Modelling Digital Natives' International Collaboration: Finnish-Korean Experiences of Environmental Education

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ABSTRACT

A new generation of young learners often described as digital native school children are attitudinally and technically equipped to employ social media as a social process in learning. However, few international virtual learning projects have been implemented and researched. This article examines a trial which aimed to combine viable technology with future pedagogic solutions for primary students from Korea and Finland and create an international collaboration model in virtual learning for environmental education. The results show various challenges of the operational model and suggest effective implementation strategies. The challenges were organisational, language, technical and collaboration barriers. The operational model illustrates possibilities of implementing cyber space pedagogy, visualization of knowledge using technology, cyber spaces for collaboration, and the motivational impetus provided by the model. This pilot study demonstrates the need to increase greater interactivity between teachers from the partner countries during the planning phase and provide more authentic interaction for inter-learner dialogue.

Keywords

International collaboration model, Environmental education, ICT in education, Finland, Korea

Introduction

As the world becomes more inter-connected and globalized, people are asked to be aware of multi-cultural differences, and global education is particularly needed for 21st century students (Cisco, 2010). Schools are often asked to provide education for global citizenship (Kaivola & Melén-Paaso, 2007; O'Neill, 2006). Information communication technology enables communities to move beyond geographical boundaries and provides a vehicle for people around the world to interact and learn together seamlessly. Concurrently learners in international collaboration on the web are required to face and overcome numerous barriers, e.g. linguistic, temporal and cultural boundaries (Walker & Creanor, 2011).

Direct interaction and communication with students from other cultures can be one of the most effective ways to understand and learn about cultural differences. Global environmental issues can be an appropriate means of introducing global citizenship to students. Social software, like Web 2.0 enables students to collaborate through computer-mediated communication and to form learning communities in which they construct and share knowledge. Learning communities emerge when students share common interests (Jonassen, Howland, Marra & Chrismond, 2008; Hakkarainen, Palonen, Paavola & Lehtinen, 2004). Since ICT is already developed enough to easily provide students with international interaction opportunities in teaching and learning, schools should not hesitate to offer international collaboration using ICT, which seems to be a promising means of achieving this goal (O'Neill, 2006).

ICT has permeated daily life extensively, and Finland and Korea are known as highly wired countries. Not only are the societies technically equipped, but schools are also. Although great differences continue to exist in resources between schools, extensive national training and school facilities have ensured adequate proficiency of teachers' technical skills and ability to employ ICT in education. However, schools still face challenges – the use of technology as a learning tool has not increased (Niemi & Kumpulainen, 2008; Kankaanranta & Puhakka, 2008). Developing school practices to reflect contemporary learning concepts powerfully impacts technologic needs in teaching (Niemi & Kumpulainen, 2008). Infrastructure of ICT in Korean and Finnish schools has been well established but pedagogic implementation of ICT in education has not been adopted well.

Digital native school children challenge pedagogy

Digital natives and net generation are two common phrases used to describe the generation of people born between the early 1990s and early 2010s. They have grown up with digital technology and are the first generation to be bathed in bits (Tapscott, 2009), creating the assumption that this generation has a natural aptitude and high skill levels for using new technology (Jones, Ramanau, Cross & Healing, 2010). Yet Jones and Healing (2010) approach the 'Net Generation' or 'Digital Natives' assumption at macro and micro levels with reservation. They claim that the net generation trend should be treated with meso level like class or program activities, as students in advanced industrial countries are far from homogenous in their response to new technology. The arguments raised by Jones and Healing (2010) underpin the use of the digital natives or net generation concepts in this paper.

An educational challenge for the global world is to provide learning experiences of authentic operational cultures that support interaction between individuals and groups (Vähähyyppä, 2010). Being exposed to a different culture can deliver an optimal learning experience, yet not all have access to such opportunities. Thus the experience of different cultures through cyber space becomes a feasible solution to meet this educational challenge. Technology becomes a vital environment for global citizenship education. Despite the importance of ICT for global education, virtual international projects between elementary schools have been little researched (O'Neill, 2006; Korkala, 2009).

A critical question is how viable technology can be integrated to future pedagogic solutions to create authentic learning experience. Green education, also known as environment study, is a strongly emerging theme in Korea (MEST, 2010). The United Nations has declared 2005–2015 the Decade of Education for Sustainable Development. Basic education endeavors to produce skills for environmental protection that take into consideration socio-cultural and technologic-economic objectives of sustainable development (Tapio, Kohl, Tikkanen & Salonen, 2007). Environment study is often used in global education as it requires international collaboration and an understanding of being connected globally regardless of differences in culture, race, and nationality.

