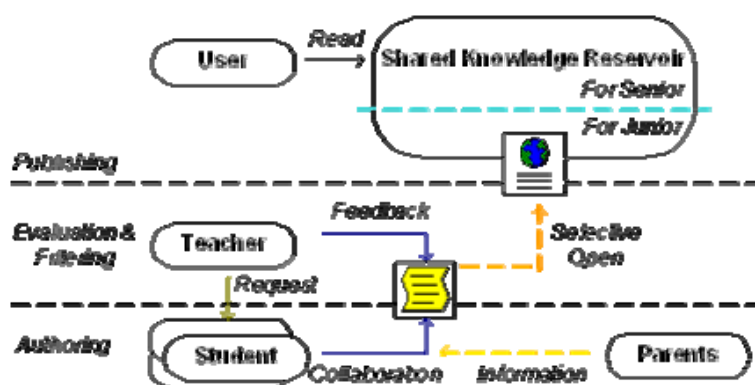


Figure 1. Task Workflow of History and Geography

Since a series of learning activities at each step in Figure 1 can include parents and other people who possess information on the region, as well as teachers and students, the whole members of a community are able to take part. When these kinds of activities are performed in schools and classes all over the country, students are information contributors and teachers, who give the evaluation and feedback to them, can be collaborators and users. Parents and local historical researchers can also be participants in working together. Besides, other users can comment on the value of information that they watched, too.

The whole website is open to other participants and they can do unrestricted work like Wikipedia, but the juniors' productions are protected from others' search, reading, and modification for educational purpose. Other users' writings are checked out by teachers and then they can only read open information in schools and classes with no right of revision. Other participants can share their knowledge in a very free

environment like Wikipedia, and display high quality of collective intelligence in juniors' information repository by offering more professional and highly knowledgeable materials.

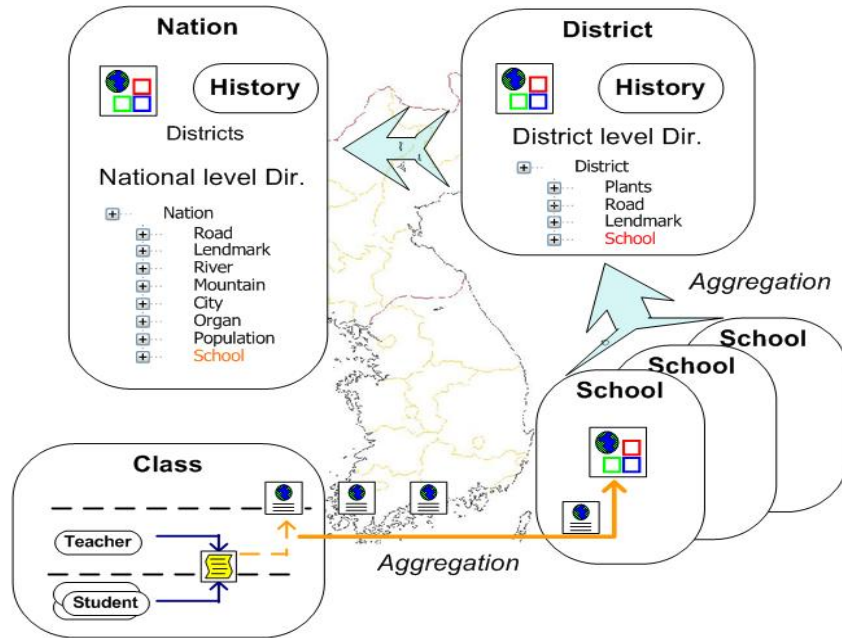


Figure 2. Frame of Junior Maphistory e-encyclopedia

Students' collaborative outputs by group reveal collective intelligence of small units and much information chosen by classes and schools are collected by region. Through the process national historical and geographical map is formed and collective intelligence is realized.

The information in Wikipedia is organized just in a way hyponyms are duplicated due to the characteristic of dictionary and the existing information is deleted by the work of contributors with better knowledge because of information system without repetition. On the other hand, for example, Junior Maphistory e-encyclopedia can deal with azalea differently depending on the geographical place and surroundings where students observe even though azalea has one dictionary meaning. Collective

intelligence like that of Wikipedia is not suitable because Junior Maphistory e-encyclopedia treats the information that each student wrote as important materials that are grounds for evaluating them. It needs a unique methodology of collective intelligence.

