Volume 10
Number 01
October, 2021

SIEF

science insights education frontiers

pISSN: 2644-058X eISSN: 2578-9813

Published Bimonthly by
Insights Publisher

Science Insights Education Frontiers

pISSN 2644-058X
eISSN 2578-9813

Volume 10, No. 1

October 2021

Insights Publisher

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pISSN 2644-058X
eISSN 2578-9813

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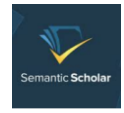


TABLE OF CONTENTS

SIEF, Vol. 10, No. 1, October 2021

Commentary

Original Article

COMMENTARY

Praise or Criticism? How Should Teachers Give Effective Feedback in the Classroom Teaching?

Fengping Zhao

271 Education Group of Shandong, Weifang 261000, Shandong, China

"Praise like sunlight, helps all things to grow."
- Croft M. Pentz

THERE are many factors that affect students' academic performance. Early studies emphasized students' existing foundations, their own abilities (Stigler et al., 1986), family factors (Wang, 2015), school or class organizational structure (Angrist, & Lavy, 1999; Häkkinen et al., 2003), cultural factors (Geary et al., 1993; Stigler & Stevenson, 2005) and other influences on their academic performance. However, the research on the influence of teacher factors has only received attention since the 1980s. Researchers explored the relationship between teachers' classroom behavior and students' academic performance, trying to focus on the teaching process (Lockheed & Komenan, 1989), teacher guidance (Brophy, 1988), teacher feedback (Gettinger, & Stoiber, 1999), Teacher planning and preparation (Peterson, Marx & Clark, 1978) explored the causes that can significantly affect students' academic performance.

Teacher feedback is considered to be the behavior that connects all events in the classroom. It provides students with opportunities to participate and makes them perform, and then immediately respond accordingly. Therefore, the two events of student learning behavior and teacher feedback are closely related in time. "The closer the connection between behavior and feedback, the faster learning will happen." That is, providing feedback is a complete continuation of classroom activities.

In terms of effectiveness, feedback gives students the opportunity to understand the teacher's subjective view of their personal characteristics and school performance. Furthermore, it can update self-cognition and self-evaluation, and help correct and strengthen students' learning in time. Specifically, the effect of feedback on students is mainly reflected in the two aspects of students' academic performance and learning motivation. Butler and Nisan (1986) confirmed that effective or efficient feedback can not only

guide students in the formulation of learning strategies and the realization of learning goals, but also inspire students' inner emotion and motivation to mobilize various factors to achieve their goals. Finally, it promotes students' meaningful learning. Inappropriate feedback from teachers can cause negative effects. For example, inappropriate feedback causes students to make wrong attributions, causing "learned helplessness" and hindering their development and progress.

As the most common motivational means in teacher teaching management, praise and criticism are both a kind of feedback (Kamins & Dweck 1999), that is, the teacher (or peers, books, parents, self and experience) provided by the individual performance or understanding Information (Hattie & Timperley, 2007). From the Skinner reinforcement theory, praise is a positive reinforcement stimulus behavior with affirmative color, while criticism is a negative reinforcement behavior (Skinner, 2019). Generally speaking, affirmative reinforcement helps students to actively accept and internalize teachers' requirements, and can mobilize students' learning motivation (Henderlong & Lepper, 2002). Negative reinforcements make students nervous and produce psychological pressure (anxiety, irritability, restlessness, depression, and even aggressive behavior) (Wei, 2015). But does this mean that teachers should praise instead of criticizing?

Zhang et al. (2021) believed that in classroom teaching, teachers' praise can play a positive role to some extent, but this effect varies with the field of use, personal characteristics of the target, and attribution habits. It presents both shallow and deep effects. The deep effect is that students consolidate their behavior after being praised, and transfer this behavior to other scenes, so that student behavior can be further strengthened. The article also starts from Skinner's reinforcement theory, and believes that if a student's behavior that is consolidated by praise is not reinforced within a certain period of time, this behavior will naturally weaken and gradually fade away. In order to avoid the natural regression of reinforcement behavior, teachers should pay attention to phased reinforcement, that is, partial reinforcement. At the same time, teachers should start from behaviorist theory and avoid frequent and superficial praise; on the contrary, they should attract students through education and teaching activities, so that students can truly feel the needs and satisfaction of learning, and then consciously participate in education and teaching activities. Finally realize the deep effect of feedback.

Although the article does not discuss criticism, it is not difficult to find in the relevant literature that there are also many studies on criticism as the "opposite" of praise. From the perspective of teachers' feedback behavior, criticism and praise are mutually integrated and connected behaviors, both of which are behaviors that discipline students (Yao et al., 2020). Teachers should not only pay attention to the multi-frequency and shallow level of praise in the praise, but also criticize the students. It is important for teachers to give encouraging answers to wrong answers, so as to maintain the non-evaluative characteristics of the triggering activity.

In general, encouraging positive feedback should look at characteristics from things to people and behaviors. Negative judgment feedback should be from people to things, affirm the people's strengths, and then point out the problems. Praise and criticism are not two opposites. Both should be properly presented in the teacher's feedback in the classroom, giving signals from different aspects of the continuation or change of student behavior. The key is to have justified, true and emotional praise and criticism.

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Correspondence to:
Fengping Zhao
271 Education Group of Shandong
Weifang 261000
Shandong
China
Email: zhaofengping5138@163.com

Conflict of Interests: *None.*

Doi: *10.15354/sief.21.co024*

ORIGINAL ARTICLE

New Era, New Choice: The Implementation Path of the "General-to-Vocational Student Roughly Equivalent" Policy in High School Education

Xuedong Liu, Yuelan Gao

The Center of Mental Health Education and Guidance, Nanjing Audit University, Nanjing 211815, Jiangsu, China

***Abstract**: The "General-to-Vocational Student Roughly Equivalent" policy is an integral part of the top-level design of China's vocational education. The paper analyzed the value of the policy from a multidisciplinary perspective and reviewed its development path. According to the statistical analysis of the "General-to-Vocational Student Ratio (GVR)" data from 2009 to 2018, it can be seen that the policy has been implemented well. Still, the GVR has a trend of further expansion. Therefore, to ensure the effective implementation of this policy, relevant policy recommendations are put forward from stakeholders such as the government, secondary vocational schools, and parents of students.*

Science Insights Education Frontiers 2021; 10(1):1323-1340.
Doi: 10.15354/sief.21.or053

How to Cite: Liu, X. & Gao, Y. (2021). New era, new choice: The implementation path of the "General-to-vocational student roughly equivalent" policy in high school education. Science Insights Education Frontiers, 10(1):1323-1340.

***Keywords**: General-to-Vocational Student Roughly Equivalent, General-to-Vocational Student Ratio, High School Education*

CHINA attaches great importance to education and has always "adhered to the development of education as the priority to promote the development of various national undertakings." After the reform and opening up, China began implementing the "General-to-Vocational Student Roughly Equivalent (GVRE)" policy. A series of practical measures have been taken to change the single secondary education structure so that vocational and technical education can develop rapidly. As a result, a large number of high-quality talents have been cultivated for the country. Today, the "GVRE" policy has become an essential content in the top-level design of national vocational education, which has played a vital role in consolidating the fundamental status of secondary vocational education in the entire vocational education and has formed a system with Chinese characteristics. In the new era, China's economy has shifted from rapid growth to a stage of high-quality development. The principal contradiction of education has also turned into the contradiction between the growing demand for high-quality education and the unbalanced and inadequate educational development. At the same time, as high school education enters the era of universalization, and economic transformation and technological upgrading continue to accelerate, industry enterprises have continuously increased their requirements for technical and skilled personnel and the internal and external environment for the implementation of the "GVRE" policy has also changed. Therefore, how to effectively implement the "GVRE" policy has become an important issue we face.

The Era Meaning of the "GVRE" Policy

By implementing the "GVRE" policy, the bottom line has been set for the reserve of students needed to develop secondary vocational education, which has played a role in promoting its sustainability. However, as the social recognition of vocational education continues to decline and the popularity of high school education continues, the "GVRE"

About the Author: *Yuelan Gao, Ph.D., Associate Professor, The Center of Mental Health Education and Guidance, Nanjing Audit University, Nanjing 211815, Jiangsu, China. E-mail: 506406889@qq.com*

Correspondence to: *Xuedong Liu, Ph.D., Associate Professor, The Center of Mental Health Education and Guidance, Nanjing Audit University, Nanjing 211815, Jiangsu, China. E-mail: xuedongliu163@163.com*

Xuedong Liu & Yuelan Gao contributed equally to this work.

Funding: *This study was supported by the National Social Science Fund Educational Key Project "Research on the Characteristics of Risk Points and Prevention Mechanisms in the Education Field" (Project Number: AFA190009).*

Conflict of Interests*: None.*

policy has been criticized by all walks of life and questioned by some experts and scholars. Some parents of students find it challenging to accept it, and many education administrators and even educational administrators have criticized it. Some experts and scholars believe it lacks a scientific basis (Ou & Dec, 2016) and has exacerbated educational unfairness (Zhu & Zhao, 2020). However, as an important national policy, whether "GVRE" is scientific and reasonable and needs to be adjusted must be based on a long-term perspective, stay away from subjective judgments, and must not be mixed with personal emotions and preferences. We will examine and think about the "GVRE" policy from a multidisciplinary perspective from different disciplines such as management, education, psychology, economics, and statistics, and explain the policy's rationality and scientific value.

Reflect the Government's Scientific Decision-Making and Retain Flexibility

Scientific decision-making, also known as rational decision-making, is decision-making made by decision-makers under the guidance of correct theory, relying on scientific thinking, methods, and technology (Li, 2019). "GVRE," as a national policy, is a long-term decision made by the central government based on the overall consideration of the country's future economic and social development. Due to the significant differences in regional economic development, industrial structure, talent demand, and educational demand, it is impractical to require all localities to maintain "GVRE." Moreover, "GVRE" does not rigidly need the "General-to-Vocational Student Ratio (GVR)" to be 1:1, which reserves flexible space for policy implementation and reflects the rationality and scientific nature of the central government's decision-making. "GVRE" does not require the whole country to be "roughly equivalent" or to set "GVR" as 1:1 but requires local governments based on local economic and social development and the total number of middle school graduates. In the end, the "GVR" can be determined with the suitability of its contribution to local economic and social development needs and ensure the effective implementation of the "GVRE" policy.

Follow the Law of Educational Development and Improve the Vocational Education System

The law of education is an essential or inevitable connection between the internal elements of the education system and between the education system and its environment (material, spiritual, and social) in the course of its operation and development (Hu, 2000). As the type of education most closely related to economic and social development, vocational education is the most direct educational means to solve practical problems. The "GVRE" policy follows the law of the relationship between education and economic and social development. Economic and social development has a restrictive effect on secondary vocational education and general high school education. The devel-

opment level of these two types of education will also have a particular impact on economic growth. The specific interaction between the two is as follows: On the one hand, economic and social development restricts the scale and speed of the development of secondary vocational education and limits the talent training specifications and educational structure. On the other hand, secondary vocational education can reproduce labor, science, and technology, increase productivity, and promote economic and social development.

Respect Individual Physical and Mental Differences and Implement Teaching per their Aptitude

The famous American educational psychologist Howard Gardner put forward the theory of multiple intelligences in 1983. He believed that eight kinds of intelligence are related to specific cognitive domains or knowledge categories in individuals relatively independently, including language intelligence, mathematical logic intelligence, spatial intelligence, body-motor intelligence, musical intelligence, interpersonal intelligence, reflective intelligence, and natural intelligence (Pi, 2009). Individuals also have differences in the ways of cognition, thinking level, and personality characteristics. Therefore, every student is a plastic talent with intellectual characteristics, learning type, and development direction. Education plays a leading role in developing the individual's body and mind, but education must be restricted by creating the individual's body and mind. High school is a critical period for the formation of rational knowledge, self-awareness, and personality, and it is also a watershed for the growth of different types of talents. In the high school stage, the general job division provides suitable development space to grow different skills and create the best environment. This reflects that the "GVRE" policy follows the law of individual physical and mental development and takes the individual's physical and psychological development as the basis for educational behavior. Teach students per their aptitude so that every student can receive "appropriate education." Let every student have their track to obtain development in line with their physical and mental characteristics.