The pilot examined in this article is a Korean and Finnish educator initiated environmental education project at elementary school level. The Korean and Finnish education systems are quite similar: 6-3-3 (six years of elementary school, 3 years of junior high school, 3 years of senior high school). Class size in Korea is about 35 students, while in Finland class groups during basic education comprise 20-25 learners. English lessons in both countries begin in third grade (9-10 year-old) at the latest. The project involved five classes in Finland (approximately 120 students) from the same elementary school and three classes from three different schools in Korea (approximately 100 students). Classes were selected arbitrarily in Finland, and in Korea schools with teachers belonging to the Global Education Foundation (GEF) (www.globaleducation.or.kr) were selected. The Finnish students were 10–12-year-olds (grades 4–6) and the Korean students 11–12-year-olds (grades 5 and 6). The project was conducted during the fall semester (Sept. - Dec.) in 2009. The pilot aimed to create an international cooperation model for elementary school environmental education. The project stimulus came from a Korean online education partner. The content used for the international collaboration was waste recycling and instructional materials came from the Korean research team.

Research

The Korean-Finnish environmental education project investigated the following research questions:

- How does a cyber space function as an environmental education meeting place for today's digital native school children? What challenges and strengths emerged in implementing technology?
- What kind of operational model would be meaningful in future international virtual collaboration at elementary school level? Which cultural factors are influential and how?

The research data primarily comprises log information, records and content saved in the Edu2.0 platform: discussions, interactive processes, produced material, and emails. Additionally, the activities of one Finnish class were observed during the project period. The data collected were used to answer the first research question. Finnish teachers (5) and one principal were group interviewed at the end of the project in January 2010. Data from the four Korean teachers was collected through in-depth interviews. Qualitative data from interviews were used to develop the operational model (Cohen, Manion & Morrison, 2000). The qualitative analysis used content categorization.

Selection of the virtual tool

The tool 'Edu2.0' (http://www.edu20.org/) (see Figure 1) was selected after a careful analysis of various alternatives as it contained features suitable for the project objectives such as user-friendliness, learning management system, interaction, and functions of sharing knowledge. The discussion forum was the main interaction area in this project. Students could, for example, send and receive messages, interact with each other, post pictures and videos in the cyber space, and read and comment on each other's productions.

The Edu 2.0 learning platform is open software which does not require any software installations or server environments. This service, administered from San Francisco, USA, was established in 2006 and has over 150000 users globally. Environment creation was initiated by the Korean partners, but was easily adaptable for any changes as the process advanced. Management of the Edu2.0 platform was facilitated by the Korean research team. Visual sharing of knowledge was critical in the project so that in addition to Edu2.0, digital cameras, YouTube and Photoshop software and other image editing tools were also used. Private data was only transmitted through Edu2.0, as its SSL log in and other security measures were deemed adequate to protect material.

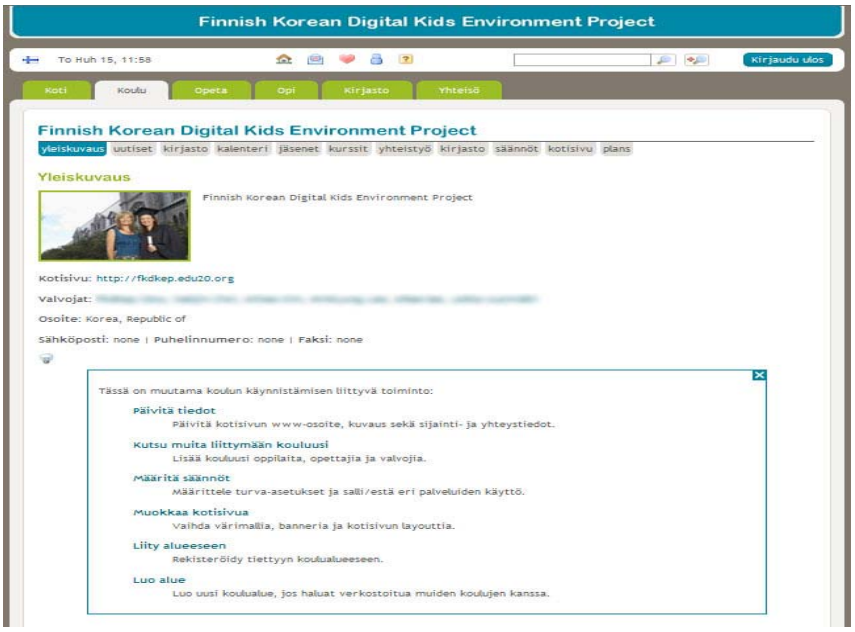

Figure 1. Edu2.0 website

Orientation and initiation

Teacher orientation programs for the entire project and its pedagogic idea were held separately in both countries. In Finland, the operational phase of the project for the 5 participating teachers began at the end of August 2009 just before school resumed. The principal lecturer of online pedagogy at a Finnish university of applied sciences and the principal of the participating elementary school conducted the orientation of the pilot's operational concept and pedagogic operational model. Issues related to class and sub-group virtual collaboration were considered and viable solutions sought. The orientation also included training in the use of digital tools, familiarization with the joint virtual working environment, and information about the use of the instructional materials for 'recycled materials'. A Korean IT specialist compiled an Edu2.0 manual, which was translated into Finnish.

