

## Research on application of Gaming learning mechanism

Chunliang Zhou<sup>1, a</sup>, WeiQing Qu<sup>1, b</sup>, Ping Cheng<sup>1, c</sup>, Yanfei Zhao<sup>1, d</sup>

<sup>1</sup>College of Information Engineering Ningbo Dahongying University

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**Abstract.** With the popularization of computers, games remarkably effects the cognition, life & learning style of college students, more and more educators begin to interest themselves in applying such entertainment to students' practical learning. Educational games inherited the characteristics of traditional games, combining games with learning completely, which provides college education with excellent new ideas. The study combines the two roles of "players" & "learners" into one, constructing the linkage learning mechanism of "player-learner", which designs the gaming and learning platform based on Robocode.

### Introduction

In recent years, with the popularization of computer, the game prevailed gradually. Game, as the representative of the new technology development, has become one of the main forms of entertainment for college students. At the same time, network game also affects profoundly the college students' cognition, life and style of learning. More and more educators have begun to focus on how to apply this kind of entertainment of college students into study<sup>[1]</sup>. The education game, which involves education function and inspires learning motivation mechanism, provides a new way for college student education<sup>[2]</sup>. This study integrates "gamer" and "learner" two roles into one, which builds the linkage learning mechanism of the "player-learner", makes students growth and development in happy learning.

### Problems Existing in the Current Teaching

#### 1. Incompatibility between professional learning and network games

Network games have functions of entertainment, leisure, and virtual sense of achievement, it needs to upgrade constantly to get more game resources and improve equipment. According to our survey data, each student spends averagely two hours and 21 minutes on network games per day, but only 24 minutes on study after class is. Students spend a lot of time in the network game, at the same time can't learn professional knowledge in the network game, the two are incompatible.

#### 2. Dissatisfaction with the after-school programming course study status

Each knowledge point for program design course is closely linked and a little abstract. However, with computer operation, a lot of knowledge can be fully understood. According to survey data, only 20% of the students are satisfied with the present situation of after-school study, of whom, students with complete satisfaction only accounts for 2.5%. The present after- class situation of students can't meet the needs of students.

#### 3. Less interest from students in programming course

Program design is the process of solving a specific question program, including four stages: analysis, design, coding and testing. Student need to learn a new language and have certain logical thinking ability for Coding, and need to find and eliminate errors. After several setbacks, Students lose confidence, and lose interest in program design course. According to statistical data, in freshman and Sophomore period student changing their majors, there are 6.2% student that choice other specialty and abandon computer specialty.

### Construction of Linkage Learning Mechanism of "Gamers - Learners"

#### 1. Establishment of situation, goal settings, motive inspiration

According to the arrangement of syllabuses, we have raised problems that need to be solved in different stages of teaching to students, and describe application of the problem in subsequent courses such as web programming technology, data structure, to demonstrate excellent software works of students of previous years, to stimulate students' learning motivation, set study goals. In this process, the teacher make instructive explanation on purpose of course, background information, theoretical basis, technical methods, plans and goals etc. For example, after learning the content of the SWING, teacher demonstrates calculator of Windows accessories, to describe its function, emphasize that SWING is a major problem of the calculator, to demonstrate calculator software that students of previous years made, to guides the student to simplify the calculator function in the existing knowledge system, to definite task that need to complete.

#### 2. Establishment of team, independent exploration, plan making

A subgroup of team consists of 3 or 4 students, free combination and elected team leader. And there are detailed division of labor in the team. It required team to complete task of topic within appointed time, cultivate the students' team spirit of cooperation, to give spiritual or material rewards to excellent team. Students utilize extracurricular time, through various channels, in subgroups discussing and solving possible solutions. At this stage, teachers should encourage students to think more, according to difficulty level of problem, give prescribed time limits to the student. After enough solution made by student, the teacher can let the representatives of each group to report their proposed solutions. Then, teachers collect, summarize the students' solution, and show all solution to students, let the students use the method of logic reasoning to eliminate impossible solution, screen out the solution that may solve the problem.

#### 3. The writing of algorithms, debugging, the practice experience

According to determinate solution, students write and extend the related algorithm, on this basis, the algorithm will be programmed in computer language, and debugging, at the same time, teachers can be carefully organized a batch data to test, keeping independent improvement of writing program until they can be very good to solve the problem. At this stage, students need to record problems encountered and programming error in the process of topic completing information. At this stage, teachers need to spot check 2 ~ 3 subgroups, and use it as a object of the experimental teaching this time, at the same time, explain questions proposed by students, encourage students to overcome the difficulties that face, let the students to explore independently the problem, to accumulate constantly experience that handle problems and debugging program.