Implement Human Capital Theory and Develop Human Resources

Human capital refers to the sum of economically valuable knowledge, skills, and physical strength (health status) in the human body (Li & Huang, 2001). In 1776, the British economist Adam Smith explained the importance of "talent" for the first time in The Wealth of Nations. In the 1960s, American economists Thodore W. Schults and Gary S. Becker co-founded Human Capital Theory. One of the core views is that the core of human capital is to improve population quality, and education investment is the central part of human investment. Education and training play an essential role in the formation of human capital. Education can improve the quality of the labor force, the workability,

and the technical level of the laborers, thereby increasing labor productivity. The formulation and implementation of the "GVRE" policy will help train laborers with higher quality and skills, that is, laborers with a higher stock of human capital, to meet the demand for economic and social development talents.

Meet the Needs of the Economy and Society, Optimize the Talent Structure

According to talents' knowledge and ability structure, talents are usually divided into four categories: academic, engineering, technical, and skill. Among them, the latter three types of talents can be collectively referred to as applied talents. From the perspective of the demand for social talents, "the ratio of applied technical talents and academic talents in developed European countries is generally 8:2, which is consistent with the structure of the supply and demand of talents for social and economic development"(Jiao & Jan, 2014). Assume that 100% of middle school graduates are promoted to high school, 50% are encouraged to ordinary high schools, and 50% are promoted to secondary vocational schools. Furthermore, 40% of the students entering general high school are promoted to academic colleges and universities, and 60% are encouraged to applied colleges and universities (Zhang, 2018) According to this assumed proportion of entering higher education, at the same time node, the ratio of academic talents obtained by the society to middle and higher applied talents is exactly 2:8. This ratio is in line with economic and social development needs, and both academic and applied talents have room for full play. Therefore, the "GVRE" policy is reasonable and necessary and can guarantee all talents needed for economic and social development.

The Development Path of the "GVRE" Policy

In China, "education reform and development are mainly promoted through policies" (Tu & Wei, 2014). Therefore, a series of policies related to the coordinated development of general vs. vocational education at the stage of high school education promulgated by the state have become the critical basis for implementing the "GVRE" policy. Reviewing these policy documents shows that the country first proposed the "GVRE" policy in 1983. A series of essential documents issued subsequently clearly set forth the goals and requirements for implementing this policy. At the same time, based on the historical time nodes of political changes, institutional changes, and key actors' concepts and behaviors that have a profound impact on the "GVRE" policy, the implementation process can be divided into pilot exploration, preliminary implementation, development and improvement, and adjustment and optimization.

Stage of Pilot Exploration

From the late 1970s to the early 1980s, the scale of general vs. vocational in China's high school stage has been severely unbalanced. In 1978, Premier Xiaoping Deng put

forward the first guidance on "Expanding the proportion of vocational and technical schools" at the National Education Work Conference. Subsequently, many regions have carried out pilot work on the reform of the secondary education structure. In 1980, the State Council approved and transmitted the "Report of the Ministry of Education and the State Administration of Labor on the Reform of Secondary Education Structure." It put forward the requirement of "making the number of students in various vocational (technical) schools a significant increase in the overall high school education." By 1982, the number of students in urban vocational middle schools (classes) and vocational (technical) schools had reached more than 350,000, and the ratio of students in general high schools at that time was 1:5 (The Chinese Ministry of Education, 1983). In 1983, the Ministry of Education, the Ministry of Labor and Personnel, and other four ministries and commissions put forward in the *Opinions on Reforming the Structure of Urban Secondary Education and the Development of Vocational and Technical Education*: The ratio should be roughly the same." This was the first policy requirement of "GVRE" proposed by China, and it provided a strong system guarantee for further promoting the reform of the secondary education structure.

Stage of Preliminary Implementation

In 1985, the "Decision of the Central Government on Education System Reform" proposed: "Adjust the structure of secondary education and vigorously develop vocational and technical education" and "strive to achieve the same number of students enrolled in vocational and technical schools at various high school stages in most regions within five years. As a result, the number of students enrolled in general high schools has reversed the current irrational structure of secondary education." To implement this requirement, in July 1986, the first national vocational and technical education work conference was held. It was proposed that "the enrollment of vocational and technical schools in most regions of the country should be approximately equal to that of ordinary high schools around 1990". Since then, "GVRE" policy discussions have been widely carried out across the country. As a result, the enrollment ratio of vocational and technical schools at the high school level has also increased rapidly.

Since the 1990s, as people's desire to go to university has become more robust, the requirement for general high school education has become more urgent, and the phenomenon of "general high school fever" has appeared. As a result, the implementation of the "GVRE" policy has been seriously affected. For example, in 1991, the *Decision of the State Council on Vigorously Developing Vocational and Technical Education* proposed that: "Expand the scale of enrollment, especially the expansion of the enrollment scale of secondary vocational and technical schools, so that the number of students in vocational and technical schools exceeds the number of students in general high schools." In 1993, there were more than 20 mentions of "vocational education" in the *Outline of China's Education Reform and Development*, which showed that China attaches great importance to the development of vocational education. Among them, it is proposed that: "Vigorously develop vocational education, and gradually form a series

of education for the common development of elementary, secondary, and higher vocational education and general education," "gradually achieve that 50%-70% of middle school graduates enter secondary vocational schools or vocational training center."

Stage of Development and Improvement

Since the 21st century, the Chinese government has successively issued a series of policy documents to ensure the effective implementation of the "GVRE" policy. In 2002, the *Decision of the State Council on Vigorously Promoting the Reform and Development of Vocational Education* stated that: "It is necessary to focus on secondary vocational education and maintain roughly the same ratio of secondary vocational education to regular high school education." In 2005, the *Decision of the State Council on Vigorously Developing Vocational Education* stated that: "By 2010, the enrollment scale of secondary vocational education will reach 8 million, which is roughly equivalent to the enrollment scale of general high schools." The *Notice on Enrollment of Educational Schools* stated: "According to the national high school education development plan and gradually achieving the roughly equivalent requirements of GVR, combined with the actual situation of the region, ... determine the enrollment scale of various schools for high school education." In 2010, the *National Medium and Long-term Educational Reform and Development Plan (2010-2020)* proposed that: "According to the needs of economic and social development, reasonable determination of the enrollment ratio of general high schools and secondary vocational schools, and maintain the general high school and secondary vocational schools for a while, and keep the school's enrollment scale be roughly the same." In 2014, the *Decision of the State Council on Accelerating the Development of Modern Vocational Education* stated that: "In general, the enrollment scale of secondary vocational schools and general high schools should be roughly equal, and the scale of higher vocational education accounts for more than half of higher education." In 2014, the *Modern Vocational Education System Construction Plan (2014-2020)* stated that: "Secondary vocational education is the focus of developing vocational education. In the future, the enrollment scale of general high schools and secondary vocational schools will be roughly the same."

Stage of Adjustment and Optimization

In 2017, the Ministry of Education and other four ministries and commissions put forward in the *High School Education Popularization Plan (2017-2020)* and stated that: "By 2020, the structure of general high school and secondary vocational education will be more reasonable, and the enrollment scale will be roughly the same." In 2019, the *National Vocational Education Reform Implementation Plan* proposed that: "The development of secondary vocational education shall be an important foundation for popularizing high school education and building a vocational education system with Chinese characteristics. The new workforce is receiving high school education." This showed that "GVRE," as an essential policy for developing vocational education, will

continue to be implemented in the future. In 2019, the Ministry of Education put forward the *Notice on In-depth Study and Implementation of the National Vocational Education Reform Implementation Plan*. It stated that: "To perfect the modern vocational education system, it is necessary to raise the level of secondary vocational education development and maintain a roughly equivalent ratio of high school education vocational education." At the same time, the Ministry of Education has clearly stated in the high school admissions notices over the years that "arrange high school admissions plans per GVRE." The *Notice of the General Office of the Ministry of Education on Doing a Good Job in the Enrollment of Secondary Vocational Schools* in 2019 stated that: "Persist that the ratio of general vs. vocational is roughly equivalent, and improve the development level of secondary vocational education"; "All localities must strictly follow the principle of the roughly equivalent ratio of general vs. vocational." According to the needs of economic and social development and the source of middle school graduates in the region, reasonable arrangements for secondary vocational school enrollment plans, adjustment and optimization of the high school education structure, and promotion of the coordinated development of general vs. vocational high school education" (General Office of the Ministry of Education, Jan, 2020)

Analysis of the Status Quo of the "GVRE" Policy

According to the *Basic Situation of National Education Development* in 2018 (The Chinese Ministry of Education, Jan, 2020) and *Basic Situation of Vocational Education in 2018* (The Chinese Ministry of Education, Jan, 2020) issued by the Ministry of Education, in 2018, there were 13,677,700 middle school graduates nationwide; high school enrollment was 13,521,200. About 7.9271 million students were enrolled in general high schools, and 5.5941 million students were enrolled in secondary vocational schools. The general undergraduate colleges and universities enrolled 7.909 million students, of which 4.2216 million were enrolled for general undergraduates and 3.6883 million were enrolled for higher vocational colleges. Based on the above data estimation, the total number of applied talents in middle and higher vocational education is 9,282,400, accounting for 68.76% of professional talents. In addition, coupled with applied talents at or above the undergraduate level, China's talent structure is close to the 8:2 of applied talents to academic talents. Therefore, all kinds of talents can meet the needs of economic and social development.

Regional Comparison

According to the 2009-2018 national education development statistics released by the Ministry of Education of China, based on the number of students enrolled in high schools across the country (see **Table 1**), it shows that: First, in the past ten years, the population of school-age enrolled in high school education across the country under the background of declining and diversified parental education choices of students, the number of students enrolled in secondary vocational education has shown a downward

Table 1. The Number of Enrolled Students for High School Education in China (Unit: 10,000).

Year	General High School	Secondary Vocational Education	Total Enrollment	General-Vocational Student Ratio
2018	792.71	557.05	1,349.76	59:41
2017	800.05	582.43	1,382.49	58:42
2106	802.92	593.34	1,396.26	58:42
2015	796.61	601.25	1,397.86	57:43
2014	796.60	619.76	1,416.36	56:44
2013	822.70	674.76	1,497.45	55:45
2012	844.61	754.13	1,598.74	53:47
2011	850.78	813.87	1,664.65	51:49
2010	836.24	870.42	1,706.66	49:51
2009	830.34	868.52	1,698.86	49:51

Source: Ministry of Education of China. 2009-2018 National Education Development Statistical Bulletin [EB/OL]. http://www.moe.gov.cn/jyb_sjzl/sjzl_fztjgb/, 2020-01-08.

trend yearly. Taking 2014 as the "turning point," the downward trend in enrollment of secondary vocational schools was more evident than before, and it would ease slightly in the future. However, the number of students enrolled in general high schools was relatively stable during the same period, with no significant decrease. Second, the "GVR" has increased year by year, but it has remained within the "roughly equivalent" range. Taking 2011 as the "turning point," the previous "GVR" was always less than "1", that is, the number of students enrolled in general high schools was smaller than that of secondary vocational schools, but the gap between the two has been narrowing yearly. Since 2011, "GVR" has been more significant than "1", that is, the number of students enrolled in general high schools was more than the number of students enrolled in secondary vocational schools, and the gap between the two has been widening yearly. However, from the data in the past ten years, the enrollment of high school education has better implemented the basic requirements of the "GVRE" policy. However, adequate measures must be taken to enhance further the attractiveness of secondary vocational schools to prevent further expansion of the "GVR" to maintain the balance of social talent structure.