Previous studies have shown that organization and availability of continuous technical support is a critical success factor for international school learning collaborations (O'Neill, 2006; Lee, 2009). The Finnish partner resourced 4 hours of in-class IT support each week. A course environment was created for pairs of students in Edu2.0. Small groups, whose task was to create and handle together environmental education knowledge, were created in the course discussion forum.

The Korean team also conducted an orientation program for the four Korean teachers more or less in the same way as in Finland and a team of instructional developers designed instructional materials. In Finland the principal's role in initiating the project was significant. According to Korean practice and protocol, teachers manage projects of this scale. However, it was obvious that activities went beyond a classroom teacher's responsibility, and help was required at school level in the form of translation support, more technical support, and field trips to waste recycling facilities. Class selection was done voluntarily through the GEF teachers' association.

The project's frame

The learning tasks of the project phases were: 1) Ice-breaking, 2) Collecting information about waste recycling in their environment, and 3) Presenting creative ideas for recycling waste. A Korean researcher designed the learning tasks, intended as guidelines, and teachers were given freedom to adapt, fine-tune and apply these to meet their needs. The learning tasks are introduced in more detail below:

Ice-breaking

Multimedia affordances were utilized in ice-breaking. The Internet generation is accustomed to information presented on screens and in diverse forms: images, videos, music (Vähähyyppä, 2010). Students brought pictures of themselves, their family, hobbies and homeland into the closed learning environment, and discussed these themes. Favorite music was also added to the Edu2.0 platform.

Figure 2. Observations on waste recycling made by South Korean students

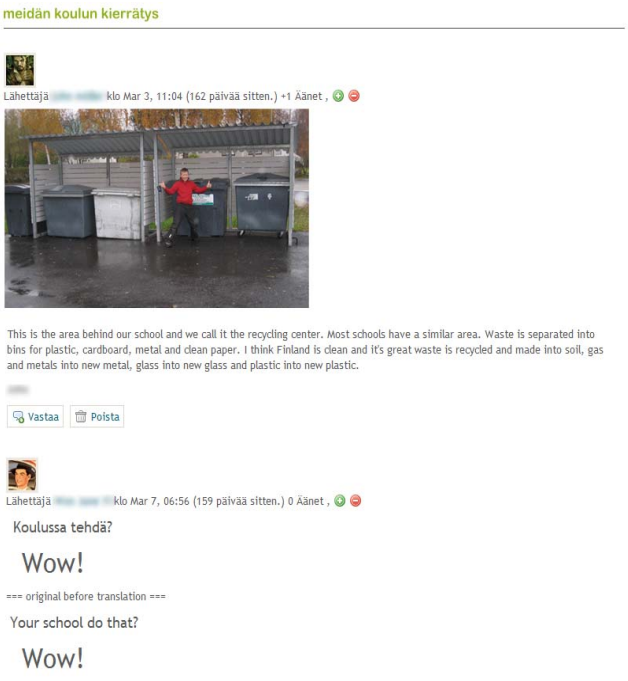

Figure 3. Observations on waste recycling at a Finnish school

Environmental themes emerged strongly in these introductions, especially in narratives of one's homeland. One Korean student wrote: "*Hello! my name is XX! my favorite food is kimchi…. My country Korea is not clean but we are separate the trash, wow! It is real! If you come to Seoul, you'll feel very happy and you'll love my city. Seoul is peaceful city, lovely city and famous city. All student and I am endeavor for earth because if the earth destruction, it will be bad to us*."

Collecting information about waste recycling in their environment

Themes investigated in this project phase included waste generated at home or school. Students used digital cameras to photograph their school neighborhood. The photos were utilized in gathering knowledge on waste recycling as required by the learning task especially in Korea, but also partly in Finland (see Figure 2 and Figure 3). The photos were eloquent illustrations of student observations.

Presenting creative ideas for recycling waste

In the final phase of the project, students used creativity to recycle waste—in fact they produced pieces of art. The aim was a reciprocal presentation and sharing of product ideas among students through the cyber space. This phase of using visuals was purposely included to minimize the language barrier and maximize the dramatic results of students' creative application of knowledge. We expected visuals to compensate for language limitations.

