ISSN 2663-8169 Vol. 5, Issue 17: 108-112, DOI: 10.25236/IJNDE.2023.051717

Research on the Design of Learning Motivation Stimulation Mechanism in Educational Games

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Abstract: *The current educational concept emphasizes "student-oriented", focusing on the stimulation of students' learning motivation, rather than simply imparting theoretical knowledge. The emergence of digital educational games has opened up a new way to stimulate students' learning motivation and improve their interest in learning. This paper combines instructional design theory, Malone's intrinsic motivation theory and SSDA/RSTR game framework, and establishes a fusion model of educational game motivation and learning motivation, in which the elements of the inner circle and the outer circle correspond to each other, forming a learning motivation stimulation mechanism in educational games.*

Keywords: *Educational games; Learning motivation; Game motivation; Stimulation mechanism; Motivation theory; instructional design*

1. Introduction

Since the 21st century, researchers have carried out extensive research on educational games and their value [1], confirming that educational games can promote brain development to a certain extent [2], improve academic performance, and enhance learners' learning motivation [3]. At this stage, the key issue of educational game research has also changed to "how to design scientific, effective and interesting educational games" [4]. This change is reflected in the fact that educational researchers should not only test the research results of educational games [5] [6], but also make them truly meet the actual needs of classroom teaching. With the impact of globalization, mixed-program teaching has become the norm of teaching. Physical classroom learning and online distance classes, whether synchronous or asynchronous, are more closely integrated and transformed. Because of this change in educational game design, there is an urgent need for more practical, effective, interesting and easy-to-use game design research and practice to solve practical teaching problems.

2. The current problems in the design of educational game software

2.1. The game and education of educational games are unbalanced

At the International Symposium on Educational Technology in 2010, Chen Mingpu put forward in his book Educational Technology and Interesting Digital Learning that the ideal of education is to teach and teach, and how to balance the problem of education and entertainment in game software is very important. Many educational game software only focus on the game of the software, but ignore that it is a kind of educational software. At the end of the game, many learners do not know what they have learned from it, but only remember whether they have succeeded in breaking through the barrier, whether they have been rewarded and so on. Only when learners think they are not playing games, educational game software really achieves the purpose of edutainment and edutainment. How to integrate educational content into game activities is the key to the design and development of educational game software.

2.2. Developers lack educational ideas

If you want to develop an excellent educational game software, you must have an excellent teaching design. Instructional design is also an important criterion for the evaluation of educational game software. "People who understand education do not understand development, and people who understand development do not understand technology" is an important problem in the training of educational game software talents at present. The educational game software developed either overemphasizes the lack of interesting and operational teaching content, or overemphasizes entertainment and neglects learning.

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2.3. It is impossible for the teaching staff to be familiar with the educational game software in a short time

At present, there are many educational game software in the market, and teachers need to choose the game software suitable for teaching. This requires teachers to spend a lot of time and energy to operate and screen, and the teaching task is very heavy, which leads to their lack of enough time and energy to familiarize themselves with educational game software. This is also a problem that there is no uniform standard and lack of marketization in the design of educational game software.

2.4. The design of educational game software is too complicated

In order to create game situations and stimulate learners'learning motivation, some educational game software has designed many rules and checkpoints, so that learners only immerse themselves in playing games and ignore the learning content. Because there are some contents unrelated to classroom teaching in educational game software, it leads to insufficient classroom time. Therefore, when designing, we should consider the length of class time.

2.5. It can not stimulate the motivation of all learners

Different learners have different personalities, hobbies, interests, abilities and so on, so their attitudes towards educational game software are different. An educational game software can not be accepted by all students from the heart, that is, it is impossible to attract all learners'interest in learning. How to design educational game software to attract more learners' interest in learning and stimulate their learning motivation is a problem worthy of consideration and solution.

2.6. Failure to transform learners'motivation to participate in games into learning-related motivation

Educational game software can attract learners' interest in learning and stimulate learners' learning motivation, but many learners simply participate in the game for entertainment, challenge, competition, honor and so on, not for acquiring knowledge, improving ability and cultivating emotion. In the design and development of educational game software, how to transform the motivation of participating in the game into the real motivation related to learning is also a problem that educational game software designers need to solve.