Among the four major economic regions in the country, Beijing, Shanghai, Jiangsu, Zhejiang, and Guangdong in the eastern region; Liaoning in the Northeast; Henan in the central area; and Shaanxi in the western area were selected for analyzing and comparing "GVRE" policy implementation. According to the 2013-2018 national education statistics released by the Ministry of Education of China, the enrollment status of high school education in these eight provinces and cities was obtained (see **Table 2**).

According to **Table 2**, the implementation of "GVR" in 8 provinces and cities in the four major economic regions across the country from 2013 to 2018 was roughly calculated (see **Table 3**).

Table 2. Number of Students Enrolled in General High Schools and Secondary Vocational Schools in 8 Provinces and Cities from 2013 to 2018 (Unit: Person).

Province/ City	2018		2017		2016		2015		2014		2013	
	GHS	SVS	GHS	SVS	GHS	SVS	GHS	SVS	GHS	SVS	GHS	SVS
Beijing	47,355	14,373	53,755	19,422	53,544	23,409	56,743	27,108	55,184	29,765	59,983	55,427
Shanghai	52,330	33,372	53,276	34,212	53,066	35,443	53,439	38,786	52,857	40,960	53,092	44,377
Jiangsu	352,082	199,204	314,573	225,970	318,236	220,939	319,487	228,701	319,780	234,361	341,417	259,053
Zhejiang	254,912	177,634	259,298	184,672	258,898	188,355	259,850	187,111	251,727	179,078	265,198	191,505
Guangdong	604,224	297,190	611,384	322,267	643,293	351,909	664,376	395,377	696,807	417,047	730,784	474,927
Liaoning	191,108	80,526	213,683	103,382	212,049	112,032	209,790	111,181	208,916	108,270	222,938	117,987
Henan	726,544	391,987	709,731	420,404	695,330	374,900	679,812	378,222	644,935	393,380	661,063	422,209
Shaanxi	232,057	82,498	243,804	98,383	257,192	93,314	264,270	106,435	279,795	135,299	299,383	163,984

Note: GHS: General high school; SVS: Secondary vocational school.
Source: Ministry of Education of China. Education Statistics 2013-2018 [EB/OL]. http://www.moe.gov.cn/s78/A03/moe_560/jytjsj_2017/, 2020-01-08.

In the eastern region, the growth trend of "GVR" in Beijing high schools was more pronounced. The "GVR" in 2013 was 52:48, which achieved the goal of "GVRE"; however, from 2014 to 2018, the "GVR" increased rapidly, reaching 77:23 in 2018, and ranked the first in the country. The "GVR" of Shanghai high schools has been increasing yearly, but the increase was slight. From 2013 to 2018, it remained between 55:45 and 60:40. The "GVR" of high schools in Jiangsu Province increased yearly, but the increase was slight. From 2013 to 2017, it remained at 58:42, basically fulfilling the target requirements of "GVRE." Before 2018, the "GVR" in Jiangsu Province was relatively stable. However, since 2018, the provincial government has adjusted the number of high school enrollment plans following Jiangsu's economic and social development needs. As a result, the "GVR" has increased significantly to 64:36. The "GVR" of Zhejiang high school was relatively stable. From 2013 to 2018, it remained at around 58:42, which achieved the target requirements of "GVRE." The "GVR" of high schools in Guangdong Province increased yearly, but the increase was slight. From 2013 to 2018, it remained around 65:35.

In the Northeast, the base of "GVR" in high schools in Liaoning Province was relatively large, with a slight increase, which generally remained at around 65:35, but increased significantly in 2018, reaching 70:30. The high school "GVR" base was relatively large in the central and western regions, increasing yearly. The high school "GVR" in Henan Province remained at around 65:35, with a slight increase. The "GVR" of high schools in Shaanxi Province remained at around 70:30 and increased significantly. As a result, neither of these two provinces achieved the "GVRE" requirements.

In general, the "GVR" of the three provinces and cities of Shanghai, Jiangsu, and Zhejiang is relatively balanced, and the target requirements of the "GVRE" have

Table 3. Statistics on the Implementation of "GVR" in 8 Provinces and Cities from 2013 to 2018.

Province/City	2018	2017	2016	2015	2014	2013
Beijing	77:23	73:27	69:31	67:33	65:35	52:48
Shanghai	61:39	61:39	60:40	58:42	56:44	54:46
Jiangsu	64:36	58:42	59:41	58:42	57:43	56:44
Zhejiang	59:41	57:43	58:42	58:42	58:42	58:42
Guangdong	67:33	65:35	65:35	63:37	62:38	61:39
Liaoning	70:30	67:33	65:35	65:35	66:34	65:35
Henan	65:35	63:37	65:35	64:36	62:38	61:39
Shaanxi	74:26	71:39	73:27	71:29	67:33	65:35

Table 4. 2009-2019 Nanjing General High School and Secondary Vocational School Planned Enrollment Number (Unit: Person).

Year	Middle School Graduates	Total Enrollment	General High School	Secondary Vocational School	General-Vocational Student Ratio
2019	51,286	53,802	31,000	22,802	57.62:42.48
2018	47,000	47,717	25,511	22,206	53.46:46.54
2017	47,800	47,971	25,465	22,506	53.08:46.92
2016	46,541	47,565	25,060	22,505	52.69:47.31
2015	47,857	48,463	25,045	23,418	51.68:48.32
2014	45,939	45,973	21,605	24,368	46.99:53.01
2013	48,000	48,197	22,190	25,989	46.08:53.92
2012	49,900	50,015	22,670	27,345	45.33:54.67
2011	52,500	52,500	23,600	28,900	44.95:55.05
2010	55,400	54,900	24,500	30,400	44.63:55.37
2009	59,000	58,500	25,600	32,900	43.76:56.24

Source: Nanjing Municipal Education Bureau. 2009-2019 Nanjing High School Examination Guide [EB/OL]. http://edu.nanjing.gov.cn/zwgk/tjsjjjd/, 2020-01-08.

been achieved. The "GVR" in Guangdong and Henan provinces remained within a reasonable range but showed an expansion trend. On the other hand, the "GVR" of the three provinces and cities of Beijing, Liaoning, and Shaanxi are seriously out of balance, with an enormous gap and a trend of expansion, with a significant increase.

Take Nanjing City, Jiangsu Province, as an example; before 2014, the total enrollment of secondary vocational schools was higher than that of general high schools, but it was downward. For the first time in 2015, the planned enrollment of general high schools surpassed the planned enrollment of secondary vocational schools, and it was on the rise. After 2016, the number of general high school enrollment has gradually increased, and the number of secondary vocational school enrollment has declined, and it was more evident in 2019. In 2015, the total number of Nanjing middle school gradu-

ates was 47,857, and the total number of high school enrollment was 48,463, including 25,045 from regular high schools and 23,418 from secondary vocational schools. The "GVR" was 1.07 (51.68: 48.32). In general, from 2009 to 2019, Nanjing maintained the "GVRE" enrollment status (**Table 4**).

Cause Analysis

"The country's main hope lies in the correct education of young people" (Daniel, 2010). Therefore, China has always emphasized the appropriate ratio of general high schools to secondary vocational schools. Thus, from a nationwide perspective, GVRE is maintained. However, the development of secondary vocational education in some regions is lagging. Implementing the "GVRE" policy has been loosened, causing the "GVR" in the various areas to increase yearly. Still, the actual value and increment of "GVR" were quite different. The reason was that some local governments have one-sidedly interpreted the "universalize of high school education" as the need to develop general high school education vigorously. Therefore, the support for secondary vocational education in terms of funding, resource allocation, and school-running conditions was relatively low, resulting in the uncoordinated development of general high school education and secondary vocational education.

The status and trends of economic and social development in different regions have different levels of talent requirements, and naturally, the implementation of "GVR" is also different. In economically developed areas, the performance of the "GVRE" policy is relatively good. Because these areas have many private enterprises and small and medium-sized enterprises, a large number of technical and skilled talents are needed to provide more jobs for graduates of secondary vocational schools. At the same time, the number and quality of higher vocational schools in these areas are large, providing more opportunities for vocational school graduates to enter higher education. Therefore, many parents of students are willing to accept "general-vocational diversion" and choose to attend secondary vocational schools.

Economically underdeveloped areas need more technical and skilled talents and larger-scale vocational education. However, the "GVR" in these areas is often very high, and more middle school graduates choose to attend general high schools. They entered universities after graduating from high school. They then went to work in economically developed areas after graduation because their local sites could not provide them with more and better job opportunities. For financially underdeveloped areas, to create local education, a large number of education funds are paid from their limited local finances. Suppose the trained talents cannot return to the local area and serve the local economy. In that case, this will waste local educational resources and cause the loss of talents, which is even more detrimental to the local economic and social development and forms the "Matthew Effect" of economic backwardness.

The level of economic and social development is directly proportional to the level of educational development. Education development is a crucial way to enhance the local "hematopoiesis" function, and it can train a large number of suitable talents for

local economic development. However, education cannot significantly advance economic and social development; otherwise, it will negatively affect education. It will cause a brain drain and waste limited local educational resources. The eastern region has a developed economy and can provide suitable jobs for laborers of different levels. As far as the northeast and central and western regions are concerned, the talents they train will flow to the economically developed eastern regions if the local areas cannot provide enough jobs. Therefore, the local government must reasonably determine the "GVR" based on the local economic and social development level to ensure an adequate supply of technical and skilled personnel.

Recommendations for the Implementation of the "GVRE" Policy

In recent years, China's secondary vocational education has shown a good development trend and is in the most critical development period. With the rapid development of science and technology, the benefits of a large number of working-age young people from vocational education may be offset by their lack of adaptability, thereby reducing the possibility of their future employment (Eric et al, 2017). This has directly led to the loss of a large number of students in secondary vocational schools, the scale of secondary vocational education is shrinking day by day, and the implementation of the "GVRE" policy for high school education has also encountered significant challenges. Therefore, ensuring the adequate performance of the "GVRE" policy has become a "historical question" that we must face. Improving the quality of secondary vocational education and enhancing the attractiveness of secondary vocational education has become the "question of the times" that we must answer. How to cultivate the comprehensive quality and employability of secondary vocational students and enhance their employment competitiveness has become the "question of the soul" that we must answer. Breaking enterprises' academic qualification-only selection and employment criteria have become a "practical question" that we must improve. Enhancing the public's satisfaction and recognition of secondary vocational education has become a "question of the people's heart" that we must think about.

Government Departments Establish a Scientific Concept of Vocational Education and Reasonably Determine GVR

The establishment of satisfactory vocational education is the responsibility and mission of governments at all levels, and it is also an inevitable choice for them to promote economic development. The central government should improve the top-level design of vocational education, establish a "general-vocational integration" overpass, facilitate the connection between vocational education and general education, and open up a channel for vocational education to rise. At the same time, establish a guarantee mecha-

nism for implementing the "GVRE" policy to promote the modernization of China's vocational education governance system and capabilities. The local government strengthened the publicity of the "GVRE" policy, deeply interpreted the purpose, significance, and connotation of the implementation of the policy eliminated the worries and doubts of the general public, and maximized consensus. According to the regional economic and social development's demand for technically skilled talents and the actual number of high school graduates in the region, and following the requirements of the "GVRE" policy, the "GVR" is reasonably determined. The "general-vocational diversion" must fully respect the education choice rights of the parents of students and cannot implement "one size fits all" rigid rules. It cannot become a mechanism for intergenerational transmission of poverty. The local education administrative department should coordinate the region's general high school and secondary vocational education and promote the structural balance. It is even more necessary to eliminate the "hard border" between the two and promote exchanges and cooperation.

