

Factors influence Asian K-12 students' and teachers' participation in global networked learning

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Strengthening ICT skills through Web-based learning environments have proved to be an effective way to motivate student learning interest and participation. The APEC (Asia Pacific Economic Corporations) Cyber Academy is a free networked learning environment that aims at ICT skill improvement, international collaboration, and project-based learning. This study concludes that English improvement, computer enjoyment, communication skills, human-computer interface, and a sense of community play the key roles in student participation. Teachers who facilitate the process also affirm the pedagogical values of collaboration, peer evaluation, and ICT skill improvements. Both teachers and students acknowledged the importance of teamwork and games in networked learning.

Keywords: ICT skills, APEC Cyber Academy, project-based learning, networked learning environment, student perceptions, international collaboration

1. Introduction

Infusing information and communication technologies (ICT) in the K-12 classrooms have become increasingly important for K-12 educators. ICT skills play an important role in student academic achievements and social skills attainment. With a wealth of information available only online, students need to know how to access, search, retrieve, analyze, synthesize, and evaluate information [1]. Learners also need to be equipped with the communication skills to face an increasingly challenging global marketplace. In many Asian countries, mastering ICT skills also provides a gateway to global citizenship. This study will explore factors that interest students in Asia to join global online learning activities. The APEC (Asia Pacific Economic Corporations) Cyber Academy (hereafter ACA) is a free networked learning environment that was created to enhance ICT skills, team collaboration, and international friendship. Annual contests were held with more than 1,000 K-12 students participating in a series of activities that promote cross-cultural understanding and international collaboration. The objectives of this study are to examine student and teacher perceptions toward networked learning environment and factors that may influence students' willingness to participate in online activities.

2. Theoretical framework

Information literacy has become part of regular K-12 curriculum in many parts of the world. New hardware and software development have also contributed to the changing pedagogy in the classroom. McKenna (2006) [2] postulated three trends of software development that have profound impact in literacy education. The three trends are advancement in speech recognition software, computer-assisted reading support for struggling young learners, and increasingly sophisticated multimedia environment (including games). The development in these three areas is especially beneficial for ESL learners in Asia. ESL students could have more opportunities to polish their language skills through speech recognition, reading-assistant, and multimedia. Teachers and students are increasingly utilizing information and communication technologies to enhance the learning and teaching activities. ICT has great potential to increase student engagement in learning activities. ICT also provides innovative pedagogy that goes

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beyond drill and practice.

ACA is steeped in the constructivist and self-regulated learning theories [3]. Learner-centered learning is especially important in networked learning. Students become autonomous through collaboration, peer evaluation, and project-based learning (PBL). PBL provides authentic learning experience that has real-world applications to students [4, 5] The tools and various ACA components were designed to facilitate teaching and learning activities with sound pedagogy and friendly human-computer interface (HCI). The technologies employed include intelligent tutoring, agent, multi-user video-conferencing, forum, mail-box, text chat, speech recognition, 3D virtual reality, games, and eLibrary. These tools are designed to support scaffolding, modeling, social construction of knowledge, online collaboration and PBL.

3. Background of APEC Cyber Academy

The APEC Cyber Academy (<http://linc.hinet.net/apec>) is sponsored by the Asia Pacific Economic Corporations (APEC) and the Ministry of Education in Taiwan. Students from the twenty-one political economies of APEC are strongly encouraged to utilize the ACA platform to improve their ICT skills. Annual international contests are held between October and December for K-12 students and teachers from the APEC member countries to engage in a series of structured activities for the purpose of ICT skill enhancement. More than 10,000 users have registered with ACA since its inception in 2002.

There were two main ACA programs: ICT Cyber Camp and Networked Collaborative Learning Program (NCLP). Both programs have strong emphases on project-based and problem-based learning. Teachers and students can form teams to participate in either the ICT Cyber Camp or one of the four projects in NCLP (table 1) during the ACA contest between October and December each year. During the nine weeks of the ACA contest, each team will present ICT artifacts based on the theme and requirement of each program. Tutors are also available to provide assistance to participants in each project area. The assistance includes English correction, project comments, and technical trouble-shooting.

Table 1 *Project-based Learning in the Networked Collaborative Learning Program*

Networked Collaborative Learning Program	Objectives
Convenience store	Understand the cultural differences of convenience stores in different countries and currency conversion
Our holidays	Compare and contrast holidays in different countries thought cross-group collaboration
Money	Understand the monetary systems and discuss the value of money in APEC member economies
A day in our school	Enrich cultural diversity through the exchange of schooling experience in different countries

4. Methodology

ACA has held four international contests since 2002. The ICT Cyber Camp activities were not available in 2002 and 2003. The contest completion rate varies every year. In 2005, only 37 teams (46%) completed all tasks in NCLP and 30% completed the ICT Cyber Camp activities. It is important to find out what elements of the ACA environment and the contest contribute to or impede student participation.