#### 4. Summarization, consolidation and improvement, migrating application

After the experiment and drawing conclusions, students need to sort data and write test report. Teacher carry out first review on study report of each subgroup, put forward specific suggestions. Students of subgroups modify and supplement the experiment report, and make the report format, standardization, then formally submit to teacher. Teacher reviews again. Teacher evaluates the results according to the circumstance, as a general comment of student's final grade. In addition, teacher organize student to exchange experience in class, and make results migrating application into some similar questions, to achieve the effect of draw inference from one example.

### **Robocode-based Construction of Game Learning Platform**

#### 1. Mainly knowledge point about JAVA course

(1) Data types, operators and expressions (2) Selection structure and loop structure (3) Class declarations, members, access modifiers (4) Class polymorphism, and interfaces (5) Establish and start-up of threads, state, transformation and scheduling strategy (6) Operation on the commonly used input/output files and catalogue (6) Exception and the processing mechanism (7) Common classes (time and date) (8) Collections framework.

#### 2. Construction of robocode platform

Robocode game learning platform, a free game software, is developed by IBM, designed by the Mat Dr Nelson. The game is developed and designed with the application of JAVA Language. It supports the running on the platform of JAVA 2. It is easy for us to learn the JAVA Language in the game.

The game carries out writing program by Java according to robot movement, using design of intelligence of robot to automatically command it, rather than by the keyboard and mouse to control it. Game players put robots wrote by themselves into battlefield, battle with other robot wrote by other players, and test their own programming level. In the process of continuously improving the robot, players will experience fun of learning.

### 3. Game design combining with JAVA knowledge

We design a simple robot that walks forward at the speed of 1000 speed. Then it turns right, and the robot will fire when an enemy is scanned. If it is hit by enemy, the robot will turn left. Design of this experiment concluding Java knowledge is as follows:

(1) Package system: putting my robot DwStraight into a unified dw package, so you can manage robot with this package.

(2) Inheritance: the class robot created by the program inherits Robot class, so the methods of Robot class can be used by its child class.

(3) Event handling: when the robot scans and find other robot event, it will fire; when the event hit by other robot occurs, it will turn 180 degrees left.

## Experimental Design and Analysis

We designed five game links, through a class's pilot (23 students) After two months practice operation, we carried out questionnaire surveys, analyzed the survey data and finally came to the following conclusion.

### 1. Experiment content:

We set up five game link, details are shown in table 1 below.

Game link	Parallelism java knowledge point
Design of the first robot	1. Package (construct package , guidance package) 2. Inherit (select, estimation, load program, write program) 3. Event handling 4. Data type (select , estimation)
Radar scanning experiment	1. Variable (select, estimation) 2.Operator, expression (select, load program) 3. Selection structure (select, load program, write program) 4. For each structure (select, load program, write program) 5. Threading processing mechanism
Experiment of monitoring counterparts	1. Class declaration (write program) 2. Access specifier (select, estimation) 3. Class member (write program) 4. Method (select, load program, write program) 5. Static member (select, load program, write program)
Experiment of chasing enemy	1. Inherit (select , estimation, load program, write program) 2. Polymorphic (select , estimation, load program, write program) 3. Interface (select , estimation, load program, write program) 4. inner class (select, estimation)
Experiment of avoiding crashing wall	1. The establish, start-up, state translate of the threaded 2. Threaded priority and scheduling strategy 3. The synchronization and mutual exclusion of the threaded 4. Exception and processing system

### 2. Analysis of the experimental results:

The survey data shows(fig1 and fig 2)that the effect of games got the nod from students. All classmates think the game is conducive to learning.The number of people who agree is 13, the number of people who strongly agree is 4, both account for 71.9% of the total. To varying degrees game has help in the initiative in learning, learning efficiency and practical ability, innovation ability, learning interest.