The distinguishing features are that students' knowledge level and producing skills are not better than adults and that the outputs become criteria for assessment. Students play a role of both producer and evaluator as service user. Teachers are first evaluator of collaborative output and filter out what was repeated and worthless in the directory of schools or classes. They can also collaborate with open productions and play a part of writer, estimator, and ordinary user.

The current curriculum of social studies in elementary school have the following purposes; students have an interest in social events and phenomenon around them, realize the diversity of human life depending on regions, and then understand the geographical characteristics of towns, regions, and the whole country and plus a variety of social phenomenon and features, which are related to geographical conditions, historical development, and political, economic, and social systems in a society.

Junior Maphistory e-encyclopedia aims to make students take part voluntarily and make something to lead to have curiosity, familiarity and affection about their region, and enable them to develop the ability and attitude to interpret, synthesize and think carefully by intensifying their historical knowledge and comparing and analyzing facts. In addition, the approach to regions in terms of everyday life related to them can foster their perspective to look at regions while students' subjective experience are elaborated, extended, enriched by contacting the geographical concept and methods.

Scardamalia and Bereiter (2003) said, "Education in a knowledge society should enable learners to participate in the creation of new knowledge as a normal part of their lives. Education and practice need to undergo a revolution to become "idea-centered" from "activity-centered" and to become collaborative learning from independent learning, so that learners can embark on a knowledge building trajectory

from a young age to prepare for the challenge. Thus it is essential to construct and cultivate learning environments such as learning communities, organizations, campuses, etc., for learners to develop these abilities.”

Junior Maphistory e-encyclopedia is very appropriate for this change of learning paradigm and can bring about a highly educational effect with its human-oriented value and be a place where juniors can get a precious experience of collective intelligence by getting them to performing collaborative learning on the Internet, a sea of collective intelligence that they will experience.

Long tail by value added geographical information

Administrative districts in Korea consist of Seoul metropolitan city, six metropolitan cities, 75 cities, 86 gun-s, 69 gu-s, 212 eup-s, 1206 myeon-s, and 2166 dong-s. The subject of social studies in elementary school is being taught by region. In addition to formal textbook of the Ministry of Education and Human Resource Development, students in each region are learning history and geography with 16 different textbooks respectively, and so education content provided by the central government does not supply the customized service to them in each region.

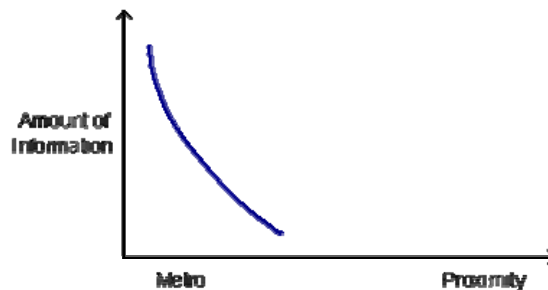


Figure 3. Distribution of local historical and geographical information, short tail

Figure 3 shows the amount of information according to large cities and surrounding areas. The current information of history and geography, which is in

circulation, is focused on large cities and other cities. Thus information on local history and geography is relatively poor and the graph displays the distribution of short tail.

Chris Anderson, founder of Long tail theory, argues in his book, “The Long Tail” that the advancement of accessing tools facilitated more production and that it made a tail longer. As the amount of information and communication speed increased by tools like searching on the Internet, goods and information whose value had not been recognized before has formed greater market than ever. Similarly, if you can access information on local history and geography through the Web and provide users with web platform to produce information for themselves, it will be able to form long tail.

It is vitally important in the subject of social studies to use different teaching materials such as map, diagram, film, slide, statistics, chronological table, yearbook, newspaper, broadcasting, photo, documentary, relic, travel notes, and account of expedition just for improving efficiency of teaching and learning. Because hands-on exploration is hard to carry out in terms of time and space, students are doing most of their assignment by using paid or unpaid education content, websites of public offices, and portal sites. But information on local history and geography, which belongs to long tail, is insufficient, and the way it is described is just in a linear manner like encyclopedia. Most of information handled in a textbook is what generalizes the assembly of parts. Therefore if it is simple and enhances educational effect that you can use some partial properties among the facts that students can easily have access to in daily life and utilize them as learning materials, it can be said that Junior Maphistory e-encyclopedia is appropriate for the long tail model of this paper as information storage on local history and geography through social collective intelligence.