Secondary Vocational Schools Establish a Scientific View of Quality and Strengthen their Connotation Construction

For secondary vocational schools, instead of struggling with "GVR," it is better to work hard to provide high-quality vocational education. Persevere in establishing morality and fostering people, and return to the original aspiration of educating people. Showing the concept of quality education while highlighting ability training, is also necessary to strengthen students' ideological and psychological qualities. This is the fundamental difference between modern vocational education and other types of education. Set up majors suitable for students' development, get out of the misunderstanding of academic qualifications, and improve students' core literacy and critical abilities. Deepen general-vocational integration and promote sustainable development. The integration of "successful" education and "adult" education, employment education and sustainability, and the strength of skill and overall growth will provide more choices for student development. Cultivate school-running characteristics and create a vocational education brand. Follow the educational ideology of "learning must be expected to be used, and using must be suitable for the place." In terms of professional settings, faculty, course content, teaching methods, etc., it is closely integrated with the production practice of the enterprise industry, and a batch of particular advantages that meet the needs of the local economy and society is run. Strengthen the construction of connotation and improve the level of running a school. Adhere to the educational concepts of "integration of production and education, school-enterprise cooperation, the combination of work and learning, and integration of knowledge and action," further eliminate the "gap between learning and use," and provide vocational education that makes students feel "useful." Only when the secondary vocational school is well run can the students' lives be brilliant, the vocational education can be glorious, and can win the applause of the society. As the

American educator, Emest L. Boyer said: "The purpose of education is not only to prepare students for their careers but also to enable them to live a dignified and meaningful life" (Ernest, 1993)

Parents of Students Establish a Scientific View of Education and Rationally Choose Suitable Education

With the improvement of economic conditions, the ability of each family to pay for education continues to increase. Education expenditure has become the central aspect of family financial expenditure, and the demand for high-quality education from parents of students is also growing. Efforts to make every student receive a fair and quality high school education do not mean that every student can be promoted to a regular high school to meet everyone's demand for quality education. Therefore, it is necessary to break the traditional understanding of the parents of students from the conceptual point of view, which is also a prerequisite for eliminating the resistance to enrollment in secondary vocational schools. Parents of students should change the stereotype that "vocational schools are bad schools" and "no one wants to read vocational education." It is necessary to treat vocational education rationally, reduce utilitarian and blind school choice behaviors, and help children choose a more suitable education path for their development. Guide parents to fully understand the meaning and value of education, labor, and professional activities. No matter what type of education you receive, as long as you can provide high-quality education for students' healthy growth and comprehensive development, you can grow into talents, make due contributions to the cause of social construction, and realize the value of life. In Germany, elementary school students are divided based on teacher identification, parental opinions, personal interests, and academic performance. They can choose vocational preschool, practical middle school, liberal arts, and comprehensive middle school, and the first two types of middle school graduates mainly choose to receive vocational education. About half of the parents will rationally let their children choose pre-vocational schools or practical middle schools, ready to acquire vocational education in the future and develop technical skills (Zhang, 2018).

Enterprise Employers Establish a Scientific Outlook on Talents and Focus on Assessing Skill Levels

In recent years, China has repeatedly experienced a shortage of senior skilled workers. Its root lies in the severe backwardness of secondary vocational education. From the perspective of the development of the world economy, the talents cultivated by secondary vocational education are the essential laborers needed for economic and social development and account for the most significant proportion in the whole talent chain under the background of the entire industry chain (Jiang et al., 2018). However, judging from the current employment orientation of enterprises, the pursuit of high academic

qualifications is the norm, and various "glass doors" for the employment of vocational college graduates are widespread. Therefore, enterprises should actively participate in talent training in secondary vocational schools from professional construction, personnel training plan formulation, curriculum design, teaching implementation, and internship guidance. In-depth development of school-enterprise cooperation education targeted training of qualified talents for enterprises and improves the practicality and effectiveness of talent training. Change the traditional concept of evaluating talents based on their academic qualifications, break the selection and employment criteria of only academic qualifications and diplomas, focus on the knowledge and skills of job applicants, and open the door for vocational school graduates to enter the "main labor market." As a result, improve skilled workers' salaries and social status, open up room for growth, and actively attract middle school graduates to choose secondary vocational education.

The Public Should Establish a Scientific Career View and Create a Good Atmosphere of Public Opinion

Since ancient times, China has had the traditional concepts of "Valuing Theoretic Knowledge More Than Craftsmanship" and "Emphasis on Learning and Less Skill." For example, in *The Analects of Confucius: Wei Zheng*, Confucius believed that "a gentleman is not a tool." There is also a saying in *Tao Te Ching* that "there are many skills and strange things arise."

Although this traditional concept inspired the ambition of "A good scholar who studies with relative ease can become an official," it also caused the embarrassment of "Fan Chi learns to do farming life in the country and be engaged in agriculture." This has an important impact on the current public's assessment of the quality of a specific profession. Moreover, it is affected by unfavorable factors such as "low level of education," "low overall quality," "poor social image," "low social status," and "limited development of graduates." As a result, the public has formed a pessimistic view that "secondary vocational education belongs to second class education," and attending a secondary vocational school has become a helpless choice for many families. Therefore, to promote the effective implementation of the "GVRE" policy, the public must be guided to break the traditional concept of "centering on general education." Recognize the acceptance of vocational education ideologically, and place vocational education in the same important position as general education. Promote the public to change outdated professional concepts, establish a sense of honor for labor, and treat and understand the skilled operators on the frontline more rationally. Abandon the practice of classifying occupations and found the concept of all occupations regardless of high or low, no matter what position they are in, and they can contribute to society.

Concluding Remarks

"Today's education problem is deeper, more acute, and more difficult because it has to face all the problems of the modern world."(Zhao & Wang, 2006) Under the require-

ments of the "GVRE" policy, it has promoted and formed the current development of vocational education in China. The basic structure of vocational education has been initially established as a framework for a modern vocational education system based on secondary vocational education. However, due to the severe shortage of skilled personnel cultivated by secondary vocational education, the quality of China's labor force is far from reaching the level of developed countries. At the 2014 National Vocational Education Work Conference, Jinping Xi emphasized that: Accelerating the development of modern vocational education should be placed in a more prominent position; better support and help the development of vocational education; provide solid talent guarantee for the realization of the "Two Centenary" goals and the Chinese Dream (Xi & Jan, 2020). This provides a direction indicator and an essential basis for further implementing the "GVRE" policy.

Secondary vocational education is an integral part of China's high school education. It is responsible for the vital mission of cultivating a large number of high-quality workers and is the fundamental force for China's economic and social development. Secondary vocational education and general high school education are like "human hands," "bird's wings," and "bicycle's wheels" and they are both critical parts of high school education. Therefore, it is of great significance to accomplish China's "universalize high school education" goal and task, and both are indispensable.

In 2020, China achieved its goal of universalizing high school education. This is not just to popularize general high school education; the purpose of popularization is bound to be inseparable from secondary vocational education. Therefore, we must comprehensively coordinate the balanced development of general high schools and secondary vocational schools. Solve the predicament of the development of secondary vocational education and make it enter the track of peaceful development. Ensure that the "GVRE" policy is effectively implemented and accurately realized. Meanwhile, we will strive to build a proper and high-quality high school education to meet everyone's needs for quality education and enhance everyone's sense of educational attainment and happiness.

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Received: 07 July 2021
Revised: 16 July 2021
Accepted: 27 September 2021

ORIGINAL ARTICLE

Emotional Contagion and Pro-social Behavior of Student Teachers: The Mediating Effect of Moral Judgment

Qing Zhang, Yiya Zhang

Jiangsu Second Normal University, Nanjing 210013, Jiangsu, China

Abstract: ***Objective***: *To study the relationship between emotional contagion, professional behavior, and moral judgment of student teachers and the mediating role of moral judgment among them.* ***Methods***: *The "Emotional Contagion Questionnaire", "Pro-social Tendencies Measure for Adolescent (PTM)" and "Moral Judgment Test (MJT)" was used to survey 448 student teachers.* ***Results***: *The emotional contagion and pro-social behavior of student teachers have no significant differences between gender and urban and rural areas, but significant differences in professional nature. No significant differences were observed in moral judgment between urban and rural areas and major character, but significant in gender. A significant positive correlation was detected between emotional contagion and pro-social behavior.* ***Conclusion***: *Moral judgment plays a partially mediating role in the relationship between emotional contagion and pro-social behavior.*

Science Insights Education Frontiers 2021; 10(1):1341-1352.
Doi: 10.15354/sief.21.or059

How to Cite: Zhang, Q. & Zhang, Y. (2021). Emotional contagion and pro-social behavior of student teachers: The mediating effect of moral judgment. Science Insights Education Frontiers, 10(1):1341-1352.

Keywords: *Emotional Contagion, Pro-social Behavior, Student Teachers, Moral Judgment, Mediation Effect*

Introduction

TEACHERS' emotions are one of the three sources of teaching emotions (Lu, 2006). Emotional contagion is either the student (information receiver) unconsciously and automatically imitating the teacher's (information inducer) emotional state, or the student's conscious perception and regulation of emotions, through observation and capture of teachers' emotional changes, and the process of subconsciously imitating and consciously adjusting emotions together (Zhang & Zhu,2020). Research has found that compared with novice teachers, authoritative teachers are more substantial in positive emotional contagion and weak in negative emotional contagion (Zhang et al., 2017). In social activities, negative emotions are often the driving force for adverse group incidents, inducing the occurrence and escalation of destructive incidents. Negative emotions (such as anger) are more likely to be infected in groups than positive emotions (Katz et al., 1999). However, emotional contagion will be expressed as positive emotions when the group is in a cooperative state. As a result, the group will produce a harmonious interpersonal atmosphere, and work efficiency will increase (Barsade, 2002).

Pro-social behavior is the core behavior of human beings, which often benefits others at the expense of oneself, such as helping, sharing, comforting, and voluntary activities (Penner et al., 2005). Positive emotions will induce pro-social behavior, and pro-social behavior will then maintain or restore positive emotions to form a positive feedback loop (Carlson et al., 1988). Pro-social behavior is conducive to increasing people's life happiness index. It can also shorten the distance between the individual and the social environment; making the relationship more intimate (Yang et al., 2017). Pro-social behavior is greatly affected by gender factors. Women show more pro-social behavior in non-emergency situations, whereas men show more pro-social behavior in emergencies. Men are responsible, but women pay more attention to self-evaluation and judgment by others (Ma & Kou, 2007).

About the Author: *Yiya Zhang, Department of Education and Science, Jiangsu Second Normal University, Nanjing 210013, Jiangsu, China. E-mail: yiya0628@126.com*

Correspondence to: *Qing Zhang, Department of Education and Science, Jiangsu Second Normal University, Nanjing 210013, Jiangsu, China. E-mail: zhangq12_0102@126.com*

Funding: *Jiangsu Province education science "13th Five-Year plan" "Teacher development special project" (Jc/2016/03); Foundation of Doctor Plan of Jiangsu Second Normal University (JSNU2015BZ12).*

Conflict of Interests*: None.*

Moral judgment can predict moral behavior. Moral judgment is an inference made on the behavior of others based on the moral insights and moral knowledge that the individual currently possesses. In uncomfortable environments, such as working on a messy desk, people tend to be stricter and less tolerant of behaviors that deviate from ethics (Haidt, 2007). Emotion is an essential factor in moral judgment. The emotional state affects the moral judgment of college students. Studies have shown that moral judgment scores, when dominated by negative emotions, are higher than those for neutral or positive emotions (Wang et al., 2007). If the subjects have a more positive first impression of the protagonist of the moral event, then they will be less critical of the protagonist's behavior (Kliemann et al., 2008). There is a significant correlation between children's pro-social behavior and moral judgment level. If a person has a mature moral judgment, he is more likely to make helpful actions (Harris, 1976).

As the successor and builder of future education and teaching work, pre-service teachers' emotional quality affects moral behavior and affects students' mental health education. Because of the exceptional professional attributes of student teachers, emotional expression and transmission will affect the development of emotional quality from generation to generation in the future. The emotional quality and moral level of student teachers are related to the level of pro-social behavior from the perspective of communication and psychology. Moral judgment is not only affected by emotions but also affects pro-society. Therefore, studying the relationship between emotional contagion and professional behavior and whether a moral judgment has a mediating effect on both factors can reference student teachers to regulate their emotions and pro-social behavior and carry out education and teaching work better.