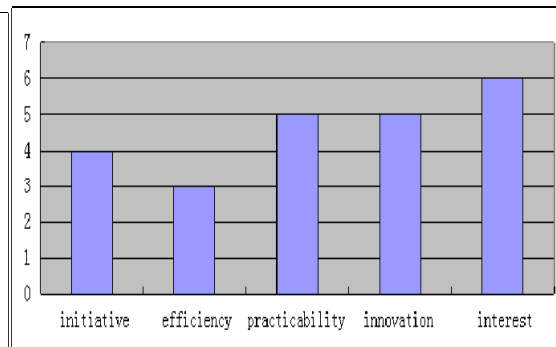
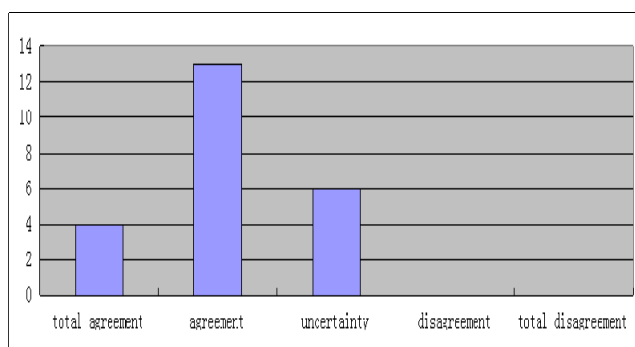


Fig.1.After-school game learning degree approval

Fig.2.contents approval for after-school game learning

The survey data(fig3 and fig 4), shows that student affirms this kind mode of teaching of the game learning. The number of students who give full supports reaches 7, the number of people who agree reaches 11, both accounting for 78.2%. The reason for choose game learning is: fun, helping study,fun, instructional, it is easier to learn than the traditional course teaching. Of which, fun and instructional accounts for 43.4%.

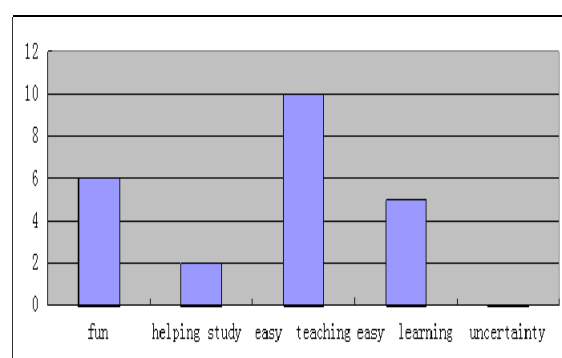
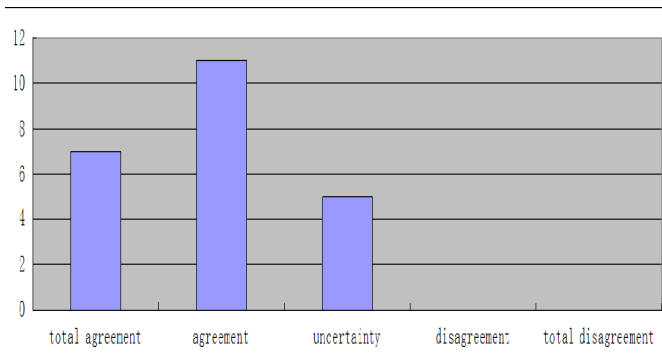


Fig 3: degree approval for game learning

Fig 4: The contents approval for game learning

## Conclusion

The linkage learning mechanism of "player-learner" is an effective learning strategy and form. Because of its unique characteristics, games learning is consistent with the active, curious and aggressive psychological demands of the students, and creates a kind of free, relaxed and happy learning atmosphere. It can arouse the enthusiasm of students and inspires them to take an active part in the learning of new knowledge in a relaxed and cheerful atmosphere. Meanwhile,it can stimulate the learning desire of students, as a result,the sustainability of "I want to learn" will accompany them all the time. So, with the application of the "gamers -learners" linkage learning mechanism, we can organically combine the game with the teaching target, and transfer the excitement of students to their studies. As a consequence, they will learn the teaching contents on an unconscious basis. In addition, it enables the students to understand the knowledge faster, master the key contents easily and to break through difficulties in a relaxed and happy environment. Therefore, it can achieve the integrated goal of learning through play and play through learning, so as to master and acquire knowledge better and faster.

## References

- [1]Brown, J. S.Situated cognition and the culture of learning.Educational Researcher[J],2010(2),4-9
- [2]Alkan, S. Studying computer game learning experience through eye tracking. British Journal of Educational Technology[J], 2007:38(3), 538–542
- [3]Mislevy,R.Evidence and inference in educational assessment. Psychometrika[J],2008 (59), 39–43.
- [4] Malone, T.W.Toward a theory of intrinsically motivating instruction. Cognitive Science[J],2009 (4), 333–369.
- [5]El-Nasr, M.S, Smith, B.K:Learning through game modding. Computers in Entertainment[J] 2006 4(1),332-341.