Central area and its surrounding one are so closely connected to each other that all the information on history and geography is intimately organized in most cases. For instance, information services on the Internet provide the search result of Seoul area through diverse directories such as Seoul, large city, Gyeonggi-do, central areas,

Gyeongbu-seon, Gyeonggi-seon, Taeyeong-ro, Sinchon, Gangngnam and simultaneously supply information that is close and highly-related to the region.

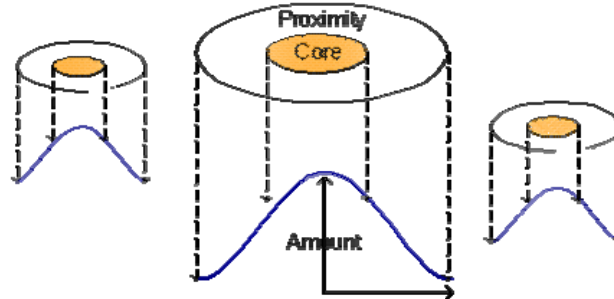


Figure 4. Distribution of information value of central and local history and geography

Information on history and geography is made up of central area with a lot of information, and surrounding areas with relatively poor information. If access to information on surrounding areas is expanded, its value will be raised and users who have tendency to actively participating in creating collective intelligence will be guaranteed, which will enhance the possibility of successful web model of local history and geography.

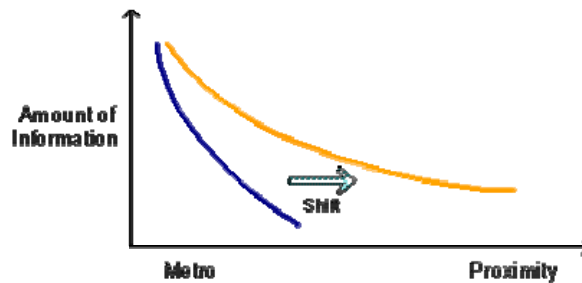


Figure 5. Distribution of information on history and geography, its shift to long tail

When the current short tail form of information on local history and geography ensures the access to authoring tools through the Web and strengthens a link with its

region so that marginal value of geographical information can go up, the short tail form in Figure 4 will shift to the long tail one in Figure 5.

Attracting Users' Participation

Many websites use incentives to induce users' participation. But the incentives don't need to be monetary value for collective intelligence. The typical examples for collective intelligence are Wikipedia and GNU. Wikipedia was able to emerge because many intellectuals felt the need to provide their own knowledge for free and contributed to it for the universal value of mankind. The reason why many software engineers in GNU got involved in difficult programming for more than 20 years is that programmers normally have passion for challenging difficult tasks.

Their reason for voluntary participation and the incentives that they receive will vary depending on the characteristics of collective intelligence content. It will be the most ideal if ordinary participants in Junior Maphistory e-encyclopedia get the incentives for providing their knowledge for collective intelligence with the universal value and public interest of contribution to local community in mind. But the immature ability of young participants alone is insufficient to build valuable collective intelligence in the field of education where participants are only young people. It can produce only the results which are just young people's study or scribble if there is no filter in making and publishing some information. That's why teachers' feedback and filtering role model and the tool that they will use are very important, which can determine if the entire model itself will succeed or not, in order to make an advantage of an educational model of collective intelligence, not just one by ordinary people's participation.

First of all, you have to know the limitation of collective intelligence in order to determine the chance of its success. Boundary is the quantitative term and can be extended. But limitation basically differs from boundary and refers what is impossible or difficult to go beyond. So the effort to expand the boundary is needed rather than

the effort to get over the limitation. Most of the Internet communities stop growing for a short time, when we see them in terms of the collective intelligence. This is because they have structures in which information and knowledge are concentrated in the hands of only too few people. The Internet communities don't seem to be the appropriate tools to harness collective intelligence.

The boundary should be extended to induce users' participation in collective intelligence model. Above all, the boundary can be enlarged when you get to realize the limitation of tool. When you offer the appropriate tool to teachers who will play the most important role in Junior Maphistory e-encyclopedia, the boundary can be expanded and collective intelligence model can succeed. The major functions to be offered to teachers in Junior Maphistory e-encyclopedia are as follows.