Methods

Research Objects

Student teachers from the freshman to the fourth grade were selected. A total of 496 copies were distributed in questionnaires, and 48 missing values were excluded. Finally, 448 valid questionnaires were recovered, and the effective response rate of the questionnaires was 90.32%. There are 206 boys (45.98%) and 242 girls (54.02%); 285 (63.62%) in urban households, 163 (36.38%) in rural households; 220 (49.11%) in literature and history, and 228 (50.89%) in science.

Research Tools

- **Emotional Contagion Questionnaire**

Based on the "emotional contagion questionnaire" (Doherty 1997), it according to China's national conditions and tested its reliability and validity (Zhang et al., 2017). The questionnaire contains 25 items, divided into five dimensions: happiness, love, sadness,

anger, and fear. All items are scored positively, using Likert 5-level scoring, with good reliability and validity.

- **Pro-social Tendencies Measure for Adolescent (PTM)**

Carlo et al. compiled a youth pro-social tendency scale, which was later revised (Kou et al., 2007). There are 26 questions on the scale, all of which are forward scoring questions. The scale is divided into six dimensions: altruism, compliance, openness, anonymity, emotion, and urgency. Likert 5 scoring was used, and the higher the score, the higher the pro-social tendency of the individual. The Cronbach alpha coefficient is 0.85.

- **Moral Judgment Test (MJT)**

There are 26 questions in total, using Likert 9-level scoring. The test contains two preset scenarios: "factory storm" and "doctor's dilemma." Participants must first judge the rationality of what the story's protagonist did and then indicate their degree of acceptance based on the support or opposition given. The measure of moral judgment is the Competent score, which is the C score (1-100). According to the specific value of the C score, the individual's moral judgment can be divided into four levels: low (< 9 points), medium (10-29 points), high (30-49 points), high and above (> 50 points).

Data Analysis

The statistical tool SPSS20.0 was used to conduct descriptive statistics on the data, independent sample t-test, correlation test, regression, and other data analysis methods to explore the relationship between the variables. And use Amos to verify the mediating effect of moral judgment in the relationship between emotional contagion and pro-social behavior.

Results

Statistical Analysis of Emotional Contagion, Pro-social Behavior and Moral Judgment of Student Teachers

The average emotional contagion score was 94.98. The overall difference in each dimension was not significant, among which the average score of "love" was the highest, and the average score of "sad" was the lowest. The average score for pro-social behavior is 98.10. Among them, the "anonymous" dimension had the highest average score, with an average of 18.93; the "compliant" dimension was followed closely with an average of 18.74; but the "urgent" dimension had the lowest average score, with an average of 11.32 (**Table 1**).

Table 1. Descriptive Statistics of Emotional Contagion, Professional Behavior, Moral Judgment and Various Dimensions of Student Teachers.

Variable	Mean	SD	Minimum	Maximum
Happiness	18.88	4.78	5	25
Love	19.43	4.78	6	25
Fear	18.75	4.64	5	25
Anger	19.19	4.91	6	25
Sadness	18.72	4.71	6	25
Emotional Contagion	94.98	22.25	35	119
Emotional	14.98	3.74	6	25
Compliant	18.74	4.86	6	25
Altruistic	14.98	3.74	4	20
Anonymous	18.93	4.83	7	25
Public	14.98	3.74	4	20
Urgent	11.32	2.98	3	15
Pro-social Behavior	98.10	22.90	38	124
Moral Judgment (C Scoring)	18.19	12.00	1.06	78.91

Moral judgment: the average score of C score was 18.19, which was moderate (10-29 points) of moral judgment. Its median value was 15.97, the standard deviation was 12.00, the minimum value was 1.06 (lower level), and the maximum value was 78.91 (higher and above level). There were 120 cases (26.79%) at a low moral judgment level; 259 cases (57.8%) at a middle level; 57 cases at a higher level (12.72%); 12 cases at a higher level (2.68%).

Analysis of Differences in Emotional Contagion, Professional Behavior, and Moral Judgment of Student Teachers in Gender, Urban and Rural Areas, and Professional Nature

No significant difference was observed in the total score of emotional contagion of student teachers in gender ($t = 0.603$, $p > 0.05$), and also no difference in urban and rural dimensions ($t = 1.251$, $p > 0.05$). Still, a significant difference was detected in the major ($t = 2.244$, $p < 0.05$).

No significant difference was shown in the total score of pro-social behavior in gender ($t = 0.279$, $p > 0.05$), but significant in the urban and rural dimensions ($t = 1.521$, $p > 0.05$), and also a significant in professional sub-discipline ($t = 2.494$, $p < 0.05$).

A significant difference was observed in moral judgment between genders ($t = 2.979$, $p < 0.01$), and the moral judgment of girls was significantly higher than that of boys. There was no significant difference in the urban and rural dimensions ($t = 0.704$,

Table 2. The Differences of Emotional Contagion, Professional Behavior, Moral Judgment of Student Teachers in Gender, Urban and Rural Areas, and Professional Nature.

Variable	Classification	Mean	SD	T	p
Emotional Contagion	Male	95.67	21.47	0.603	0.547
	Female	94.39	22.92		
Pro-social Behavior	Male	98.43	22.26	0.279	0.781
	Female	97.83	23.48		
Moral Judgment (C)	Male	16.37	10.98	2.979	0.003**
	Female	20.01	17.3		
Emotional Contagion	Urban	95.97	21.54	1.251	0.211
	Rural	93.24	23.42		
Pro-social Behavior	Urban	99.35	22.22	1.521	0.129
	Rural	95.93	23.96		
Moral Judgment (C)	Urban	18.49	12.04	0.704	0.482
	Rural	17.66	11.95		
Emotional Contagion	Literature and History	97.37	21.13	2.244	0.025*
	Science and Engineering	92.67	23.10		
Pro-social Behavior	Literature and History	100.84	21.70	2.494	0.013*
	Science and Engineering	95.47	23.75		
Moral Judgment (C)	Literature and History	19.38	12.50	2.079	0.038*
	Science and Engineering	17.03	11.41		

**p < 0.05.*

Table 3. Correlation Analysis of Emotional Contagion, Pro-social Behavior, and Moral Judgment.

	Emotional Contagion	Pro-social Behavior	Moral Judgment
Emotional Contagion	1		
Pro-social Behavior	0.968**	1	
Moral Judgment (C Scoring)	-0.063	-0.051	1

***p < 0.01.*

$p > 0.05$), but a significant difference was shown in the major division ($t = 2.079$, $p < 0.05$) (**Table 2**).

Correlation Analysis of Emotional Contagion, Pro-social Behavior and Moral Judgment of Student Teachers

Table 4. Regression Analysis of Emotional Contagion, Moral Judgment, and Pro-social Behavior.

Dependent Variable	Independent Variable	R	R^2	F	B	SE	β	t
Pro-social behavior	Happy	0.917	0.841	2,352.576	15.128	1.765	.011	.549
	Love	0.967	0.934	1,572.906	5.003	1.215	.009	.034*
	Fear	0.969	0.939	1,370.585	3.675	1.187	.008	.513
	Angry	0.963	0.927	1,888.592	6.629	1.250	.007	.595
	Sorrowful	0.952	0.906	2,135.914	8.427	1.412	-.008	.603
	Moral Judgment	0.051	0.003	1.146	-.097	.090	-	.285

*Note: *p < 0.05.*

The three variables of emotional contagion, pro-social behavior, and moral judgment of student teachers were analyzed for correlation, and the correlation matrix of three variables was obtained.

There was an extremely significant positive correlation between emotional contagion and professional behavior of student teachers. But the correlation with moral judgment was not substantial (**Table 3**).

Regression Analysis of Emotional Contagion, Pro-social Behavior and Moral Judgment of Student Teachers

The dimensions of emotional contagion and moral judgment were the independent variables, and the dependent variable was pro-social behavior. Further stepwise regression analysis found a very high linear relationship between the dimension of "love" and pro-social behavior, which could explain the dependent variable to a great extent. At the same time, moral judgment had a low degree of explanation for pro-social behavior (**Table 4**).

Analysis of the Mediating Effect of Moral Judgment of Student Teachers on Emotional Contagion and Professional Behavior

In Amos, the Bootstrap method was selected as the significance test of the mediating effect of moral judgment, and random sampling was repeated 2,000 times in the original data.

The 95% confidence interval was calculated. The standardized mediation effect value and confidence interval is a mediation path, namely "emotional contagion—moral

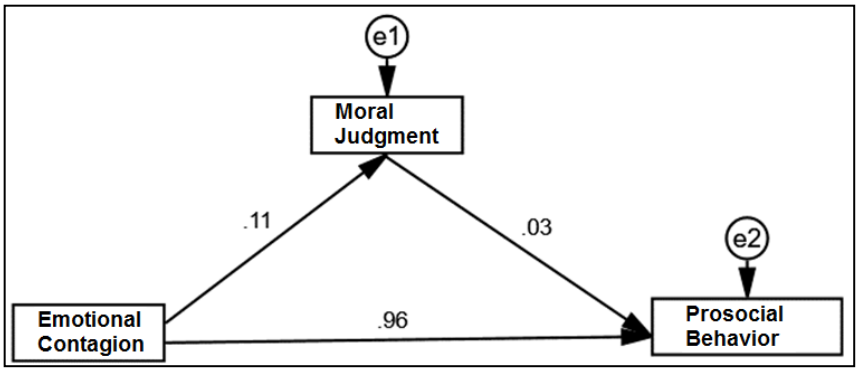

Figure 1. The Mediating Effect of Moral Judgment.

Table 5. The Test Result of the Mediating Effect.

				95% CI	
Hypothesized Pathway	**Effect Type**	**Standardization Factor**	**SD**	**Boot-CI Lower Limit**	**Boot-CI Upper Limit**
Emotional Contagion—Moral Judgment—Pro-social Behavior	Overall Effect	0.968	0.003	0.962	0.973
	Direct Effect	0.965	0.002	0.957	0.971
	Indirect Effect	0.004	0.003	0.001	0.008

judgment—pro-social behavior." (**Figure 1**).

The total effect of emotional contagion on pro-social behavior was 0.968. The confidence interval is [0.962, 0.973] excluding zero, which shows that the overall effect of emotional contagion on pro-social behavior was significant. At the same time, after adding the intermediary variable (moral judgment), the direct effect of emotional contagion on pro-social behavior was 0.965, and the confidence interval was [0.957, 0.971], excluding zero. Accordingly, emotional contagion has a significant positive impact on pro-social behavior. Further, the mediating effect value of moral judgment in the relationship between emotional contagion on professional behavior was 0.004, and the confidence interval is [0.001, 0.008] excluding zero; that is, moral judgment plays a part of the mediating role in the relationship between emotional contagion and professional behavior (**Table 5**).

Discussion

We investigated the current situation of three aspects of professional behavior, emotional contagion, and moral judgment of student teachers. The results showed that the emotional contagion of student teachers had no significant difference in gender, but the

average value of boys was higher than that of girls. There was no significant difference in the difference between urban and rural dimensions. A further investigation of emotional contagion's sub-dimension reveals a considerable difference between the "fear" in urban and rural areas, and urban students score higher than rural students. Significant differences were shown in the major sub-subjects.

Further investigation found significant differences in the major classification of happy, affectionate, angry, and sad, indicating that the scores of the students of the arts and history were significantly higher than those of the science and engineering students in these aspects. That is, liberal arts students are more capable of emotional contagion. No significant difference was observed in the total score of pro-social behavior in gender, but significant in the difference between urban and rural dimensions. Further, of all dimensions, they revealed that urban student teachers were significantly higher in the sub-dimensions of "emotional," "submissive," "altruistic," "anonymous" and "public than those from rural areas. There were also significant differences in professional subdisciplines. Among them, the scores of "emotional," "compliant," "altruistic," and "public" were significantly higher than those of science and engineering students, and there were significant differences in the "anonymous" scores. There was a very significant difference in moral judgment between genders, and the moral judgment of girls was significantly higher than that of boys. The difference in the urban and rural dimensions was not significant, but there was a significant difference in the professional subdiscipline. The data showed that students' moral judgment of literature and history was higher than science and engineering students.

