Collaborative Tablet PC the System for Self-Active Awareness in a Dormitory Environment

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Abstract. We describe a new interactive system using a social learning platform to provide dormitory students with the ability to communicate with teachers/advisors in a timely manner to promote self-active awareness in the dormitory environment. Our system comprises tablet PCs, cloud computing services, and application and server software to enable collaboration over a high-speed wireless local area network (WLAN) that covers the campus, dormitory, and teachers' homes.

To enable students to review their behavior in the dormitory, the dormitory staff records the evaluations of student activities related to acceptable and unacceptable behavior based on dormitory room inspections as objective information by capturing an image on a tablet computer. The information is stored as centralized time-series data on a cloud server using several front-end graphical user interface (GUI) tools via the WLAN in the dormitory. The students can access the high-speed WLAN with multipurpose pocket sized electronic devices provided to all students.

The purpose of this system is to facilitate the self-recognition of behavioral problems, raise awareness, and encourage student initiative in a natural manner.

Keywords: Advanced educational environment · Mental health · Distance education

1 Introduction

In contemporary society, promoting the use of computers in schools is very important. It has been suggested that the primary challenge in our information-rich world is to use information specifically to say the right thing at the right time and in the right manner [1]. In particular, the fundamental pedagogical concern regarding information use is to provide learners with the right information at the right time and place in the right manner rather than merely enabling them to learn at any time and any place [2]. Moreover, to facilitate the task of learning at the right time and place, educators should

P. Zaphiris and A. Ioannou (Eds.): LCT 2015, LNCS 9192, pp. 503–509, 2015.
DOI: 10.1007/978-3-319-20609-7_47

employ transparent methods that allow students to access lessons flexibly and seamlessly [3]. Such an approach involves the use of calm technology for ubiquitous computing environments that can adapt to student needs by supporting specific practices. Information and communication technology for education is expected to increase student motivation to study.

In our present study, we have developed a new collaborative learning system called Terakoya [4–6] for remedial education, which helps students actively study anywhere on a high-speed wireless local area network (WLAN) that is linked to multipoint remote users and covers the campus, dormitory, and student and teacher homes. Terakoya provides interactive lessons and a small private school environment similar to the 18th-century Japanese basic schools called Terakoya.

The system consists of 50 client PC tablets with 12-inch extended graphics array (XGA) monitors in conjunction with a server machine, and software to enable collaboration among the tablets over WLAN. The network speed was maintained at 500 kbps or less for each connection. Furthermore, this system interconnects via a Gbit LAN for the server on our campus and via an IEEE 802.11a/g/b WLAN for the target hosts in our dormitory and via an IP virtual private network (VPN) for a teacher in his/her home.

A one-year study of Terakoya was implemented using the tablet computers in a prototype application to provide real-time counseling to students in a girl's dormitory with a teacher at home or in a teacher's room on campus. The test verified the effectiveness of Terakoya for helping the students study actively and willingly. Although Terakoya can be used to collaborative learn up to 50 students simultaneously, it cannot be applied to promote self-active awareness for over 400 all students in the dormitory.

We propose a new interactive communication system with the use of a social learning platform to provide students housed in dormitories with the ability to communicate with teachers/advisors in a timely manner for promoting self-active awareness in the dormitory environment. The target dormitory houses over 400 students and is supported by 11 staff members. At least one staff member is present in the dormitory at all times when it is occupied by students. Regularly scheduled transition briefings allow information sharing among staff members. However, the staff members are a small group, and it is difficult to provide instantaneous services for real-time information sharing.

Under such conditions, it is necessary to design and implement a new communication system for the students to create the environment required to build self-discipline by reflecting on their behavior. To enable the students to review their behavior in the dormitory, the staff records student activities, i.e., the five W's and the one H (who, where, when, why, what, and how), related to acceptable and unacceptable behavior using a tablet PC. Information that is difficult to quantify is recorded as objective information by capturing an image on a tablet computer.

This information is stored as centralized time-series data on a cloud server using several front-end graphical user interface (GUI) tools via the dormitory WLAN. Thus, students can review their behavior in chronological order. The dormitory WLAN connects seamlessly to the campus WLAN. Multipurpose pocket size electronic devices are provided to all students; thus, each student can access the high-speed WLAN anytime and anywhere.