- function to designate students that teachers will guide
- function to manage bulletin board for teachers and students
- function to request the assignments to students form of designated postings in a special bulletin board
- function to deliver SMS, e-mails, notes to students
- LMS information about students (attendance, activities, statistics for the present state)
- function to review students' writings (Teachers can add their comments on them.)
- function to evaluate students' writings and compile statistics
- function to open student's writings as school's recommended ones
- function to review students' writings and compile statistics by year

To enhance teachers' participation, LMS information that is needed for e-Learning should be sufficiently offered. Their voluntary participation help to produce content with high quality and Junior Maphistory e-encyclopedia can have a firm foundation to succeed.

Participants' Satisfaction with Social skills

SNS(Social Networking Service) is recently under the spotlight. Representative services are Myspace(<http://myspace.com>) and Facebook(<http://facebook.com>). Google has also developed an Open - API - based platform called OpenSocial, and other SNSs such as Myspace, LinkedIn(<http://linkedin.com>) and Bebo(<http://bebo.com>) take part in it. Facebook opened their platform and announced that any SNS can use its platform so that Facebook application can be used freely in any other site.

The latest trends in SNS business show that users not only can maintain cyber human networks by finding their acquaintances among the subscribers of specific SNS but also may be able to find out which site the person that they try to look for logged on and what he or she is doing there in the near future.

When a virtual blogosphere, which is composed of numerous blog-type contents, is linked to SNS, it will create new service models and added values as well.

Blogs created when young can be accessed when you are adult, and will be utilized in forming lifetime e-Portfolio. E-Learning has gone beyond the stage of using the concept of lifetime e-Portfolio in education and been entering the stage of utilizing Web spaces (or desktop) and Web applications provided by sites such as SNS and Google or by own platform.

In order to satisfy participants' demand of sociality in a model of collective intelligence, it will be indispensable to connect the model to SNS systems through Open-API based on the utilization of technologies of the current RSS and Trackback.

Information, which is contributed to by participants, can be contained not only in collective intelligence content but also in participants' lifetime e-Portfolio, and the information should be shared within the blogosphere.

Utility in the field of education

Considering the educational utility of Junior Maphistory e - encyclopedia, one of the most similar and representative cases is Edunet. 'Edunet Collaborative Learning Room' is a space of new concept for collaborative learning, functioning not only as a collaborative learning room but also as a ground for communication and information exchange among teachers. In particular, it supports not only intra-class but also inter-class collaborative learning through introducing matching systems such as 'joining collaborative learning' and 'finding cooperating teachers' for linking teachers to one another. Since 'Edunet Collaborative Learning Room' was also designed without considering learners' active participation or systematic collaborative learning, it has, however, many limitations in attaining collective intelligence.

Accordingly, in order to enhance students' participation and utilize Junior Maphistory e-encyclopedia model continuously in the field of education, it is important to establish effective incentive systems such as evaluating each student's improvement and rewarding students. In order to raise students' participation through incentives, two methods can be considered.

First, regarding project participation as social contribution like a volunteer activity, we may give a credit for it or write it down in a student's school record or a third-party institution with public trust may issue an officially approved certificate. No means of attracting students is stronger than public reputation capital of school in the area of education content that needs public trust more than anything else.

With the concept of linking school learning to volunteer activities in the current curriculum, there are several volunteer activity systems in which students can develop the sense of community and social skills, but such systems are not being operated properly and students' volunteer activities are limited to simple works such as picking up the trash on public road. However, if Junior Maphistory e-encyclopedia, which learners participate in, generate local information and distribute it, is included in volunteer activities and their activities are recorded in a school record, it will be very

effective in promoting local vitality and in improving students' continuous participation.

Besides, the issue of officially approved certificates by a third-party institution with public trust such as the education office of city or province may also induce many students' participation by giving them public reputation capital.

Second, among works that teachers posted with a school tag on them, we can select the works that are rated as the best by users throughout the district, province and country, those receiving high marks from teachers and those with a large number of page views, compile statistics regularly, update cumulative statistics constantly, make users read them, and announce it periodically.

Other effective methods include a ranking system for juniors in which individual's improvement is graded in learning activities, competition is stimulated and students are rewarded by announcing the rankings in class, school, region, and nation according to accumulated evaluations for a period of time.