3. Research Status of Educational Game Design and Learning Motivation

3.1. Educational game design

Table 1: Content Analysis of Domestic and Foreign Educational Game Design Related Literature

<table>
<tr><td rowspan="10">Educational Game Design Literature at Home and Abroad</td><td>Design based on theory</td><td colspan="2">Multiple Intelligence Theory, Immersion Theory, Experiential Learning Theory, Cognitive Theory, Activity Theory, Flow Theory, etc.</td></tr>
<tr><td rowspan="3">Object-based design</td><td>Game type</td><td>Role playing, action, adventure, strategy, shooting</td></tr>
<tr><td>Discipline</td><td>Primary school English, primary school mathematics, early childhood education, information technology, preschool education</td></tr>
<tr><td>Learner</td><td>Infants, preschoolers, teenagers</td></tr>
<tr><td rowspan="3">Goal-based design</td><td>Basic education</td><td>Chinese, Mathematics, English</td></tr>
<tr><td>Quality Education</td><td>Computational thinking training, children's emotional training, problem solving ability</td></tr>
<tr><td>Professional education</td><td>Programming literacy, teaching design</td></tr>
<tr><td>Design based on game elements</td><td colspan="2">Pressure, suspense, decision-making, achievement, role, situation, rules, tasks</td></tr>
<tr><td>Design based on technology</td><td colspan="2">Unity3D, Scratch, Flash, VR, AR……</td></tr>
<tr><td>Other</td><td colspan="2">Research review, strategy and method, model analysis, essence and value analysis</td></tr>
</table>

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In the field of educational games, scholars have explored the theoretical basis, objects, objectives, game elements, design methods, technical tools and research reviews of educational design from different perspectives [7]. From the perspective of the above research, we can see that there are many studies involving the design of educational games. After basically determining the feasibility and benefits of educational games, the research began to turn to the theoretical methods and practical applications of educational game design, as shown in Table 1.

3.2. Learning motivation

Learning motivation is the internal motive force that directly promotes people to learn, and it is the internal motive force that causes learning, maintains learning, and leads learning to a certain goal. Any activity of human beings is motivated and directed to a certain purpose, and learning motivation and learning activities play a mutual role. Learners' needs, interests and emotional factors are the important aspects affecting learning motivation, which involve curiosity, interest in the task, sense of achievement, sense of competence and so on. Behaviorist psychologists were the first to pay attention to and study the related issues of learning motivation. Thorndike and Skinner (B. F. Skinne), the representatives of behaviorist psychologists, believed that internal drive was the result of some kind of reinforcement, and that the tendency to increase learning behavior was established between the generated learning behavior and the stimulus because of the timely reinforcement. Cognitive psychologists and behaviorist psychologists hold the opposite view. They believe that learning is a process of information processing, the organization and reorganization of cognitive structure, and this cognitive process is carried out with the participation of governance. Therefore, learning behavior is determined by learners' cognition, emphasizing the role of intrinsic motivation. Humanistic psychologists who emphasize people-oriented believe that learning is initiated by individuals, not only to master knowledge, but also to promote the development of human mind, morality and emotion.

Learners' learning motivation is closely related to their learning effectiveness, creativity and emotional value. Only by fully understanding the various factors and mechanisms that affect learners' learning motivation, can learners achieve ideal learning results. Therefore, this study is of great significance to solve the practical problems of education and teaching, and to enrich the educational theory and teaching practice.

4. Stimulation and integration mechanism of educational game motivation and learning motivation

The design of educational games not only needs to grasp the balance between education and games, but also needs to attract learners' interest, stimulate more learners' learning motivation, and transform learners' motivation to participate in games into learning-related motivation. The starting point of this study is to provide ideas for the integration of educational game design by exploring the process and mechanism of motivation stimulation and integration of learners' game motivation and learning motivation, as shown in Figure 1.

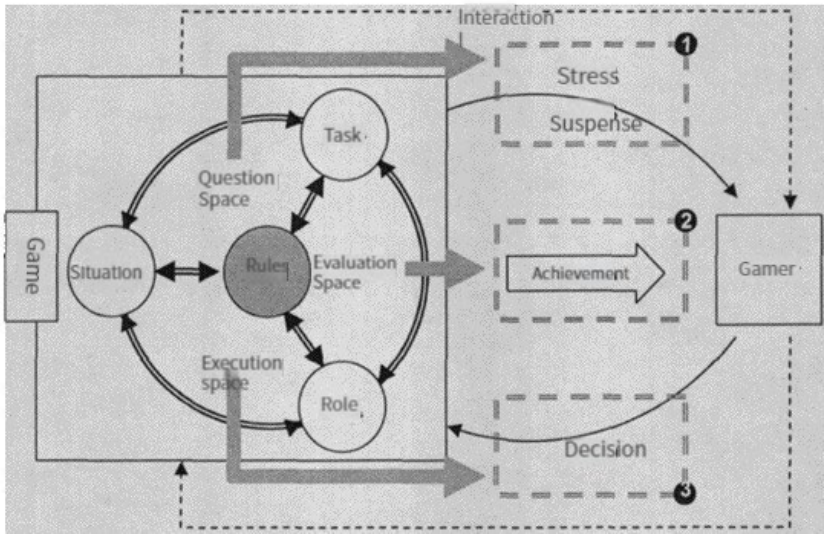

Figure 1: SSDA/RSTR Game Architecture Model

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In China, educational game design researchers have proposed that the SS-da/RSTR architecture adopts a sub-dimensional design principle. Because stress (S), suspense (S), decision-making (D) and achievement (A) originate from the interaction of three functional spaces, namely, problem, execution and evaluation, and the formation of these functional spaces is the result of the interaction of four elements, namely, role (R), situation (S), task (T) and rule (R), this kind of sub-dimensional design is to divide the role, situation and task more carefully. Then the four elements of S, S, D and A are embedded in these sub-items.