The purpose of this system is to facilitate the self-recognition of behavioral problems, raise awareness, and encourage student initiative in a natural manner.

This paper describes how the proposed new interactive communication system assisted in student dormitory life, and the implementation of a prototype framework and its practical application. The test verified the feasibility of the system for helping the students to obtain advice actively and willingly. The feasibility of the system indicates that the proposed new interactive communication system has the ability to create an environment that facilitates the development of student socializing skills. Enhancing student sociality through dormitory life is an educational policy of our school.

2 Basic Configuration

Our prototype system comprised 10 iPad tablet PCs, cloud computing services, and application and server software to enable collaboration over the WLAN. In Fig. 1 we display a framework of the proposed interactive communication system. The prototype system was applied to facilitate real-time counseling for a group of students in a dormitory. The tablets were used to record the evaluations of the acceptable and unacceptable behaviors of the students based on dormitory room inspections, which are then stored as secure centralized time-series data on a cloud server. Students can review their behavior by accessing the data on the cloud server using a multipurpose pocket-sized electronic device provided to each student. Individual data of the students on the cloud server is backed-up in order to secure data. Furthermore, the parent of a student can access that student's behavior data on the cloud server via the Internet to monitor his/her child's activity.

As the cloud server, we adopted Edmodo, which is a social learning platform website for teachers and students, and a customized version of OpenMeetings running on Ubuntu Linux. OpenMeetings is an open source web conferencing system developed for distance education, which supports multiple audio and video sharing as well as presentations with extended whiteboard capabilities. Edmodo provides a user ID for parents. Parents receive their own unique parent code from their child, which is used to create an account that can be used to interact only with the teacher and their child. Edmodo supports the Japanese language on the login screen—a part of the "Invitations" page—and some menus and buttons. As such, it is accessible for teachers and schools in Japan.

However, it is difficult to introduce a learning management system in the field of education in Japan due to school regulations that do not permit students to use cellular phones and/or smartphones in the classroom. According to the latest survey of elementary and junior high schools by the Japan Association for Promotion of Educational Technology (JAPET), the penetration rate of tablet PCs is less than 10 % [7]. The penetration rate of tablet PCs for each individual student is no more than 0.7 %.

A four-year environmental improvement project for the introduction of educational information technology (IT) was begun in 2014 by the Ministry of Education, Culture, Sports, Science and Technology in Japan, which indicates that a great deal of time is required to increase the prevalence of educational IT environments in elementary and junior high schools. Therefore, especially in elementary and junior high schools, owing

to the low penetration rate of the electronic devices in Japanese schools and students, it is necessary for the schools to provide electronic devices such as tablet PCs.

Our school provides multipurpose pocket-sized electronic devices to all students. A team in our school has developed some software enabling the electronic devices to be used for learning English with online software, receiving assignments, research purposes, checking the attendance book, and so on.

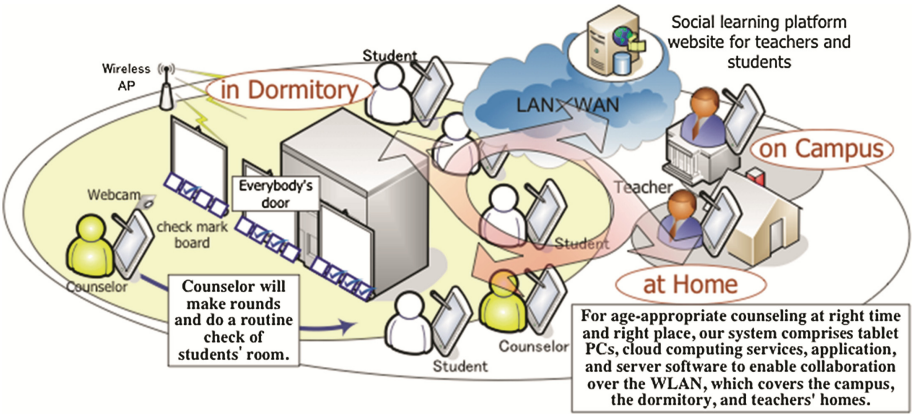

Fig. 1. Framework of the proposed interactive communication system

3 Practice and Evaluation

The proposed prototype system was implemented experimentally in a women's evening dormitory. After implementing the prototype system in this environment, the feasibility and practicality of the system in helping the students get advice actively and willingly was verified through the observation and evaluation of the assistance provided. Using this system, a teacher was able to send instructions or age-appropriate counseling from their office to the electronic devices of all students via the network. Consequently, it became easier for students to ask questions to teachers via face-to-face and/or online interaction. In addition, student queries could be answered immediately, and therefore their work could be adjusted appropriately in a timely manner.