A high correlation between emotional contagion and pro-social behavior in the correlation study, and emotional contagion could explain more than 90% of pro-social behavior. In contrast, the correlation between moral judgment and emotional contagion and pro-social behavior was low, and the explanation was small. In analyzing the mediating effect of moral judgment on emotional contagion and major-related behavior, moral judgment played a part in the mediating role in emotional contagion and professional behavior, and our hypothesis was verified. Emotional contagion and pro-social behavior variables have highly significant positive correlations in each dimension within and between variables. The five sub-dimensions of pro-social behavior and emotional contagion had extremely high linear relationships (all R values were higher than 0.9). Although related studies have not directly linked these two variables for research before, studies on the relationship between other branches of emotion and pro-social behavior had also got similar results.

For example, the path through which empathy affects pro-social behavior is that individuals have empathy due to the particular situation of others. Empathy involves empathy-like emotions related to compassion. These emotions were highly associated with pro-social feelings, and emotions trigger pro-social behavior (Zeng, 2011). There was a strong positive correlation between empathy and pro-social behavior, and data showed that the individual's empathy ability could predict pro-social behavior (Zhao et al., 2020). These results could mutually support the close relationship between emotional contagion and pro-social behavior. Our study also revealed a significant cor-

relation between moral judgment and emotional contagion in the four sub-dimensions. Among them, a significant negative correlation was observed between moral judgment and the sub-dimension "angry." The five sub-dimensions of moral judgment and professional behavior also had a high correlation. In previous studies, similar results were received; that is, there was a significant correlation between children's pro-social behavior and moral judgment (Harris, 1976). Moral judgment predicted pro-social behavior and had a high degree of explanation (Eisenberg et al., 1983).

By analyzing the mediating role of moral judgment, we found that moral judgment plays a part in mediation between emotional contagion and pro-social behavior of students majoring in education. As an explicit behavior, pro-social behavior is bound to affect the individual's internal emotions, emotions, and perceptual judgments. Moral judgment belongs to moral cognition, which is attached to influence the moral behavior of individuals. Moreover, emotion is a factor that affects individual moral judgment. Therefore, assuming the path is established, after data analysis, the hypothesis is verified, i.e., moral judgment plays a part in the mediating role in the relationship between emotional contagion and pro-social behavior. However, the main limitation of our study is that the nature of the science subjects in the educational institutions in the sample was not obvious enough, which would inevitably weaken the difference in the results. In addition, in future research, it may be better to introduce the variable "moral emotion" that belongs to the category of emotion and feeling instead of the mediating variable of "moral judgment" for research.

According to the survey results, the following inspirations are provided for better teacher education. First of all, student teachers pay attention to the cultivation of emotional quality during school, especially the expression and experience ability of teachers' professional emotions. Allow students to receive adequate counseling and negative emotion regulation before taking up their posts, better understand the role of teachers' professional emotions, enhance the emotional appeal, and improve their pro-social behavior, which will be of great benefit to future education work. Second, since the emotional contagion scores of literature and history students are significantly higher than those of science and engineering students, science students' emotional expression ability training can be consciously strengthened. This makes it easier to perceive students' emotions in daily study and life, and can effectively pay attention to the emotional health of themselves and students. Educational institutions should provide more emotional support and guidance to relieve their pressure and appropriately express professional emotions. Third, apply the research conclusions that there is a significant positive correlation between emotional contagion and pro-social behavior, and moral judgment plays a part in the mediating role. Educational institutions pay more attention to cultivating students' moral awareness and behavior and provide students with opportunities for social practice and voluntary service to enhance pro-social behavior.

Conclusions

From the findings of the study, we draw the following conclusions:

(i) First, the emotional contagion of college student teachers differs significantly in the major nature. Second, pro-social behavior showed significant differences in both urban and rural areas and major-related character. Third, moral judgment differs significantly in gender.

(ii) Moral judgment has a low correlation with emotional contagion and pro-social behavior. However, there is a significant positive correlation between the total score of emotional contagion and each dimension and the total score of pro-social behavior and each dimension. Meanwhile, emotional contagion explains pro-social behavior as high as 90%.

(iii) Moral judgment partially mediates the relationship between emotional contagion and pro-social behavior.

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Received: 30 September 2021
Revised: 14 October 2021
Accepted: 26 October 2021

ORIGINAL ARTICLE

A Mixed Study on the Effectiveness of Verbal Praise in Primary School Class

Shiyuan Zhang,[1] Xinrong Du,[2] Jie Deng[3]

1. *Educational Science College, Shangrao Normal University, Shangrao, Jiangxi, China*
2. *Yuanping Special Education School of Shenzhen, Shenzhen, China*
3. *Shanghai Normal University, Shanghai, China*

***Abstract**: Verbal praise is frequently used as motivation by teachers in class and truly effective verbal praise plays an important role in maintaining classroom order and stimulating positive student behavior. In this study, students from three classes of X Primary School of Jiangxi Province were interviewed and 328 verbal praise expressions collected. The subsequent empirical study on the effectiveness of verbal praise in four dimensions, namely content, spatiality, subjectivity and time, found that verbal praise generates both shallow and deep effects. The shallow effects act as a foundation for deep effects but do not necessarily result in deep effects. Other conditions are required to actualize a deep effect.*

Science Insights Education Frontiers 2021; 10(1):1353-1363.
Doi: 10.15354/sief.21.or060

How to Cite: Zhang, S., Du, X., & Deng, J. (2021). A mixed study on the effectiveness of verbal praise in primary school class. Science Insights Education Frontiers, 10(1):1353-1363.

***Keywords**: Verbal Praise, Effectiveness, Mixed Research*

Reflection and Inquiry

INFORMAL, random and motivational, verbal praise is an incentive often used by primary school teachers to encourage students to improve their academic performance through self-discipline. Nevertheless, sustained observation of class teaching reveals that when the same verbal praise expression is repeatedly used in the same classes, or if the same expression happens in different classes, the praised behavior does not necessarily turn into an example followed by other students, nor does it improve class management. This observation triggers reflection and inquiry on the effectiveness of teachers' verbal praise. As a form of appreciation education, does verbal praise work as expected? What is its real effect?

In the past, research on the significance of praise to students has been a major focus in the study of praise. The field of praise hypothesizes that praise motivates students effectively because to the praised students it signifies giving, guidance and appreciation and it meets their emotional need to be noticed, valued and cared for (Zhu, 2008). Being motivated further stimulates students' interest in learning, enlivening the classroom atmosphere, helping teachers to organize topics, and most importantly, has a long-term incentive effect on students. Proper verbal praise can even help develop students' personalities (Wang, 2014). Expectations from others (Yao et al., 2021), intrinsic aspirations (Gao & Zhang, 2016), self-discipline and learning attitudes (Yang, 2020) resulting from teachers' praise all work together to positively affect students' academic achievement, learning motivation and personality development.

With deepening study on praise, scholars began to consider the effectiveness of praise. Research has suggested that inappropriate praise can have negative effects on students and that excessive praise leads to long-term alienation of praise, and shows undue intentions of surveillance and control on students (Huang, 2013). Moreover, undue praise backfires from the perspective of students' long-term growth, limiting the formation of students' independent personalities and an appropriate attitude toward setbacks, potentially even leading to hypocrisies. Furthermore, some scholars view praise as unnecessary stating that praise is more an evaluation than an affirmation that may

About Authors: *Xinrong Du, Yuanping Special Education School of Shenzhen, Shenzhen, China. E-mail: duxr623@nenu.edu.cn*

Jie Deng, Post-graduate, Shanghai Normal University, Shanghai, China. E-mail: dengjiexqy@163.com

Correspondence to: *Shiyuan Zhang, Vice President and Associate Professor, Educational Science College, Shangrao Normal University, Shangrao, Jiangxi, China. E-mail: tingxiu5120@163.com*

Funding: *A qualitative study on the teaching life process of primary and secondary school teachers, Jiangxi Social Science Planning Project, Project No.: 15JY11.*

Conflict of Interests*: None.*

increase children's psychological stress, make them afraid of failure, challenge-avoidant, and consequently weaken their autonomy (Kohn, 1993). As a result, inappropriate praise may damage intrinsic motivation (Weiner, 1992) and risks turning it into extrinsic motivation, thus hindering the functioning of long-term mechanisms of intrinsic motivation. Therefore, some scholars warn against the "trap" of praise and the "sequelae of praise," and suggest a rational application of praise (Li, 2011). However, to date, researchers have not defined appropriate praise in terms of its coverage and approach.

To some extent verbal praise is an acceptable means of managing class and motivating students. However, does being right mean it leads to the expected outcome? At present, some disputes exist about the effects, effect path and the effect strength of praise on students. In this study, a mixed research pattern is adopted to examine the effectiveness of praise, including whether the effect of praise varies across settings, personal characteristics of the praised and attribution habits. Previous research suggests that praise shows strong dependent variable attribute, i.e., that the effect of praise depends on the situation and approach in use. To explore the mechanism of verbal praise, questionnaire survey was employed as the main approach, supplemented by group interviews.

Fundamental Framework and Research Structure

Fundamental Framework

The goal of education is the growth of individuals pursuant to the social ideal. Verbal praise as a means of education must be targeted at the growth of individuals rather than simply at short-term classroom order. In this sense, the effect of verbal praise covers two layers, a shallow and a deep effect. When the shallow layer is examined, verbal praise is characterized as temporary and unstable. At this level, verbal praise is aimed to motivate the praised student to carry on his good behavior and to set an example for other students to follow. At the deeper layer, praised behaviors are regarded as a part of students' everyday behavior, and the ultimate purpose of praise is to make students accustomed to using the praised behaviors and incorporating such behaviors into their daily life.

Exploration of the effectiveness of verbal praise should cover the following four aspects.

Content Acceptance

This refers to whether the teachers' praise is well-based and whether praise content is accepted and recognized by students after their subjective perception and interpretation.

Spatial Transfer

Spatial transfer refers to whether students' individual behaviors transfer to other environments, which indicates whether students recognize and understand the praised be-

haviors and consciously transmit them to another situation. Can the praised behaviors be presented again and transferred to other situations? For example, can active speaking at Chinese class be transferred to mathematics class or classes of other subjects after being praised?

Subject Transfer

Experiencing praise oneself and observing others being praised results in different degrees of internalization of the praise and different degrees of habituation for the praised behavior. The subjective dimension of the effectiveness of verbal praise refers to whether the praised behavior will be repeated and transferred interpersonally; that is, whether a praised individual will maintain the praised behavior and whether an individual will imitate and maintain praised behavior observed in others.

Time Continuity

Time continuity refers to the length of time that students maintain their praised behavior in different situations. The greater the effectiveness of the praise, the longer the praised behavior can persist, which in turn indicates students can consciously maintain praised behavior. Time continuity is about how long the praised behavior will last and what type of praised behavior motivates students to continue behavior to allow habituation.

Research Design

Research Tools

The Questionnaire on Effectiveness of Primary School Teachers' Praise and the Interview Outline of primary school teachers' praise were used to collect data.

Before preparation of the questionnaire, the card method was used to conduct group interviews with middle and senior students, and the teachers' verbal praise in class was collected (**Figure 1**). A total of 328 praise expressions were obtained. Verbal praise is defined as praise applied specifically to a certain behavior of a person or a specific group for the purpose of attaining a desired teaching outcome. Therefore, in the analysis, evaluative language that does not target a specific student, such as "good" and "great," is ignored. Also ignored is teachers' neutral evaluative language for specific students, such as "OK" and "um." Selected praise expressions were sorted and classified as the material for the preparation of the questionnaire. The questionnaire is compiled according to time, spatiality, subject and content dimensions, and includes 31 questions, of which 29 are multiple choices and two are open-ended.

