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Development of a New Smart Learning Project- Rainbow Fun

Fang-Chen CHUANG[a*], Bert CHEN[a], Chia-Heng CHEN[a], Min-Tsuei CHEN[a], & I-Chang TSAI[a]
[a]*Digital Education Institute, Institute for Information Industry, Taiwan, R.O.C.*
*nonochuang@iii.org.tw

Abstract: This paper proposes a new smart learning project- "Rainbow Fun" for K-12 education system. The framework of "Rainbow Fun" is composed of four parts: 1) "Learning Lab" is designed for learners to better understand their own learning styles; 2) "Teaching Lab" enables teachers to apply interactive technologies to create more effective ways of teaching; 3) "Integrative Pedagogy" helps teachers develop their role as facilitators to lead their students to explore their potentials; and 4) "Education Cloud" generates a learner's learning record instantly, continues to maintain his/her e-portfolio, and creates a ubiquitous learning environment for everyone. The goal of this project is to equip the next generation with the ability to learn actively and solve problem.

Keywords: 21st Century Skills, challenge-based learning, interactive technology, education cloud.

1. Introduction

The learning and innovation skills which are proposed by the Partnership for 21st Century Skills [1] are what separate students who are prepared for increasingly complex life and work environments in today's world and those who are not. They consist of creativity and innovation, critical thinking and problem solving, and communication and collaboration. In addition, people's creativity is the main key of improving the national competitiveness, and lack of creativity causes the sluggishness of national social development. Therefore, under this situation, enhancement people's 21st Century Skills has become an important goal of education. Recently, challenge-based learning (CBL) [2], [3] is an emerging issue, and CBL can let students leverage the innovative technologies they use in their daily life to inspire their creativity to solve complex, real-world problems. After the CBL implementation study, the major findings are concluded: 1) it is effective in building 21st Century Skills including creativity, collaboration, critical thinking, communication, innovation, and so on; 2) over three-quarter of joined students feel that they worked harder than before, and learned more than expected; 3) CBL can help students master the materials and a good use of their limited time; 4) CBL is suited to teach in a technologically rich environment.

Due to advance of technology and aforementioned advantages of CBL, this paper proposes a smart learning project-"Rainbow Fun", and it fuses the concept of CBL and innovative interactive technologies to develop various innovative teaching and learning systems. The framework of this project includes "Learning Lab", "Teaching Lab", "Integrative Pedagogy", and "Education Cloud". The developed innovative teaching and learning systems have four core ideas: 1) analyze learners' learning behaviors and learning styles to advise on learning plans; 2) integrate interactive technologies with various learning activities to provide learners with better learning methods; 3) identify infrastructure/hardware required for teaching strategies to design challenging theme-based curricula; 4) introduce this system to the market with two focuses: teacher training and total-solution licensing. The remainder of this paper is organized as follows. In Section 2, we introduce the content of this smart learning project, and a conclusion and future work of our proposed project is given in Section 3.

2. Smart Learning Project– Rainbow Fun

The innovative smart learning project, "Rainbow Fun", is developed for K-12 education system, and the framework of "Rainbow Fun" which is composed of "Learning Lab", "Teaching Lab", "Integrative Pedagogy" and "Education Cloud". The goal of this project is to develop an interactive smart classroom

and to foster students' skills with "5C" and "5I". 5C are communication, critical thinking, collaborative, connected, and creativity. 5I are innovation, informal learning, information, interaction, and intelligence.

a. Learning Lab

"Learning Lab" is designed for learners to better understand their own learning styles, train their brain, and inspire their creativity. One of the developed learning systems is "GyriGym" [4] which is an online game-based platform for brain training. It can assess students' cognitive abilities and provides in-depth game-based training accordingly. The platform includes eight parts of the brain which are attention skills, language, executive skills, orientation, psychomotor, visual-spatial perception, memory, and problem solving, as shown in Figure 1.

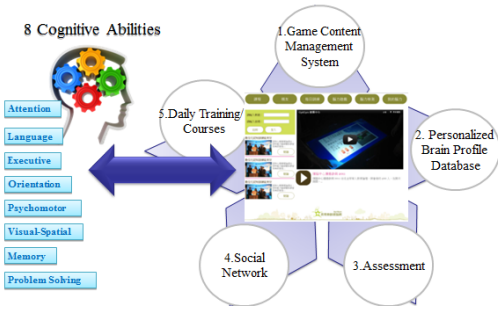

Figure 1. The platform of GyriGym.

b. Teaching Lab

The core idea of the "Teaching Lab" is to develop innovative interactive human-machine technologies for educational applications and enable teachers to apply new technologies to create more effective ways of teaching. Here, research areas such as multi-touch, augmented reality/ virtual reality (VR), motion sensing technology are focused. For instance, an interactive VR teaching system with multi-screen devices and motion-sensing technology for earth/space science, geography, and history teaching has been developed, and it can create an interactive and immersive virtual environment with high resolution multi-media materials, such as panorama pictures and historical paintings.

Figure 2. The interactive VR teaching system.

c. Integrative Pedagogy

Integrative Pedagogy helps teachers develop their role as facilitators to lead their students to explore their potentials. In addition, it encourages the learner to interact with the teacher, making learning more flexible and immediate.

d. Education Cloud

Education Cloud service functioning with all kinds of learning and teaching applications connects to users devices at anywhere. The advantages of developing the Education Cloud for teachers and students are: 1) before class: students can preview teaching materials, and teachers can prepare lessons; 2) in

class: Teachers use computers or tablet computers for e-teaching; 3) after class: students can study by self-learning at home. In addition, parents can trace children's grades and learning statuses from the cloud platform, and also increase interaction with theirs children.

e. Curricula and Products

Various theme-based courses based on a modified CBL module and multiple-learning testing modules are designed. The modified CBL module complete process includes: identifying problems, analyzing available resources, exchanging ideas, finding solutions, demonstrating results, and teacher and student feedbacks. The multiple-learning testing modules include attention diagnosis, learning style diagnosis, and learning workload diagnosis. The curricula of "Science Camp" which is one of our designed theme-based courses include five parts: 1) explore your brain power and stimulate your brain with technology; 2) learning by exploring: study the principle of machinery; 3) learning by simulating: copy and redesign teachers' samples; 4) learning by evaluating: hypothesizing & verifying by manipulating machinery; 5) integration & cooperation: innovate their own devices and build team's masterpieces. After project completion, students can use an iPad to control the masterpiece.

3. Conclusion and Future Work

This smart learning project in our research aims at developing various modified CBL courses with innovative interactive technologies, and functions of this project are: 1) to train students' brain and inspire their creativity; 2) teachers can apply new technologies to create more effective ways of teaching; 3) to help teachers develop their role as facilitators to lead their students to explore their potentials, 4) to generate a learner's learning record instantly, continue to maintain his/her e-portfolio, and create a ubiquitous learning environment for everyone.

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