The conventional procedure employed in our dormitory required an inspection of each student room every weekday morning by a dormitory matron to ensure that the door and the window were locked, the bedding was put away, and the curtains were opened. The inspection results were recorded on a checking list, and later manually entered into a computer. The dormitory staff provided only verbal commentary to a student in accordance with the records. It seems that it is difficult for many students to heed the staff's advice due to verbal advice alone. We have come to embrace the idea that to facilitate self-recognition, raise awareness, and encourage student initiative in a natural manner, it is necessary for students to review their actual behavior in the dormitory.

We required the new procedure incorporating the interactive communication system that additional procedures be kept down to the minimum necessary, and the conventional procedure used by the dormitory matrons employing non-exclusive equipment such as pens and paper were retained as much as possible. Doing so alleviated the need to require individuals unfamiliar with the use of electronic devices such as smartphones, tablet PCs, and laptops to adopt complicated and non-intuitive procedures in order to provide digital records of inspection results. This also allowed students to obtain feedback easily and timely from the written record on the checking list, and the communication is recorded for students' subsequent use.

(a) The inspection results are entered on the appraisal list as check marks.

(b) The written record is captured by the camera on the tablet PC.

Fig. 2. Snapshots of the daily inspection and the recording of written records

Figure 2 illustrates the actual inspection recording procedures. After the dormitory matron inspects the condition of the room, the results are entered on the appraisal list as check marks for each condition, and the written record is then captured by the camera on the tablet PC and stored electronically. The written record remains on the wall outside the room as a message to students. The students are therefore provided timely information regarding their behavior when they return to their rooms.

The captured images were placed on Edmodo to share with the dormitory staff. The on-campus teacher was able to access Edmodo to clarify the conditions of each student's dormitory room, and the teachers were able to engage in face-to-face and/or online contact with students as needed. The student's parent was also able to examine their child's behavior in the dormitory via Edmodo.

The proposed system can provide the necessary counseling and a perspective to provide relief from study stress, relationship difficulties, social network site (SNS) addiction, and serious mental health problems. Because of experience with the system, teachers will be better informed, provide sound counseling, and recommend appropriate treatment or actions to help students overcome traumatic events and other difficult periods of their lives.

4 Conclusions

In this paper, we detailed how the proposed new interactive communication system assisted in student dormitory life. A prototype system was implemented experimentally in a women's evening dormitory as a social learning platform to provide dormitory students with the ability to communicate with teachers/advisors in a timely manner for self-active awareness of the dormitory environment. The staff members, including student advisors, record acceptable and unacceptable behaviors using a tablet PC. This information is stored as centralized time-series data on a cloud server using several front-end GUI tools via high-speed WLAN in the dormitory in order to enable students review their behavior in the dormitory. The feasibility and practicality of the system in helping students to obtain advice actively and willingly was verified through observation and by evaluation of the assistance provided.

For our system, we considered the benefit of continuing the use of conventional methods employing paper and pens owing to its simplicity and requirements for no exclusive equipment. The written records can be used by students to review their behavior. Consequently, the new communication method requires no additional procedures, no complicated and non-intuitive actions, and no exclusive equipment. The captured images are placed on Edmodo to share with the dormitory staff. The campus teacher is able to access Edmodo to clarify the conditions in a student's room. The teachers can engage in face-to-face and/or online contact with the students as needed. The proposed system can provide the necessary counseling and a perspective to provide relief from study stress, relationship difficulties, SNS-addiction, and serious mental health problems.

In conclusion, experience indicates that a more effective system is required for student self-active awareness of the dormitory environment and to reduce dormitory staff workload. In the future, we would like to further evaluate the impact of this system on student motivation. We would also like to study various configurations of our proposed system under various dormitory life conditions and procedures, including the development of increased interaction with parents. Our ultimate goal is to work toward realizing a ubiquitous user-oriented human interface system.

Acknowledgments. This study was partially supported by a Grant-in-Aid for Scientific Research (C, Area #1602, Project No. 24501236).

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