The interview was semi-structured. Based on the four dimensions, students were guided to talk about teachers' praise by telling stories and giving examples to collect information on how the students evaluate the content of teachers' praise, under what circumstances the teachers' praise transferred to other settings, how long the praised behavior persisted, etc.

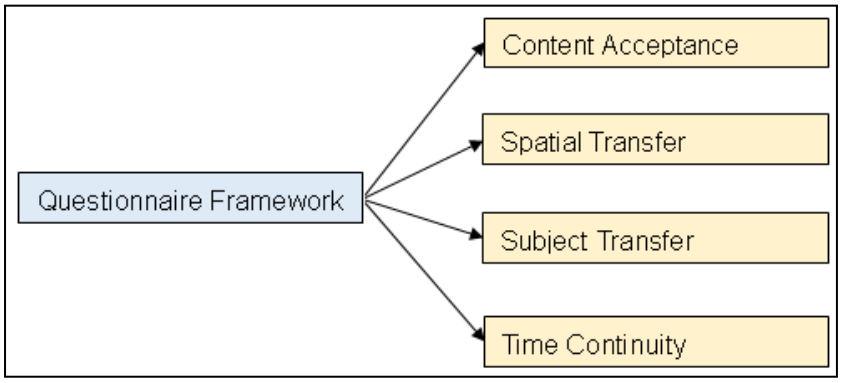

Figure 1. Framework of Questionnaire on Verbal Praise.

Sample Selection

The survey adopted purposeful sampling and selected X primary school in a county of Jiangxi Province. This primary school was selected as a case study school because it was praised as "a primary school with advanced reform ideas" by the local education authorities, and teachers at the school attached importance to verbal praise in class.
To obtain more accurate data, senior graders were selected as the specific sample. The school has three classes in each of grades 4, 5 and 6, with about 150 pupils in each grade. One class was selected from each grade for the survey and interview.

Survey Data Results and Analysis

Verbal praise was received by 93.3% of students, indicating scope was broad. Among surveyed students, 52% stated they are often praised and 65.3% of students indicated they expect teachers' praise.

Acceptance of Verbal Praise in Content Dimension

The list method was used to survey the contents of teachers' verbal praise, including body language and oral language. Normally, teachers would use praise in oral language, complemented with body language. For example, when praising students orally, they would give a thumbs-up sign. The most repeated oral praise expressions were "good", "very good", "you're great", "you did a good job today", etc. Common sentence patterns were "praise X, Y", "Those that did the best are X, Y …", "You are really + adjective," "You + verb + truly + adverb", "praise + come on!/keep it up /continue to

work hard", "praise + everyone should learn from him/her", "praise + clapping", "you have made great progress this time, keep up with it", you can … because…" and so on.

Student response to verbal praise varied. Some students thought: "I was very happy when I was praised at the beginning!" or "When we saw the teacher praise other students, we would make sure that we sit well." However, others said, "These praise words have been repeated for so many times. That's nothing." or "Everyone heard the same praise words. That's nothing special." or "When the teacher said these words, he was perfunctory and didn't add any feelings. The teacher just said it casually."

Further interviews were conducted to examine the reasons for the different responses. All students accepted praise initially, and even acted happily according to the requirements hinted at in the teacher's praise. However, with the passage of time and increased repetitions, some student's enthusiasm faded, and their perception of praise gradually decreased, indicating that these students began to reflect on the praise and could judge the meaning of praise through self-consciousness. It further indicates that to guarantee its effectiveness, praise should not occur with undue frequency. Too much stimulation of superficial praise reduces students' sensibility to it and may induce doubt to the extent that they no longer experience excitement after being praised or expect praise. Therefore, in the dimension of content, verbal praise does play an initial role in behavior reinforcement, for example, with stimulation and efficiency improvement of class management. However, with frequent use of praise, the shallow effect of verbal praise does not increase and the objective of cultivating self-motivation is not achieved.

Field Transfer in Spatial Dimension

Spatial transfer of verbal praise refers to whether the praised behavior is repeated in other settings without praise. This assesses whether the praised behavior has become a part of students' daily behavior and is maintained for a long time. The survey on the most common situations of praise suggests that spatial transfer of praised behavior is infrequent (see **Figure 2**).

Survey results of the praised behavior 'preparation before class' show that 45% of the students persist in preparation before class in a small number of classes, 33.33% persist only in the class of the teacher issuing the praise, 20% persist with the behavior in most teachers' classes, and no student persists in preparation before class behavior in all classes, indicating weak internalization and habituation of the praised behavior.

The survey question focusing on 'conscientious fulfillment of assignments' indicates that 30.66% of students persist in this praised behavior in most teachers' classes, while only 17.33% of students persisted with this behavior in all teachers' classes.

For the behavior 'being attentive at class, 46.6% of students persist in this praised behavior in most classes, suggesting that spatial transfer of 'being attentive at class' is stronger than that of 'conscientious fulfillment of assignments' and 'preparation before class.'

Data showed that effective verbal praise has a transfer effect on students' learning behavior, and that degree of transfer differs. However, teacher's verbal praise of

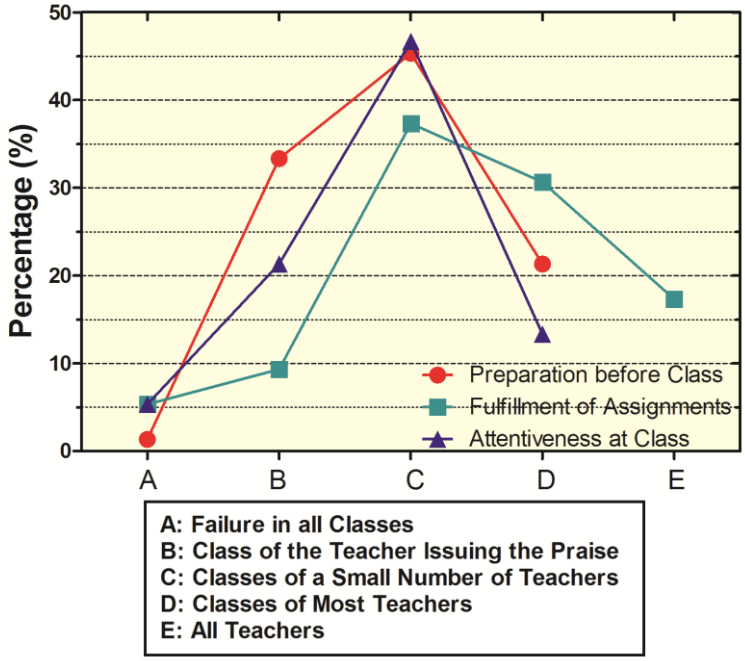

Figure 2. Spatial Mobility of Verbal Praise in Different Situations.

behavior does not create good results in field transfer. When the setting changes, it is difficult to fully extend the student's praised behavior to other environments. That is, when the characters, places or teaching situations in the teaching environment change, the students have difficulty persisting in the praised behavior or internalizing it into their own normalized behavior. Praised behavior migrates and is internalized only in a small number of cases. Spatial field transfer for the three praised behaviors did not surpass 50%.

Verbal Praise Perception and Transfer Effect in the Dimension of Subjects

Teachers' verbal praise is aimed at an appropriate or excellent behavior of students. Although students are the object of praise, they are the subject of praised behavior. When teachers praise a certain behavior, they are also praising the student generating this behavior. The students place themselves in the position of the subject of the praised behavior and feel proud or inspired. On the same occasion, some students are praised, and some are not. Teachers hope that students who are not praised will learn from the appropriate or excellent behavior of the praised students (**Table 1**). Praised and non-

Table 1. Students' Verbal Praise Experience.

Subject	Option	%
Moods after praise	Extremely Happy	62.7%
	Moderately Happy	26.7%
	No Mood Change	5.3%
	Skeptical of Truthfulness	5.3%
	Feeling Criticism/Sarcasm	0%

praised students' experiences differ during the stimulation of teachers' praise. Encouraging the non-praised students to learn from the praised students is one purpose of the teachers' praise. In the survey, we considered responses from both the praised subjects and the non-praised subjects to teachers' verbal praise, the same stimulus.

In non-praised students, 62.27% learned from the praised students and performed the praised behavior in a small number of classes. In the class where the praise was issued, 21.33% of the students learned from the praise and followed the praised behavior, while only 13.33% of the students hoped to follow the praised behavior in most classes.

In praised students, 17.3% were indifferent when teachers praised others, 22.67% wanted to learn from the praise but did not act, 26.7% wanted to learn but persisted for only a few days, and 28% could always learn from the praise.

In time persistence, most students often or occasionally want to learn from the praise but typically persist for only 1-3 days. If students do act, they do so in only a small number of classes and do not persevere.

The above data indicate that teachers' praise can prolong the praised behavior, but for students not praised, motivation to learn and internalize the good behavior is poor, and sustainability is weak.

Effectiveness in the Dimension of Time

Effectiveness in the dimension of time is reflected in time persistence of praised behavior. The survey results show that teachers' verbal praise does not affect students' behavioral habits for long. In response to the question, "how long did your most impressive praise last?" most students indicated that when praised by the teacher, they could consciously maintain the praised behavior for about 3-7 days.

For the most impressive cases of praise, 13.33% affect students for 2-3 days, 25.33% for 3-5 days, 26.7% for one week, and only about 25% affect them for more than one month. It is not unreasonable to infer that the persistence duration of moderately impressive praise is even shorter.

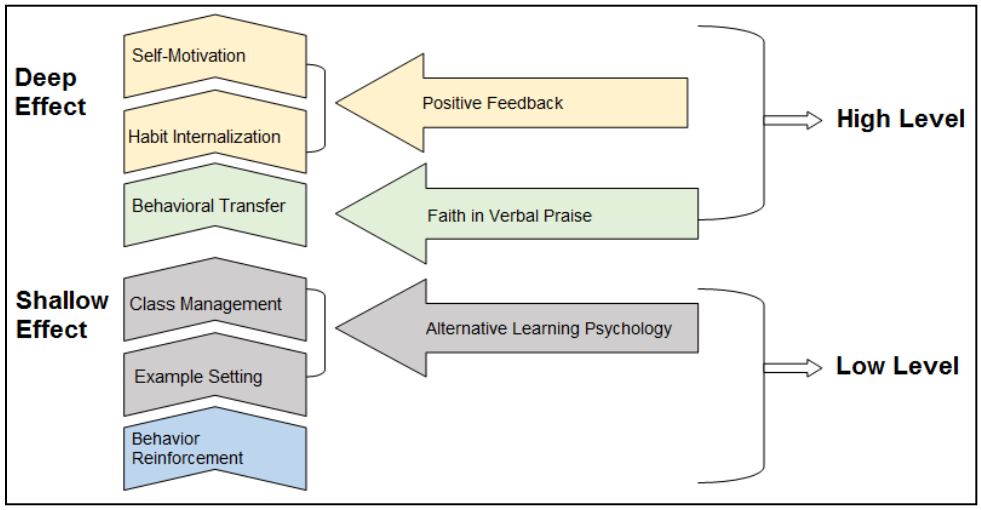

Figure 3. Effectiveness Model of Verbal Praise.

Representation Model of the Effectiveness of Verbal Praise in Primary School Classes

Verbal praise is more often and more widely used in primary school class than in schools past the primary stage (**Figure 3**). However, rigorous study of its effects indicates that many conditions are required for verbal praise to work appropriately. According to our results, the effectiveness of verbal praise in primary school class is reflected in shallow and deep effects. Shallow effects include the students' temporary response to praise, involving relatively simple or direct effects on emotion, attitude and motivation. Deep effects reflect a change of the student's internal attainment, emotions and attitudes after reflection and judgment. While verbal praise has a certain effect on behavior reinforcement, example setting and classroom management, it is not easy to obtain its deep effect on behavioral transfer, internal habituation and self-motivation.