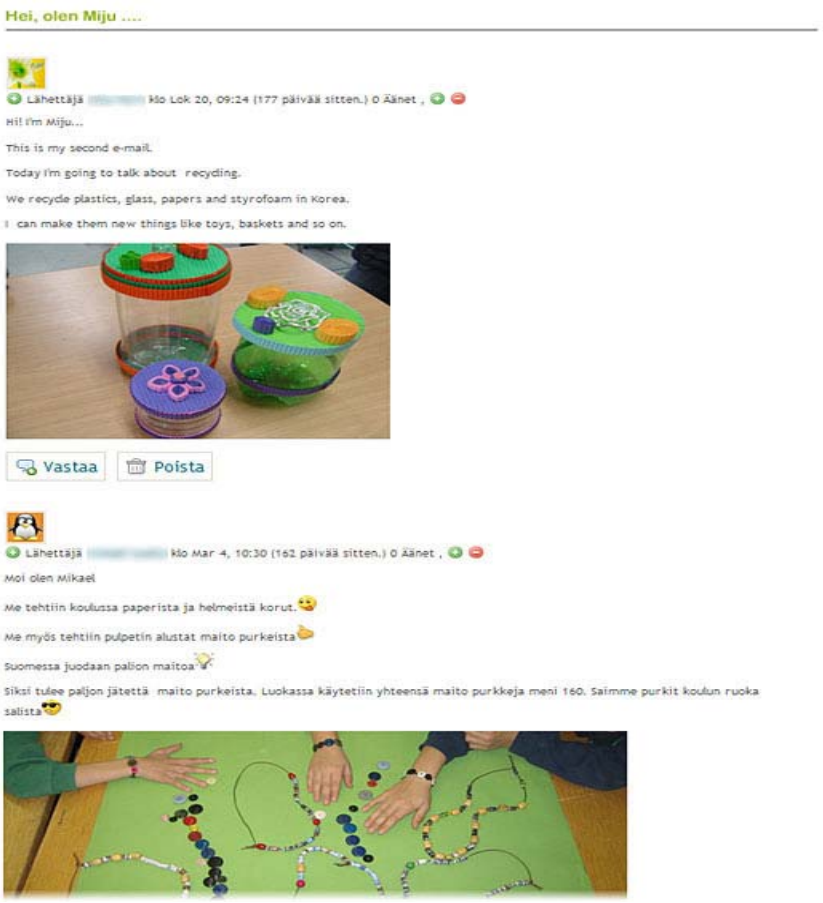

Figure 4. Pictures of handicrafts students made of reused waste

Finnish students made, for example, furniture coasters for their desks from milk cartons. Finns drink a lot of milk, generating a lot of milk carton waste during school meals. In the second phase, students interviewed school catering staff about milk carton waste. They then calculated how much carton waste is produced daily. The class needed 160

milk cartons to make their coasters. Other arts and craft were made from recycled products, such as candle lanterns from glass jars, and jewellery fashioned from paper, buttons and beads. Pictures of the products (see Figure 4) were posted in the Edu2.0 platform for others to see.

Challenges in the operational model

Organization barriers

Several barriers and boundaries were identified during the project. Due to numerous organizational, scheduling, language and interaction challenges, project objectives were only partially achieved. In her research on the internationality and various operational forms of Finnish basic education, Korkala (2009) stresses the fact that participation in international projects requires time and resources. These projects should not disrupt core work and burden staff; rather they should be integrated into curriculum activity and be a continuous process tightly coordinated within everyday school work (Korkala, 2009).

This project's commencement timetable was tight and it began rather spontaneously. The original objective was to create an operational model with a large number of participants. Timetable mismatches existed due to organizational difficulties and school vacations. For example, the number of classes participating from South Korea was less than originally planned and therefore only one Finnish class was matched with a Korean partner class. In Finland, separate resources were not allocated to the project, which in practice determined the project's importance amongst the heavy school workload. The time assigned for the use of computers was not sufficient for participating students to write, read, discuss and respond to counterpart students' postings. International cooperation should be scheduled before the school fiscal calendar is decided, which in Korea is in February. Thus, as this project started in the fall semester, some schools that planned to participate were unable to fit the project into the school curriculum smoothly. Only one out of three schools was able to participate from Korea. This was also due to lack of school leadership where principals of the three schools showed little enthusiasm at the beginning of the project. School leadership is essential for the success of these kinds of international projects.