Collective Intelligence System Model

Authoring Methodology of Collective Intelligence

In Junior Maphistory e-encyclopedia, an information document has a sub-unit which is also a compound document that can have another sub-unit and is written as the lowest unit by the authoring tool. The position of the sub-unit in the document can be defined by the layout template that has already been defined in the system.

Basic writing space in Junior Maphistory e-encyclopedia looks like blog which can be made as an e-Lifetime Portfolio. Users can create and control the writing space that has the form of a file directory and do the authoring with the options of open, closed, or partly open access permission. They can also decide whether or not to allow the search of a completed information document. An authoring unit is considered as a unique document and can be made as a database. Revisions in the

document can be traced through document versioning and each revised information document can be searched in blogs.

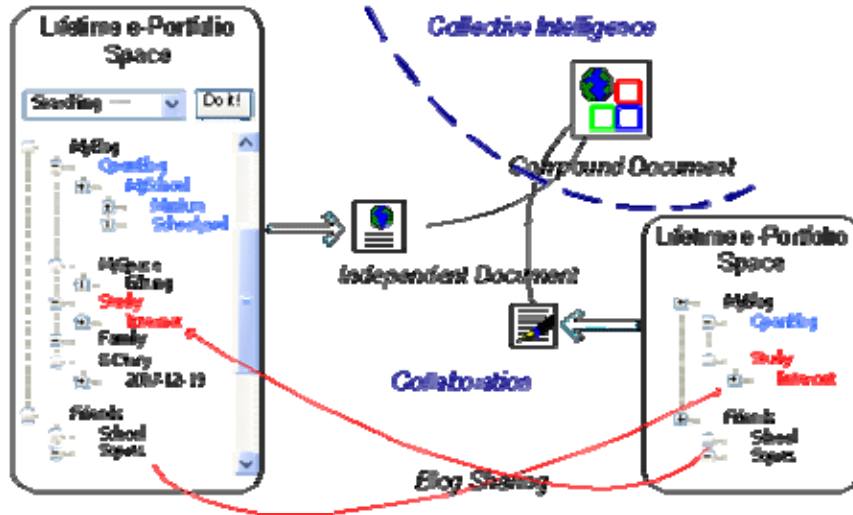


Figure 6. Authoring space of blog and its sharing

What is considered for collective intelligence in a web service first is authoring units. On a platform that involves juniors as main participants and pursues collective intelligence from the history and geography of small communities, it is hard to expect the participation of intelligent professionals like in Wikipedia. For that reason, classified directories for writing units can be beyond general hierarchical structure such as <Seoul: Mapo-gu: Gondeok-dong> and be something like <Seoul: Mapo-gu: Gongdeok-dong: School: Elementary school: Gongdeok elementary school: playground(or my school: playground)>, which juniors can easily make, and allows them to write information document independently even to minor information units. If directory entries through user tagging are added at the bottom of the user-made hierarchical information structure, user-defined entries such as <Seoul: Mapogu: Gongdukdong: Gongduk elementary school: athletic equipment: balance beam (or my school: balance beam, my school: athletic equipment: balance beam)> can be inserted in the directory structure as a user defined directory entry, which make it

possible to participate in collaborative work by group and yield unit information only with minimal effort.

