

# A systematic review on Research on Teaching Interaction in the Environment of Smart Classroom

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## Abstract

Within most colleges and universities, the traditional teaching method is still regarded as principle in the teaching mode nowadays. With our country's vigorous promotion of education and the rapid development of national Internet technology and information technology in recent years, smart classrooms have emerged at this historic moment. It is a novel Internet of Things technology. The computer technology and Internet techniques are used during the process of smart classroom construction to enhance teachers' use of classroom teaching resources and improve teachers' teaching methods, which can increase teaching efficiency and provide students with a better teaching environment. Smart classrooms can not only better serve instruction, but also have far-reaching significance for the promotion of modern teaching. However, at present, the effect of using smart classrooms for teaching activities is not particularly ideal because of the problems that the functions of smart classrooms are not close to teaching and the operation of teaching equipment is complicated. Based on the research and analysis of the teaching interaction among the smart classrooms and smart classrooms at home and abroad, this paper briefly summarizes the research and discussion results of domestic and foreign scholars on this issue in recent years. It is concluded that the current research on the interaction of intelligent classroom teaching is separated from the classrooms, which only stays at the theoretical research level. The research to solve this problem of divorcing theory from practice should start from the real classroom teaching activities and take the prominent problems in teaching as the starting point, so as to achieve the purpose of effective teaching.

## Keywords

Smart classroom ,teaching interaction, classroom teaching.

## 1. Relative Work Outside China

### 1.1. Current status of smart classroom research

Ronald (1988)<sup>1</sup> took the lead in proposing the concept of "Smart-Classroom", thinking that a smart classroom is the use of modern technologies such as information technology, network equipment, and mobile devices, and combined with traditional classrooms to create a new environment to improve the classroom Efficiency increases the performance of students. However, due to the limitations of the theoretical and practical conditions at the time, the idea of the smart classroom was not implemented and valued. Until 2008, on the one hand, due to the development and popularization of modern technologies such as information technology,

<sup>1</sup> Rescigno R C . Practical Implementation of Educational Technology. The GTE/GTEL Smart-Classroom. The Hueneme School District Experience.[J]. Academic Achievement, 1988:27.

network equipment, and mobile devices; on the other hand, after the concept of "smart earth" was proposed, wisdom once again returned to the public's field of vision, making smart classrooms. The concept of "has once again returned to the public's field of vision, and people have further in-depth research on smart classrooms here. Skipton (2009)<sup>2</sup> believes that only the enhancement of electronics or technology can be regarded as a smart classroom, and the rest are not. Marko (2011)<sup>3</sup> found through research that openness, flexibility, mobility, interactivity, and the use of new technologies are the five characteristics of smart classrooms, and summarized the construction of smart classrooms. Jawa (2010)<sup>4</sup> believes that smart classrooms not only need to record and update learner data in real time, but also need feedback. After 2012, research on smart classrooms has focused on the word "wisdom". Pirahandeh (2015)<sup>5</sup> believes that cloud technology and the Internet are effective methods to support smart classrooms, and smart classrooms can improve learning efficiency. Alberto (2020)<sup>6</sup> proposed a new multi-modal learning analysis (MMLA) architecture, and believes that future work on the construction of smart classrooms should be dedicated to deploying this architecture to real education scenarios.

## 1.2. Status Quo of Research on Teaching Interaction

Amidon (1967)<sup>7</sup> proposed the Language Interactive Category System (VICS) on the basis of the Flanders Interactive Analysis System. On his own basis, he concluded that the teacher's language is different, and the students' responses will be different, and affect Enthusiasm in class. Flanders (1970)<sup>8</sup> proposed the "Flanders Interactive Analysis System" (FIAS) on the basis of studying the teaching interaction in order to analyze the verbal interaction behavior in teaching. He believes that in teaching, teachers should minimize classroom behavior, so as to increase students' enthusiasm for participating in the classroom, enhance students' ability to learn independently, and improve students' learning efficiency. Kenneth (1992)<sup>9</sup> found that in the process of teacher-student interaction, speech acts accounted for the highest proportion of the interaction process, while non-verbal acts had very little influence on students. Barbara (1996)<sup>10</sup> believes that different interactive methods will lead to differences in interactive teaching. Teachers and students with different learning situations should adopt different interactive methods to help better teaching. According to different students, different interactive methods can be adopted so as to produce different and better teaching effects. In the research on the types of teaching interaction, Hargreaves believes that there are three classifications: one is the lion training type; the other is the entertainment type; the third is the romantic type. And the three different types of interactive behaviors are explained in different concepts. Thomas (2002)<sup>11</sup> divides interaction into three types: learning, disciplined behavior, and regular interactions other than the former two. It is believed that these three interactions

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<sup>3</sup> Marko Kuuskorpi et al. The future of the physical learning environment: school facilities that support the user[J]. OCED CELE Organizing Framework on Evaluating Quality in Educational Spaces, 2011: 2072-7925.

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<sup>5</sup> Pirahandeh M , Kim D H . Energy-aware and intelligent storage features for multimedia devices in smart classroom[J]. Multimedia Tools and Applications, 2015:1-19.