The design and development of educational games is a systematic process. [8] Taking a course as an example, it mainly includes three links: instructional design, system design and game development. Instructional design includes the design of learner characteristics, teaching objectives, learning content, learning strategies, teaching evaluation, etc. The system design includes the overall structure design and the detailed design of the system. The detailed design of the system includes the story, the role of the game, the task of the game, the rules of the game, the interface of the game and the interaction of the game. Game development mainly includes the construction of development environment, development process, basic resource development, game task realization, interactive function realization, incentive evaluation function realization and so on. Researchers try to do theoretical and practical research from different perspectives, some from the macro perspective, some from the micro perspective, such as the analysis and design of educational game characters, the analysis and design of incentive evaluation mechanism, the design of emotional experience and the teaching design of educational games [9] [10].

On this basis, the instructional design theory, Malone intrinsic motivation theory and SSDA/RSTR game framework are combined to establish a fusion model of educational game motivation and learning motivation, in which the elements of the inner circle and the outer circle correspond to each other, forming a learning motivation stimulation mechanism in educational games , as shown in Figure 2.

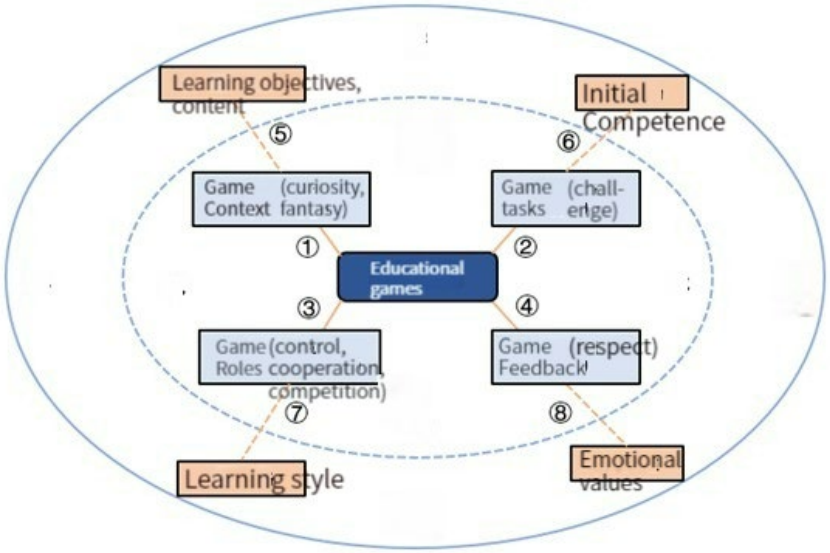

Figure 2: Construction of integrated model of game motivation and learning motivation

The inner circle represents: game motivation. The four variables are game situation, game task, game role and game feedback. Each variable contains a corresponding motivational factor, and the variable and the corresponding motivational factor represent the learner's feeling state. The four solid lines represent: 1 (suspense S); 2 (pressure S); 3 (Decision D); 4 (Achievement A).

The outer circle represents learning motivation. The four variables are: learners' learning objectives and content, initial ability, learning style, emotional value; The four dotted lines indicate: 5 (cognitive ability); 6 (inquiry ability); 7 (practical ability); and 8 (psychological adjustment ability).

The dotted line between the inner circle and the outer circle represents the value of educational games. The teaching design of the course is integrated with the game, the learning content and the game task are dynamically integrated through SS-da and other ways, the difficulty of the game is matched and coordinated with the initial ability of the learner, and the learner obtains the development of the realistic ability under the free game surface, and gains knowledge and happiness.

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5. Summary

Educational game software is one of the products of the combination of education and games, and it is also an important network educational resource. However, at present, the quality of educational game software developed in our country is not ideal, and even there are some problems, especially in the aspect of learning motivation, there is no comprehensive analysis of the motivation factors of learners in learning and games, ignoring the motivation of learners to participate in games into learning-related motivation. Research on the design of educational games is not only helpful to stimulate the motivation factors of learners, The motivation of participating in games can be transformed into real learning motivation, and the stimulation of learning motivation can also help to stimulate more learners'interest, make them participate in learning, improve learners' knowledge and skills, cultivate high-level abilities, shape emotions and so on. Educational games provide learners with a situational learning environment, and learners can experience the motivation of their own learning in game-based learning, so as to acquire knowledge and develop skills. It is hoped that the model mechanism will inspire educational game designers.

Acknowledgements

This research: The research on the motivation stimulation mechanism of learning in educational games has been approved by Yunnan Normal University as a school level project, project number: YJSJJ23-B167.

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