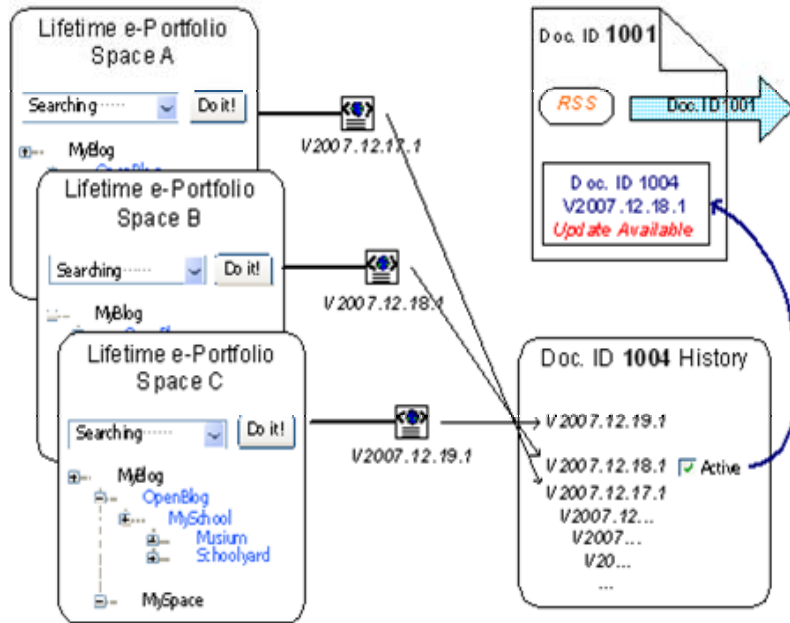


Figure 7. document versioning diagram

The smallest unit of document is an independent document and can be linked to hypertext in the process of authoring the information document or be embedded in another information document, which maximizes usefulness of created information. Possible problems caused by revision in the embedded document such as collision of contents or errors in the RSS connectivity can be avoided with document versioning of each authoring document.

When providing information document by selecting contents from each unit, it is necessary to check the version of the embedded document. If there is a new version, it has to be noted on the web page so the users who have permission to donate information are able to check the content of the document and update its version.

Collective Verdict

In this model, a teacher takes the role of compiling juniors' different opinions to a collective verdict and its process is open by filtering. However, there is no device to cut off malicious action of anonymous users who don't belong anywhere. The saying that CEO of Wikipedia, Eric Raymond cited and many software developers used while working online for the open source project, "Only if we have enough eyes, no bug is so serious." shows that historical and geographical information is expected to be sound by self-cleaning through numerous participants' sound common sense, not by controlling or restricting participants' behaviors with a platform or a tool. When there are uncontrollable disagreements among online participants over many subjects, anticipating self-cleaning ability is the only ideal solution because the party trying to eliminate prejudice or malice is also a mere online group of users.

Web service system model

Figure 8 shows essential components when the system is provided to users through the web.

For users' access through external search engines, it is necessary to open external search for historical and geographical information with Open-API and to design the system in a way that mash-up with external map service is possible. Blogs have to be equipped with infrastructure that can be linked with the external blog system and SNS in a way of Open-API and technology like RSS.

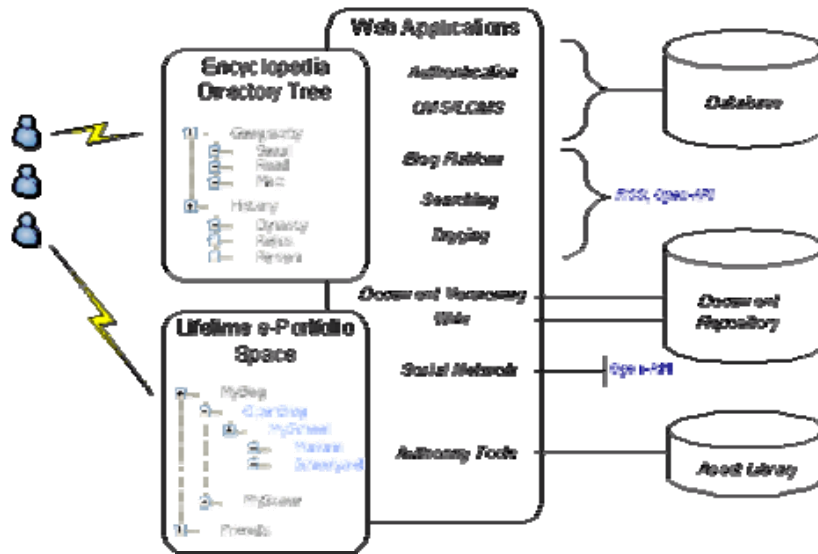


Figure 8. Web service system

Development Direction

When Junior Maphistory e-encyclopedia is successfully managed with accumulation of a good amount of national historical and geographical information, it needs to be linked to external service in order to create high added value. As shown in Mash-up model of HousingMaps made by linking GoogleMaps and Craigslist, if mash-up service is pursued by linking Open-API and sites that merchandised massive local information, it will have an effect of broadening the service areas of sites for more participants by exposing Junior Maphistory e-encyclopedia more often.

In addition, Junior Maphistory e-encyclopedia can develop globally by providing information in foreign languages. The service platform can also be expanded to neighboring countries as a way of increasing the amount of information and broaden the boundary of service.

When the amount of historical and geographical information reaches a certain amount level and its accumulation rate slows down, it will be naturally necessary to

broaden the area of information to cultural or personal information, so that the site will become a repository of historical, geographical, personal and cultural information.