<sup>6</sup> Alberto Huertas Celdrán, José A. Ruipérez-Valiente, Félix J. García Clemente, María Jesús Rodríguez-Triana, Shashi Kant Shankar, Gregorio Martínez Pérez. A Scalable Architecture for the Dynamic Deployment of Multimodal Learning Analytics Applications in Smart Classrooms[J]. Sensors, 2020, 20(10).

<sup>7</sup> Amidon E J and Hough J B. Interaction Analysis: Theory, Research and Application[M]. Massachusetts: Addison-Wesley Publishing Company, 1967.

<sup>8</sup> Flanders N. Analyzing teacher behavior[M]. MA: Addison-Wesley, 1970: 107.

<sup>9</sup> Kenneth D. Moore. Classroom Teaching Skills [M]. McGraw-Hill, Inc, 1992.

<sup>10</sup> Barbara J., Williams, Guzzetti, Wayne O. Gender, text, and discussion: Examining intellectual safety in the science classroom.[J] Journal of Research in Science Teaching. 1996, 5-20.

<sup>11</sup> Thomas L. Good, Jere E. Brophy. Translated by Tao Zhiqiong and others: "Perspective Classroom", China Light Industry Press, 2002 edition.

encompass all types of interactions. Beauchamp (2010)<sup>12</sup> uses different distribution types, dividing the teaching interaction types into: one is authoritative; two is dialectical; three is dialogue; and four is collaborative. Christopoulos (2018)<sup>13</sup> conducted experiments in virtual classrooms and real classrooms, and concluded that the use of technology will increase the learning effect and eliminate the shortcomings in these two learning environments, further increase the efficiency of learning, and make classroom interactive behaviors Better increase.

### 1.3. Interactive teaching research in the smart classroom environment

Tu (2005)<sup>14</sup> In order to study whether the smart classroom environment has an impact on teaching interaction, by comparing the students of two schools and conducting experiments, it is found that the interaction, mobility, and flexibility in the smart classroom environment can play a role in promoting learning efficiency. And smart classrooms are better than traditional classrooms. Tiburcio (2005)<sup>15</sup> found that compared with traditional classroom learning, students studying in a smart classroom environment are more conducive to stimulating their enthusiasm and enthusiasm for learning. In the relatively flexible classroom environment of the smart classroom, students learn independently and cooperatively. The potential is stimulated, and group learning is conducive to the progress of the classroom. Lui (2014)<sup>16</sup> used experiments to allow students to study in a smart classroom environment and found that students' interest was increased, which promoted learning efficiency, and students would learn more happily. JOJ (2015)<sup>17</sup> conducted a research on the classroom interaction behavior of students in the fifth grade of elementary school. Through experiments and comparisons with students in traditional classrooms, they found that different environments do have an impact on the interaction behavior between students and teachers, and smart classrooms are more effective. Promote learning, and students are more motivated. Andres (2016)<sup>18</sup> designed a development system for teaching activities in a smart classroom environment through research and found that the use of different interactive technologies has different effects on learning effects, and concluded that for better classroom learning effects, The use of different technologies can better promote the improvement of classroom efficiency. Al-Qirim (2016)<sup>19</sup> In order to study the integration between smart classrooms and IWBT (Interactive Whiteboard Technology), it is found that the use of technology in smart classrooms will prompt students to think about themselves, and can provide two-way feedback, which has a better learning effect.

## 2. Relative work in China

### 2.1. Current status of smart classroom research

Domestic research on smart classrooms started late. Chen Weidong (2011)<sup>20</sup> believes that a smart classroom is an interactive classroom with human-computer interaction realized by technical means. Huang Ronghuai (2012)<sup>21</sup> believes that smart classrooms are a new type of classrooms that are different from the past. They have two main functions, one is emotional perception, and the other is environmental management. On this basis, the "SMART" model is

12 Beauchamp G, Kennewell S. Interactivity in the classroom and its impact on learning[J].Computers & Education, 2010, 54(3):0-766.

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20 Chen Weidong, Ye Xindong,Zhang Jiping.The research status and future prospects of smart classrooms[J].Journal of Distance Education,2011,(4):39-45.

21 Huang Ronghuai, Hu Yongbin, Yang Junfeng, etc. The concept and characteristics of Zhihui classroom W. Open Education Research, 2012(2):23.

proposed to better teach and help students develop. Yang Zongkai (2015) believes that cloud classrooms will be the direction of future development, a place that can meet their own individual needs, and can be personalized according to individual needs. Fenghua Nie (2013)<sup>22</sup> proposed the "iSMART" model on the basis of the "SMART" model, and believed that the smart classroom is composed of six parts: infrastructure, network sensor, visual management, augmented Reality (augmented reality), real time record (real-time record), ubiquitous technology (ubiquitous technology), he believes that this model can provide a good teaching and learning environment for teachers and students. Zhang Yi, Chen Beilei, and Dong Xuemin (2016)<sup>23</sup> paid attention to classroom teaching and proposed the APT model to study participation and metacognition. Xu Xianlong (2017)<sup>24</sup> From the perspective of the impact of smart classrooms on study groups, the research group studies whether the efficiency of group learning is higher than that of traditional teachers. Zhang Tianrong (2018)<sup>25</sup> believes that smart classrooms have achieved certain results, but in the long run, the method of measuring the effects of smart classrooms needs further research.