Difficulties in the roles, responsibilities and flow of information emerged due to a lack of direct communication between teachers. Teachers from Finland and Korea lacked opportunities to build trust between each other before the project started. But trust is a key factor for successful virtual learning community activity (Lewis & Allan, 2005). Communication primarily occurred through "intermediaries," that is, between project initiators. The operational model's core difficulty in this experiment was the creation of a concrete collaboration model among classes and groups. This kind of international collaboration requires well defined support activities, which include among other aspects, recognition, priority of incentives and cultural acceptance.

Language barriers

One significant boundary was language. English was to be the primary communication medium as one project aim was to provide authentic opportunities for students to use English. However, it was quickly apparent that using English to complete class tasks was too challenging for ten-year-olds, even with support from the English teacher. Classes were dissimilar and differences of language proficiency existed between them. In Finland, the class teacher was responsible for supporting students' English, with help available from the English teacher only after problems emerged. In Korea, the English teacher was assigned to support the process. At the beginning of the project, students were encouraged to use English, but very quickly it was clear that they were unable to cope with the language barrier by themselves, even with teacher support. One teacher reported: "*Language resources should have been thought out completely differently, our children do not yet have such strong language skills.*" While Korean teachers thought language was the major barrier, Finnish teachers did not consider it a key difficulty in the project, as the primary objective was collaborative construction of knowledge and interaction in waste recycling. But the Finns also realized that English was not only pivotal in sustaining instructional activity, but also student motivation. Language support such as translation tools are needed for multilingual communities comprised of ten-year-old students (cf. Walker & Creanor, 2011).

Visualization of text (visual language) significantly facilitated construction of knowledge and interaction in waste recycling and reuse. Visual language enabled communication in the learning platform without words as it was built on students' familiarity with sustainable development and recycling. Visual language could be employed in the construction of new knowledge.

Technical barriers

The learning platform Edu2.0 was new to all participants. Additionally, Finnish teachers had no previous experience of working in a cyber space. Support for technologic facilities such as internet connections and digital cameras is necessary, but not enough. A Finnish teacher mentioned that "*The children brought their own digital cameras to school, but not everyone had cables for transferring photos.*" Posting images in the Edu2.0 learning platform and defining image size was challenging to students. Technological infrastructure such as internet access, computing lab availability or laptops in classrooms should be the basic requirement in implementing this type of project. The best solution would be to provide mobile technology to students so that classroom activities are linked seamlessly to the project without having to go to the computing lab (cf. O'Neill, 2006). Convergent with activity theory (see Jones & Healing, 2010), the project demonstrated that individual players, teachers and learners are part of an activity system which should be thoughtfully integrated into a project system. The school system, learning environment, access to technology and infrastructure, and pedagogic solutions in learning projects all impact digital natives' use of technology (Jones & Healing, 2010).

One Finnish teacher observed fourth graders' (10-year-olds) need for technical support in the project as follows: "*I often thought, hey c'mon, our IT Finnish society, some country is going to really pass us very fast, even though we think that our students are on the internet the whole time and can do whatever…they can only play on the net, what they know how to do is very limited, they don't know how to save or search on the machine....*" It is interesting to note that Korean teachers made similar comments. Successful infrastructure for internet connectivity, but poor application was mentioned by the Korean Presidential committee's 2010 national IT agenda (Lee, 2010). In this project there was no homogenous net generation so to speak (Jones & Healing, 2010). Some students were able to assist their friends (peers) and teacher in the use of the new technology, but there were also students who needed support in digital technology use.

According to the Finnish teachers, students' IT skills were limited, restricted to playing games on the internet (OECD, 2005). However, teachers may not fully appreciate how children live, act and experience the media world (Pohjola & Johnson, 2009). After being in the Edu2.0 platform with children, the Finnish IT support observed that boys quickly found more complicated applications and had fun with some functions commonly used in games. Games were familiar to students but ignored by teachers. Game-like features should be considered a valuable asset in learning.

Opportunities to employ IT facilities differ noticeably between Finnish schools. Reports indicate that there is a wide difference amongst institutions in device capacity, and clear regional differences also exist. Increasing educational use of ICT requires systematic support for facilities in school and structural and pedagogic development for teachers. Also, adequate internet connections at school and at home have to be guaranteed for all students (Niemi & Kumpulainen, 2008). Korean schools provided free H/W and network (internet access) to less affluent students as part of the social welfare system for educational equity. Most students, however, have internet access at home.

Collaboration barriers and cultural differences

In this pilot study, there was little interaction between Korean and Finnish students as the few resources were focused on *producing products* for the discussion forum. It was evident that students were not so interested in the visual products of others, but more interested in receiving responses to their own messages and work. Energy and resources were all used in creating one's own products, which left neither time nor energy to comment on the work of others, although students loved reading comments on their work made by students from another country. It raises the need to emphasize commenting on other students' postings as vigorous interaction.