Conclusion and Discussion

In order to make collective intelligence a successful model in educational contents, it is essential to actively accept Web 2.0 trends, which is abstract but confirmed by a real case, and decide its appropriateness. So this research suggested 'Junior Maphistory e-encyclopedia', web model of historical and geographical information for youths. This model is built on harnessing collective intelligence based on participation, sharing and openness, its educational value and appropriateness as a long tail business.

Junior Maphistory e-encyclopedia is a web service model, in which students carry out a project on geography of a region as part of their school curriculum.

Accordingly this research has its significance in that it proposed a prospective collective intelligence model which corresponds to the features of Web 2.0 and can develop into a complex historical and geographical information service by studying a web model of historical and geographical information web model for youths.

Possible future projects in relation to this research would be whether the system, which can support the factors drawn to verify the validity of Junior Maphistory e-encyclopedia in this research, will be developed and be reflected in practice in educational fields.

Lastly, I expect that the research on a new model of collective intelligence related to Junior Maphistory e-encyclopedia is used as valuable means in educational fields and as information storage of collective intelligence of local historical and geographical information, which can contribute to local cultural development.

References

- Anderson, C. (2006). *The long tail: why the future of business is selling less or more*. London: Randomhouse.
- Downes, S. (2005). *e-Learning 2.0*. Proceedings of ACM International Conference, 317, pp.236-241.
- Gan, Y., & Zhu, Z. (2007). A Learning framework for knowledge building and collective wisdom advancement in virtual learning communities. *Educational Technology and Society*, 10(1), 206-226.
- Han, H., & Kim, H. (2006). Effectiveness of adaptive navigation system for group activity at the Wiki-based collaborative learning. *Journal of Computer Education Society*, 9(1), 41-48.
- Jung, M. (2003). Design and realization of a supportive environment for project-focused collaborative learning. Unpublished master's thesis. Dong-guk university.
- Keris (2005). Research on next generation e-learning model and developmental method based on intensification of learners' interests, motivation and concentration. Research report KR 2005-34. Seoul: Keris.
- Kim, I. (2004). Curriculum and cultural/historical geography, *Journal of Cultural-historical Geography Research*, 16(1), 29-45.
- Kim, J., & Kim, H. (2006). *Interactions in learning in Wiki environment*. Proceedings of the 14th Winter Seminar of Korean Computer Education Association, pp.236-241.
- Kim, Y., & Kim, H. (2005) Learning of creativity based on Wiki - analytical research on collaborative writing class of novel. Proceedings of Korean Computer Education Association 14th winter seminar 9(1), pp.78-84.
- Lee, I. (2004). Research on Korean Ubiquitous education system. *Journal of Educational Information and Media Research*, 10(4). 165-193.
- Lee, J., & Yim, I. (2006). *Web 2.0 Business Strategy*. Sigmainsightcom.
- Levy, P. (1997). *Collective intelligence: Mankind's emerging world in cyberspace*. Cambridge:

Perseus Books.

Musser, J., O'Reilly, T., and the O'Reilly Radar Team. (2006). *Web 2.0 Principles and Best Practices, O'Reilly radar report*. C. A.: Sebastopol

O'Reilly, T. (2005). What is web 2.0? from the world wide web: [http://www. What – is- web 2.0.html](http://www.what-is-web-2.0.html).

Scardamalia, M. (2002). Collective cognitive responsibility for the advancement of knowledge. In smith, B, (ED.), *Liberal education in a knowledge society*. Chicago: Open Court, pp.67-98.

Scardamalia, M., & Bereiter, C. (2003). Knowledge buliding. In Guthrie, J. W. (Ed). *Encyclopedia of education*, New York: Macmillan. pp.1370-1373.

Seok, Y. (2007). An Analysis of the Social Significance of Information Production by Means of Collective Intelligence. Unpublished master's thesis. Yeungnam university.

Surowiecki, J. (2005). *Wisdom of crowds*. London: Random House.



Mi-Hyang BANG

Ph.D. candidate, GSCT(Graduate School Culture Technology), KAIST
& General Manager, Kumsung Publishing Co., Ltd. Interests: Children's
Culture Contents, e-learning for Children, Edutainment, Structuring
Knowledge of Textbook, e-Encyclopedia
E-mail: rifo64@kaist.ac.kr