This study employed two surveys that include both quantitative and qualitative data. Surveys for the teachers and students were designed to examine the perceptions of the ACA participants. In addition to the surveys, data on respondents' login frequency and forum postings were recorded by the system for analysis. The teacher survey consists of 14 questions including 3 open-ended questions. The student survey including questions on learner attitudes toward the ACA learning activities and the environment has 25 multiple choice questions and 1 open-ended question. The student survey was adopted from the

Young Children's Computer Inventory (YCCI) by Miyashita & Knezek (1992) [6]. The YCCI was tested with Japanese, Mexican, and American students with high validity and reliability. The original survey has examined children's attitudes in the following six areas: computer importance (I), computer enjoyment (J), motivation/persistence (M), study habits (S), empathy (E), and creative tendencies (C). The student survey for this study was developed with questions that focus on computer importance, enjoyment, and other specific ACA areas. The reliability of the surveys is measured by Cronbach's alpha. The results show high reliability of the survey instruments (student survey= .880; teacher survey= .969). The comments for the open-ended questions were analyzed with NVivo, a qualitative research software program. The first researcher for this study was an observer of the ACA contest who didn't participate in the actual project management or operation. The second author of this study is the project director who has designed and implemented the ACA programs since 2002.

An announcement of the surveys was posted at the ACA web site at the end of the 2005 contest. There are a total of 545 registered students, 53 teachers, and 100 teams for the 2005 ACA contest. Ninety-six students and 15 teachers who participated in the 2005 contest completed the online survey. The survey return rate is about 18% for the students and 28% for the teachers. The countries of the respondents include Taiwan, Korea, and Thailand. The grades range from 5th grade to 12th grade. The surveys were designed in both Chinese and English.

The main research questions are:

1. What are the student perceptions toward ACA and computer in general?
2. What are teacher perceptions toward the ACA activities?
3. What are the factors that may contribute to or inhibit the learner participation of ACA activities?

5. Data Analysis

5.1 Student perceptions toward computers and ACA

To answer the first research questions on the general attitudes toward ACA and computer, the percentage, means, and standard deviation of the responses to each question are tabulated². As shown in Table 2, more than 50% of the students strongly agreed that they enjoy working with a computer (#4, 60%), playing computer games (#6, 55%), learning with a computer (#7, 54%), and collaborating with teammates (#19, 55%). In addition, the majority agreed (> 50%) that they enjoy writing in English (#1), chatting online (#3), using the computer (#5), navigating easily in ACA (#8), using critical thinking skills for ACA activities (#10), having fun with ACA activities (#11), feeling rewarded from ACA activities (#12), communicating with other ACA students (#22), logging onto ACA to review projects (#23), and becoming more interested in communication in English (#24).

Table 2 Questions with high ratings on student perceptions toward computer and ACA (n=96), 5, strongly agree; 4, agree; 3, slightly agree; 2, disagree; 1, strongly disagree

Questions	5	4	3	2	1	NA	Mean	SD
4. I enjoy doing things on a computer.	60%	24%	14%	0%	1%	1%	4.44	0.81
6. I enjoy computer games very much.	55%	22%	11%	4%	6%	1%	4.17	1.18
7. I can learn many things when I use a computer.	54%	30%	14%	1%	1%	0%	4.35	0.83

² Tables are available at http://personal.stthomas.edu/ccchou/AERA07_tables.htm

19. I collaborated with my team-mates on projects.	55%	26%	10%	5%	1%	2%	4.32	0.94
25. Favorite ACA activities Showcase (60.45%), Play ground (53.13%), Video chat (39.58%), Forum (38.54%), Mailbox (37.5%), Online tutors (35.42%)								

A factor analysis was conducted and the following main groups were extracted: computer importance and enjoyment, communication skills, ACA interface and design, ACA community and interaction, and project management. The variable that is not in any group is placed in the "other" category. These five factors provide explanation on student perceptions toward the ACA networked learning activities and environment. The students who responded to the survey have strongly enjoyed computer activities and acknowledged the importance of computer which can teach them many things. Online communication skills have also played an important role in their participation of the ACA activities. Furthermore, the design of the ACA interface and activities has also received very positive ratings from the participants. Community building has been one of the main emphases in the ACA activity design. Students in general agreed that the ACA activities are interactive. They enjoyed interacting with participants and online facilitators in the ACA community. Although the means for questions in this group (#D, community and interaction) are not as high as other categories such as communication skills and interface, students did agree that interacting with other is important. One explanation on the slight lower means from the project director is that this is the first year that the human online tutor was implemented. Ill-trained online facilitators and low response rate to participants' questions could have contributed to a slightly lower means in the ACA community category.

The low project completion rate of ACA activities in 2005 coincide with student views on project management. Project management refers to the perception on the difficulty and time required to complete projects. Forty four percent of students found it difficult to complete the projects and forty percent of students agreed that they could have used more time to complete the projects.