Finnish and Korean students showed differences in communication style. These examples of international dialogue between school children show how Korean students use interactive dialogue to set challenges: "*Hi! I saw Finnish friends' mail. So I am very happy. I only have Korean friends but now I have some Finnish friends. Let's talk about "our world." Do you have a good idea about cleaning the world? I will not throw away the trash in the street. I am just 11 years old. So I think we cannot do difficult works but we can do very simple things in our homes and school. Saving water & saving Energy is the best way to clean the world.*" The Korean student "throws out" a question for reflection. What can we do together to save the world? All in all, there were more questions on environmental issues in the Korean students' messages, while the Finnish students' messages were on average perhaps more descriptive; the latter focused more on presenting knowledge than challenging to dialogue on an emotive and attitudinal level (Munro, 2009).

This type of dialogue, rich context vs. low context communication, also shows that Korean students tried to receive consent from Finnish or other Korean students. Korean students tried to seek consent from other students in order to be socially accepted. According to a previous study on online interaction cultural differences among Finnish, USA and Korean university students, Kim and Bonk (2002) reported similar findings, though this was a study into cross-cultural differences in online collaboration behaviors in university students. In the study, Korean students showed a higher level of social interaction behaviors than Finnish or American students, who displayed very few social interaction behaviors. These differences are most likely related to different communication styles across cultures. It is generally understood that Western cultures, such as the U.S. and Finland, use low-context communication, and Asian cultures such as Korea use high-context communication. It is assumed that Korean students tried to use social context in order to make meaningful communication. Further research is recommended to ascertain whether this different style of communication is due to cultural differences or different teaching styles. Whatever the research outcomes, being sensitive to pedagogic cultural differences is essential (EBS, 2008).

Strengths of the operational model

Environmental education themes facilitate active learning

Environmental education and observations on recycling as a sub-section are easily applicable to authentic and problem-based learning. The learning tasks in this pilot were desirable for the following reasons: (1) they had a real-world relevance, (2) students had to investigate a single complex problem (tasks were not defined in detail beforehand, but were ill-structured, and not fixed in advance), (3) the learning tasks required a sustained period of time for investigation and could be integrated across subject areas (Herrington, Reeves & Oliver, 2010). In the operational model students worked in groups on open, real-world tasks and were (partly) able to play an active role in defining and solving learning tasks. Teachers had a guidance role in learning as defined by social constructivism. Students had an opportunity to network and learn through working collaboratively with students from another country (Kankaaranta & Puhakka, 2008; Herrington et al., 2010). In fact, students not only enthusiastically investigated the subject matter, but also culture. The project introduced the customs and culture of another school community. The pedagogic operational model facilitated crossing of traditional boundaries (cf. Hakkarainen et al., 2004) and took students outside their school—both near and far.

Knowledge visualization with technology

Technology can help us see things in a new way. Digital cameras and mobile phones make visualizing knowledge easy. Students can create documentaries which contain real-world phenomena in more visual form, giving them a better understanding of their own society (Jonassen et al., 2008). In this regard, knowledge visualization was successfully implemented in this project. A Finnish teacher narrates in the project's early phase: "*I have designed tasks for pairs in which they find out how recycling happens in their city. Students will interview the caretaker and catering staff on recycling and waste disposal at their school. Some will research Ekoroski's website, some will produce information about Finland in pictures and words.*"At the project's conclusion one teacher felt: "*An environmental theme was fantastic, and the images alone visualized some kind of interaction.*" Traditionally, text-based virtual communication has been more natural for Finns (Munro, 2009). One key insight the project provided to teachers was the affordances of a virtual learning environment for visualizing knowledge. Images can strengthen authenticity and provide a real-world perspective. Positive learning outcomes are reported more often from learning

environments where visual technology, such as digital video technology and multimedia is applied (Vähähyyppä, 2010). One characteristic of digital natives is that they are more oriented to visual media than previous generations.

Virtual learning environment

Teachers valued Edu 2.0 highly for international collaboration between elementary schools. The learning environment also contained elements students found interesting (gifts, profile images). All in all, Edu2.0 was a eureka-experience for Finnish teachers and students. A teacher's experience: "*It's possible…to do whatever with the students there; they were very excited by the tasks we (teacher pair) had designed."* Another teacher's summary of experiences: *"Absolutely wonderful how the environment supports learning, starting with language learning.... The environment will continue to be used in classwork and in inter-class work.*" Administration of the Edu2.0 platform worked extremely well, as students in the different countries were able to log in to the same place.