## 2.2. Status Quo of Research on Teaching Interaction

Kang Xiaomei (2005)<sup>26</sup> believes that classroom interaction is a kind of social interaction at the class level. It is a behavior of interdependence between teachers and students. Teaching interaction not only depends on teachers, but also on students. Pei Yuejin (2006)<sup>27</sup> found that teaching interaction can not only teach students the knowledge of culture, but also learn the knowledge of interpersonal communication. Although the learning of classroom knowledge is important, it is more important to teach students the principles of doing things. Han Qin (2008)<sup>28</sup> found through a survey that differences in classrooms, students, and teaching methods will affect the teaching interaction in the classroom. Therefore, in order to promote classroom efficiency, teachers, students, and teaching methods all need to be considered. Wang Jian (2011)<sup>29</sup> studied the interactive behaviors in the classrooms of different ethnic groups in Northwest China and found that different ethnic cultures have different interaction behaviors with teachers. Therefore, different teaching methods are also used for students of different ethnic cultures in different regions. It should be different. Chen Baihua (2013) found that the two forms of teacher-group discussion and one-way questioning have different effects on classroom interaction, and the teacher-group discussion has a better effect. We must develop in this direction. Fang Zheng (2013)<sup>30</sup> found that the number of classes will have an impact on the teaching interaction. The smaller the class size, the more the teacher will pay attention to the students. The class size will decrease, the teacher will pay more attention to the students, and the frequency of interaction will increase. The development of small classrooms is a major trend in the future. Wen Xue (2016)<sup>31</sup> Based on the FIAS model, he believes that the academic record has a good effect in the course of classroom activities, and the introduction of the academic record should have a positive impact on classroom interaction. Chang Yahui (2017)<sup>32</sup> found through a survey that, relatively speaking, children with rich language will speak more

22 Nie Fenghua, Zhong Xiaoliu, Song Shujiang. Smart classroom: conceptual features, system models and construction cases (1). *Modern Educational Technology*, 2013(7): 5

23 Zhang Yi, Bai Qingyu, Li Xiaoyan, Zhu Yinghui, Fan Fulan, Xie Ling. Research on the Influence of Mobile Learning Based on the APT Teaching Model on Students' Learning Interest and Achievement——Taking the "fan-shaped statistical chart" of primary school mathematics as an example[J]. *China Audio-visual Education*, 2016(01):26-33.

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32 Chang Yahui, Zhao Qiansen. Vocabulary: The Arbiter of Classroom Teaching[J]. *Contemporary Educational Science*, 2017, (10):14-17.

in the classroom and will have more opportunities for interaction in the classroom. Therefore, it is necessary to cultivate the enthusiasm and initiative of students to discover.

### 2.3. Research on Interactive Teaching in Smart Classroom Environment

Wang Xiaochen (2015)<sup>33</sup> observed the teaching interaction in the smart classroom through three dimensions, and concluded that the different types of classrooms will have an impact on the effect of classroom teaching, so the smart classroom has good results. Zou Huajie (2016)<sup>34</sup> In order to explore the effect of smart classrooms in junior high school teaching, he hopes to further promote the application of smart classrooms in junior high school teaching in my country, and smart classrooms should be further promoted. Zhou Pinghong (2018)<sup>35</sup> used the Flanders interactive analysis system for reference and improved it. On the one hand, it enhances the scientific nature of the system, and on the other hand, it increases the operability in practice, which provides a good outline for future practice in our country. The theoretical basis. Wentao He (2018)<sup>36</sup> compared smart classrooms with traditional classrooms and conducted related research on whether collaborative learning interaction can improve teaching interaction, and found that collaborative learning can better promote student learning. Li Li (2018)<sup>37</sup> introduced smart classrooms in elementary school classrooms, and analyzed the support of teacher-student interaction and Chinese language, and found that smart classrooms did not surpass traditional classrooms, and the role of smart classrooms was not so obvious. Zhi min (2019)<sup>38</sup> used the SCIAS system to compare the classrooms of colleges and primary schools in the teaching interaction, to study the similarities and differences between the two, and to find a better research direction for smart classrooms. Lu Bo (2019)<sup>39</sup> found a series of problems in studying the interactive behavior of elementary school students' teaching in a smart classroom environment, and proposed rectification measures to provide better results for subsequent research. Chen Beilei (2019)<sup>40</sup> believes that smart classrooms can have an impact on teaching interaction, and smart classrooms have a positive effect. Li Yanhong (2020)<sup>41</sup> integrates "mobile learning" with smart classrooms to increase the teaching interaction in the smart classroom environment, and found that the teaching interaction in the smart classroom environment will increase, which can promote teaching interaction and produce good results.

In summary, the research on the interaction between smart classrooms and teaching has always been the focus of research in the field of pedagogy. However, most domestic and foreign researches focus on theoretical analysis and the analysis of overall classroom interaction behavior, and lack the analysis of specific teaching environments. The research talks further.

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