When asked to choose the top three favorite ACA activities, the following six items have a higher rating: showcase (60.45%), playground (53.13%), video chat (39.58%), forum (38.54%), mailbox (37.5%), and online tutors (35.42%). Showcase is the place where student artifacts are exhibited and peer-evaluation is employed. The data indicate that students enjoyed browsing each other's projects through the showcase tool. They definitely enjoyed playing games at the playground. They were also constantly seeking ways to reach out to each other via asynchronous and asynchronous communication tools. Online tutor is also a very popular idea and need to be reinforced more thoroughly.

Video chat and project management skills are the two areas that need improvement. Interacting via video-conferencing has the lowest rating of all ACA activities. Based on the researchers' observation, lack of communication protocols and limited bandwidth may have explained the low rating. Many participants who attempted to join the video-chat do not have the appropriate computer set up or were not guided by the online facilitators effectively. The training of the online facilitators to conduct effective sessions with the participants would be one of the top priorities for the 2006 contest. Students also express difficulties in completing all tasks. Project managing tools could be incorporated in ACA to assist the teams in monitoring their progress. Alternatively, simplifying the tasks would be an option to assist the teams that scrambled for time.

The open-ended questions have also revealed the likes and dislikes of the participants. The positive feedback on the learners' experience includes: interacting with participants from different cultures, improving English, gaining new knowledge, engaging in peer learning, and experiencing fun games. The students have also provided concrete suggestions for improvement: providing more interesting games, allowing more time for project completion, giving better instructions on activities, supplying translation on some part of the web activities.

5.2 Teacher Perceptions

In the 2005 contest, 100 teams registered with the ACA contest. Each team is led by a teacher. A teacher can lead multiple teams. There were 53 teachers leading 100 teams. A survey announcement was posted at the ACA web site at the end of December. Fifteen teachers responded to the survey. Table 5 shows the survey results by mean, SD, and percentage. More than half of the respondents agreed that ACA's interface is easy to navigate (57%), students enjoyed the ACA games (60%), and the activities could encourage student collaboration (74%) and increase ICT (75%) and English communication skills (73%). The respondents have also pointed out that ACA activities require more time (60%) and much assistance from the teachers (67%).

The data collected from the open-ended questions indicate that the benefits of the ACA activities include: cross-school collaboration, teamwork, improved computer and web skills, knowledge in animation video and web site production, effective communication, increased English proficiency, and a better understanding of the society (e.g., convenient stores). The challenges include: motivating the students to meet the deadlines, lack of knowledge for technical trouble-shooting, extra time outside classroom to brainstorm and complete projects, project completion delayed due to ACA system slowdown during peak hours (e.g. noon time) and other glitches, convince students the benefits of project-based learning outside of existing curriculum, insufficient time, coordinate time among team members to work on projects, and lack of information and communication skills

In short, the data indicate that the main factors in ACA that attract the teachers are the opportunities for students to collaborate, communicate, and improve ICT skills. Also there is a need to coordinate the time with students. Furthermore, introducing new pedagogy such as project-based learning could be challenging for students who are used to lectures and tests. Many teachers would like to see more countries participating and more choices of topics for project completion.

5.3 Factors in participation

The survey data and analysis on the open-ended responses have provided evidence of areas that the ACA participants have shown strong interest, which are recapped as below:

- Sense of community: Students enjoy interacting with each other and the online facilitators. It provides a sense of community to be in a learning environment that is highly interactive.
- Computer importance: A high number of respondents agreed that computers could assist them in gaining new knowledge. It is important to be good at using a computer.
- Human-computer interface: The design of the networked learning environment for age appropriate audience is important in attracting students to engage in learning.
- Games: For today's young learners, the use of games is essential in motivating them in learning at the onset. This is reflected in their favorite ACA activity and their request for more games. How to incorporate more content knowledge in games or embed games in knowledge construction will be a continuing challenge for all virtual learning designers.

6. Conclusion

The main goal of ACA is to enhance ICT skills through project-based learning and collaboration in a networked learning environment that encourages international collaboration and intercultural exchanges. ACA has accomplished the main goal as most participants have indicated enhanced ICT skills and a strong desire to communicate with peers in English. In addition, students have also demonstrated a strong interest in computers, international collaboration, online community, interactive human-computer interface, fun activities and games, and human feedback. Having fun, establishing new friendships, and learning something meaningful are also revealed in their choice of the favorite ACA activities.

Teachers are the team leaders of the ACA contest and their participation is equally important. Most teachers have acknowledged the increased ICT skills in students as a result of participating in the ACA projects. To encourage more active participation of the teachers, it is important to integrate ACA activi-

ties into K-12 curriculum, allow more flexibilities in project completion, maintain a robust system, reduce network bottleneck, and increase participating countries.

This study has profiled several key elements that attract Asian K-12 student participation in networked learning. The use of games and interactive tasks to engage students in active learning is essential. Further research on what students do online and how to keep them engaged while learning content knowledge should be continued.

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