A teacher describes how enthusiastic students were to use Edu2.0: *"… so the children paid attention to the platform, were extremely enthusiastic and inquisitive and even rather demanding…found out for themselves and supported their teacher.*" A teacher explains: "*When I showed one student how to attach a video, the information spread throughout the class.*" The behavior of digital native school children is evident here; knowledge is received from peers and it is shared with peers. The role of learner and teacher alternates as necessary. Today, a teacher finds herself in the role of learner just as often as a learner finds herself in the role of teacher (cf. Hartnell-Young, 2006.) Digital natives unreservedly adopt new technology and they have the courage to throw themselves into learning something new: "*…what I have learned from students is to jump right in (teacher).*" In Finland the *ICT in a school's day to day activities* ("Arjen," 2009) report recommends ICT be used more rigorously in teaching and learning. Children learn to utilize technology quickly, a natural characteristic of digital natives which teachers often tend to forget (Vähähyyppä, 2010).

Motivation

Consistent with earlier studies (Korkala, 2009), students showed great motivation in using technology for environmental themes. The children were innately enthusiastic: "*…after they had read the messages and images sent by the Korean children, it was hey, when can we go again…it was thoroughly interesting…"*A meaningful and creative pedagogic use of IT engaged students in learning. The use of images was especially motivational. Finnish teachers felt the activities promoted learning: *"The students said they had learned a great deal about recycling."* However, infrequent interaction dampened students' enthusiasm. Thus frequent interaction is essential and teacher support can positively impact student participation. Sustained active teacher participation relies on intrinsic motivation which requires autonomy, competence, and relatedness (Radford, 2010). Korean teachers and students did not participate as enthusiastically as expected. This was attributed to a lack of language competence, as teachers and students found recycling related to their daily lives and teachers have full autonomy in class activities in Korea. Support for technology and English must be provided to teachers to ensure competence as suggested by the Self Determination Theory (Pink, 2009) and Radford's (2010) motivation theory.

Teacher skills and attitudes have a critical role in how technology is utilized in teaching (Niemi & Kumpulainen, 2008). The three Finnish classes left without a partner class adapted the project to their own needs and felt the project was the best thing they did during the fall, even though it was not implemented according to its original objectives. Only one Finnish class did not complete the environmental education tasks or work in Edu2.0 (Pohjola & Johnson, 2009).

Students could acquire IT skills through authentic class activities, rather than formal instruction of IT skills. When content is of primary importance, the learning of which is supported by technology, authentic learning projects are created. A significant dimension of motivation was the articulation of knowledge, that the project helped students to develop writing skills for real audiences (Herrington et al., 2000; Jonassen et al., 2008). The Finnish teachers noted that even boys paid greater attention to grammatically correct writing when they knew they were writing for a wider audience in Edu2.0, contradicting the finding that female university students are better than male university students in cyber space asynchronous communication (Im & Lee, 2008). This invites further study on how school level and gender affect communication skills in a cyber space.

Pedagogy

Despite the potential power of technology, it is generally not utilized effectively in teaching. A primary reason for this is that teachers do not know how technology can be employed in meaningful ways. While teachers have the necessary technical IT skills, pedagogic training is also needed (Niemi & Kumpulainen, 2008; Vähähyyppä, 2010). This study showed that suitable themes and teacher training can motivate use of IT to enhance students' authentic learning experience.

New learning concepts which emphasize a social construction of knowledge and collaboration demand changes in basic education in Finland. Technology has an important role in this reform process (Niemi & Kumpulainen, 2008). Pedagogic wellbeing is improved when teaching and studying are built on a participatory, listening, interactive and motivating learning environment that utilizes learning methods typical to today's youth ("Arjen", 2009). Changes in society, such as multiculturalism and the needs of personalized learning also set new challenges for schools. Kankaanranta and Puhakka (2008) suggest Finnish teachers use the advantages of networking and expanded learning environments afforded by IT specifically to acquire classroom connections to experts, friends and other educational groups. Korean educational policy addressed a similar need in education where creativity and personal character building education are emphasized.

It appears that the permanent impact of this project is the positive attitude of teachers towards international collaboration as a new learning environment and teaching method using IT (Korkala, 2009; Vähähyyppä, 2010). The positive effect of IT in education is evident when instructional activity in a learning cyber space is guided by clear pedagogic goals originating from genuine pedagogic needs (Vähähyyppä, 2010).

Operational model for international cooperation using cyber space

The pilot experience is applied to describe the operational model for international elementary environmental education in Table 1.

Table 1. Operational model for international elementary environmental education

Stage	*Instructional activities*				
Stages	1. Planning and preparation	2. Ice-breaking	3. Data collection	4. Presenting results	5.Summary
Activities	- Establishing international connection between practitioners/ coordinators / teachers (real time meetings) and collective planning - Selection of cyber space, IT support resource, manual and training - Resourcing English teacher for classroom support - Orientation for teachers, allocation of roles - Formation of partner class and groups in cyber space	- Introducing each other - Students introduce themselves, their hobbies, family, school, neighborhood and homeland (e.g., weather, culture, food) in groups / pairs through words or images - Comment by partner school (all students should have a reply) - Summary of what was learned about partners - Presentation of summary in multimedia format	- Investigate and observe waste in neighbourhood and bring findings to the cyber space in words and images (groups). - Interview e.g., school caretaker or city environmental experts. - What waste does one household / school generate? - What is it? - How to categorize them? - How to dispose of them? - Quantity of waste generated (e.g., papers, bottles,	- Ideas to reuse waste by visiting shops, or interview experts - Discuss ideas in group in cyber space using multimedia - Develop product made of wastes - Presentation of products (by photos or video) in cyber space - Comment on products by partner school	- Writing research results - Vote for the best idea - Contest result - Sharing experience

	- Logging in to learning environment and instructions for activities	by group	plastic) - Comment on research results		
Cyber Tools	Real time internet software, videoconference (e.g., Skype, Adobe Connet Pro, ooVoo, email)	Learning platform / cyber space, e.g., Edu2.0, digital cameras, YouTube, Photoshop software	Learning platform/ cyber space, e.g., Edu2.0, digital cameras, YouTube, Photoshop software	Learning platform/ cyber space, e.g., Edu2.0, digital cameras, YouTube, Photoshop software	Voting S/W videoconfe-rence YouTube
Scheduling	8 weeks	4 weeks	6 weeks	6 weeks	4 weeks

Reflection

The examined project is an example of a new educational practice in elementary school level international environmental education. The pilot study offers insights on how the use of technology can be strengthened in meaningful ways and identifies pedagogic models that integrate teaching to authentic contexts and promote authentic learning, as this is a necessary step on the road to such pedagogy (Niemi & Kumpulainen, 2008; Herrington et al., 2010).

ICT is a central part of life for today's young people, the so-called net generation. Virtual interaction is a natural activity for digital native school children, but the challenge for project coordinators and teachers is to construct clear work methods for group-based collaboration. Construction of project implementation cannot bypass teacher-level reciprocal collaboration. The crucial significance of laying a solid foundation for collaboration also emerged strongly. In Finnish schools, limited ICT resources for the use of the entire class was a big barrier, while in Korea little support for teachers in organizational aspects due to lack of school leadership was a limiting factor. Korean teachers felt insufficient English skills to be the greatest obstacle.

New generations grow into digitalism and at school, young generations challenge the abilities and expertize of teachers (Vähähyyppä, 2010). School children as digital natives adopt familiar functions from games in virtual interaction. While a teacher felt that students "only know how to play", games actually provided students a context for perceiving the learning environment easily. New technology can help to put contemporary learning concepts into practice.

The attitudes of Finnish teachers and students towards the project idea, despite implementation difficulties, were positive. The project offered school children a virtual opportunity to become familiar with a significantly different culture and promoted self-awareness of their own identity (O'Neill, 2006). An attitudinal readiness for a new type of work for the 21st century, consisting of cognitive skills, working together, digital literacy, and communication skills (Cisco, 2010) exists. However, consistent with McNaught, Lam and Lam (2009), differences in students' levels of motivation to use technology in learning were notable.

The pilot study, contrary to our expectations, found student activities more task-centered than interaction-centered. In future, thoughtful operational models to promote international interaction are needed. Trust building at the beginning of activities can enhance communication quantitatively and qualitatively (Im & Lee, 2007).

It would be interesting to compare the impact of culture on virtual interaction between school children. Korean students who are more rich-context communicators in general prefer communication through video or other forms of multimedia. Consistent with previous studies, the project examined here indicates that a western method of processing knowledge is traditionally more text-based, while an eastern approach relies more on knowledge visualization (Munro, 2009). This is consistent with the general notion that Asians (including Koreans) are rich-context communicators preferring to communicate in multimedia form. Communication differences need to be

culturally embedded in pedagogy, particularly in cyber space communication. French, Lee and Pidada (2006) have compared friendships of Indonesian, South Korean and U.S. youth in order to learn about group dynamics. In their study, Korean college students preferred small groups of 2 or 3, while college students from the U.S. preferred slightly bigger groups (5-6), and Indonesian students the biggest groups (8–10). Further studies should include how cultural preference for group size affects effective interaction in virtual learning environments.

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