The following inferences are drawn from survey results.

i. *As a means of evaluation in primary school class, verbal praise exhibits its effectiveness at two different levels: shallow level and deep level.*

Verbal praise manifests its shallow effect on behavior reinforcement, example stimulation and classroom management. Especially in the beginning, students respond well to praise for reinforcing their behaviors, which is reflected in the fact that praised students will repeat the praised model behavior and observing non-praised students will also replicate the model behavior. This alternative learning psychology mechanism works

positively in class management. Nevertheless, the ultimate objective of praise is to normalize the praised behavior, facilitate its field transfer, and finally for students to internalize good habits and build self-motivation. However, the survey data shows that only a small percentage of students achieved field transfer and that persistence time for the praised behavior was short, never surpassing a week. Given its shallow effect, verbal praise does not effectively change behavior at a deeper level.

ii. Shallow effects of verbal praise can provide a foundation for deep effects, but creation of a deep effect does not depend solely on satisfying shallow effect requirements.

Evidence from the survey showed that a shallow effect does not necessarily lead to a deep effect. From the perspective of praise content, students respond actively to teachers' praise initially, follow instructions for class discipline and persist in the praised behavior. Yet, over time and with repetition of the praise, the shallow effect is not deepened and instead students grow insensitive to the praise, assuming it is 'casual and superficial.' Eventually, students stop caring about the praise. This result is supported by class observation that verbal praise works well in lower grades for maintaining class discipline but that teachers of high grades cannot maintain class discipline simply using verbal praise, and rather can only achieve discipline by imposing criticisms. Survey data indicate that only 46.67% of students persisted in 'being attentive at class', while persistence in 'preparation before class' and 'conscientious fulfillment of assignments' was even weaker.

iii. The functioning of deep effects from verbal praise requires necessary psychological conditions.

Survey data imply that a deep effect is based not only on a shallow effect, but also on certain psychological conditions. Students' faith in verbal praise is the key to the generation of behavioral transfer, habituation and self-motivation. According to the theory of behaviorism, praise is a stimulus that can strengthen people's behavior. On one hand, as a way of strengthening, praise connects students' positive experience with the praised behavior. On the other hand, if students' praised behavior is not further strengthened later, it will gradually subside, with the speed of regression depends on the reinforcement pattern. Skinner (2019) identified two reinforcement patterns: continuous reinforcement and interval reinforcement. A continuous reinforcement pattern strengthens each behavior after the expected behavior appears. If not reinforced continuously in the later stage, the strengthened behavior subsides quickly. In interval, or partial, reinforcement, the expected behavior is strengthened randomly from time to time, and this creates strong resistance to regression. Moreover, the nature of feedback is also key. Praise plays the role of both messenger and inducer. The messenger sends information affirming the praised behavior and the inducer compels the praised person to make further efforts to obtain similar praise. Praise encompasses both affirmation and expectation of students. If the nature of feedback is positive, students are more likely to be motivated.

To conclude, verbal praise in primary school classes as a mode of behavioral reinforcement does affect students' behavior but these effects are typically shallow, emotional and temporary. When using verbal praise for behavioral reinforcement, teachers should highlight its potential role in students' long-term development. Further research on how praise promotes students' self-efficacy and self-motivation is highly recommended.

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Received: 29 September 2021
Revised: 30 September 2021
Accepted: 29 October 2021

ORIGINAL ARTICLE

XR-TECAN Teaching Model for Chinese Traditional Art Education

Min Gao

Taiyuan University of Science and Technology,
Taiyuan 030024, Shanxi, China

***Abstract**: Chinese traditional art education plays a unique role in transmitting traditional culture and in developing social civilization but is limited by the monotony of the teaching model structure, its inflexibility in learning time and space, constraints in the teaching scale, and lack of immersive experience. This article discusses the application of extended reality (XR) technology to the seven links of Chinese traditional art education, namely introduction, evaluation, analysis, practice, adjustment, appraisal and research, initiating a new human-machine interactive virtual reality teaching model, known as the XR-TECAN teaching model for Chinese traditional art education. This new teaching model covers basic technology, the equipment environment, content resources, application implementation and the digital cloud. Compared with the old apprenticeship model in traditional art education, the XR-TECAN teaching model is a breakthrough that allows learners to freely switch between virtual reality and the real world in a deeply immersive experience that improves education efficacy.*

Science Insights Education Frontiers 2021; 10(1):1365-1380.
Doi: 10.15354/sief.21.or057

How to Cite: Gao, M. (2021). XR-TECAN: A teaching model for Chinese traditional art education. Science Insights Education Frontiers, 10(1):1365-1380.

***Keywords**: Extended Reality (XR), China, Traditional Art Education, XR-TECAN Model, Teaching Model*

The Status Quo of Chinese Traditional Art Education

The Roles of Chinese Traditional Art Education

CHINESE traditional art, an essential part of Chinese traditional culture, is rich in Chinese ideology and art spirit. Chinese traditional art education keeps Chinese traditional culture alive and helps build values for social norms and education in three ways. First, Chinese traditional art education plays an important part in aesthetic education by cultivating a student's aesthetic taste and judgement through the perception, appreciation and expression of beauty. Second, Chinese traditional art education functions as a moral educator. Among Six Arts put forward by Confucius in Spring and Autumn Period, Music (also called dance accompanied by music) represents art, ranking just second to Ritual (representing etiquettes, laws, ethics). Rituals and Music are important instructive tools for civilizing an individual's nature, both extrinsic (ritual) and intrinsic (music). Rituals promote mutual respect, while Music encourages mutual love. Ritual helps people differentiate from one another while Music reminds them of their common identity (Xue, 2010). Ritual and Music, complement each other, working together to develop civilization in society. Third, Chinese traditional art education helps nurture multiple skills. Research highlights six groups of skills as compelling qualifications for 21st century talents: 1) critical thinking and problem-solving; 2) innovation, creativity and entrepreneurship; 3) self-directed learning; 4) communication; 5) collaboration and leadership; and 6) global citizenship and character (Ontario Ministry of Education, 2016; Sinay & Ryan, 2016; Rifandi & Rahmi, 2019). Activities in art education, such as artistic perception, appreciation and creation, can develop a learner's observation, imagination, exploration, assertion, understanding, expression, creation, and cooperation abilities.

Problems with Chinese Traditional Art Education

While maintaining the function of artistic education in the new age, Chinese traditional art education faces the problem of an outdated teaching mode that no longer suits current demand, in terms of teaching mode, human resources, curriculum design, teaching environment and teaching scale.

Correspondence to: *Min Gao, Taiyuan University of Science and Technology, Taiyuan 030024, Shanxi, China. E-mail: thebestminmin@126.com*

Conflict of Interests*: None.*

The Chinese traditional art teaching model was historically one of intergenerational transmission (Lu & Liu, 2019), master-apprentice transmission, old-type opera school training (Liang, 2009), or master's class-basically dominated by the thousands-year-old apprenticeship system. For the past hundred years, class teaching methods have been accepted in Chinese traditional art education, yet the traditional teaching methods characterized by apprenticeship and teaching by precept and example, remains, showing resilience despite experiencing difficulty in the transformation to class teaching (Gu, 2019). Methodologically, oral inspirational teaching is the most basic mode of an apprenticeship system, whereby teachers impart skills by enlightening while students learning by being enlightened. 'Being enlightened' is the key here and refers to knowing, understanding, and awakening. By 'being enlightened,' students fully comprehend the implication and spirit of Chinese traditional art. However, this methodology is experiencing increasing challenges in its attempts to offer deep understanding and full awakening, because teaching vehicles are undergoing tremendous change. In historical times, when the life pace was slow and information communication was sluggish, teachers and students lived together and language bore special advantages as an effective tool. Currently, in the context of convenient information sharing, rich on-site artistic experience, reduced face-to-face interaction between teachers and students, knowledge iteration and the widening generation gap, the traditional oral inspirational teaching method is less attractive. Without the desirable teaching effectiveness, it fails to meet high teaching standards regarding teacher performance and profound communication. In terms of teaching human resources, oral inspirational teaching requires teachers of an exceptional artistic level and the current scarcity in qualified teachers results in instability in teaching quality (Tian & Wang, 2021). Also, disparity in teaching levels leads to difficulties building a standard curriculum structure, which hinders popularization of traditional art education. Furthermore, traditional face-to-face teaching needs a relatively fixed time and space, preventing students from learning anytime and anywhere, rendering the traditional teaching process impossible at modern-day scales. Thus, face-to-face teaching sets limits to the scale of traditional art education.

In the past two years, the covid-19 pandemic has necessitated distance teaching and led oral inspirational teaching to be discarded. Superficially, this demonstrates the inadaptability of this traditional teaching mode to the current educational context. Yet, more essentially, it reflects the discordant relationship among performers in education (teachers and students), educational content and educational media (language, teaching materials, environment). A compelling need exists for a new teaching model, by which traditional art can be easily learned by anybody, at anytime and anywhere. The development of new teaching interactive media to build teaching situations where both teachers and students are deeply immersed in the process of artistic appreciation and experience is required to enhance the appeal of artistic beauty, while reducing the cost of 'being inspired' and 'being enlightened' and increasing teaching efficacy. Extended reality (XR) technology makes this possible.

Implications and Value of XR in Chinese Traditional Art Education

Connotation of Extended Reality

Extended reality (XR) is an umbrella term covering virtual reality (VR), augmented reality (AR), mixed reality (MR) and other newly developed immersive technologies (Fan, Hou, Zhang & Liao, 2021). XR experiences encompass the major technological phases of VR, AR and MR and integration of the three. **Table 1** compares the four technologies in terms of concept, feature, device, field of application and educational implications.

Implications and Value of the XR Teaching Model for Chinese Traditional Art

By connecting, mapping and augmenting the real and virtual worlds, XR technology creates human-machine interactive virtual reality teaching situations that enable users to be deeply immersed in an environment that seamlessly switches between the virtual and real worlds. Functional improvement and application expansion are enriching and developing the content of XR technology. By integrating new technologies such as artificial intelligence, mass data, holographic projection and 3D printing, XR can break the limitations on teaching time, space and scale, and realize self-adaptive teaching in which repeated evaluations can be made on teaching-learning interactions.

Built on XR technology, the new teaching model for Chinese traditional art will make existing teaching methods more effective, initiate innovations and exhibit several advantages as outlined below.

Immersive Situational Presentations

Available applications and innovative research in XR technology contribute to life-like presentations for teaching. In the multiple sensory virtual reality, students can move fluidly among different time and space settings appropriate to different art teaching content. The virtual classroom is created to be almost real, a real-life version of "The Magic School Bus." (Hopkins & Lillard, 2021) Improved iterations of leading technology provide technical support for such possibilities. For example, the light field display project Starline, unveiled by Google in May 2021 demonstrates the promise of such technologies: 'One of the proudest things is that once you sit down and start talking, the technology will disappear in the background, and you can focus on the most important thing: the person in front of you (actually a 1:1 high simulation virtual portrait that is difficult to be identified by the naked eyes).' (Liu, 2020, May 19) Eventually, XR holographic projection technology and naked eye 3D imaging technology will be possible, allowing the virtual image to be directly projected into real three-dimensional space as a

Table 1. Comparisons among VR, AR, MR, and AR.

Items	Concept	Feature	Terminal Device	Application Field	Educational Implication
VR	A computer simulation system that can create and experience virtual world. It integrates multi-source information, simulates entity behaviors and presents three-dimensional dynamic scenes	Virtual scene simulating reality	VR head display, VR wearable device, PC terminal	Game, film and television, tourism, education, telemedicine	1. Increase the understanding of spatial structure and function 2. Learn Language Association 3. Keep long term memory retention 4. Improve the effectiveness of physical operation 5. Improve learning motivation and participation
AR	A technology that calculates the image position and angle in real time and adds the corresponding image. It sets the virtual world in the real world on the screen and interacts with it.	Superposition of virtual scene and real world	AR head display, AR wearable device, external device, PC terminal	3D street view, education, security, industry, tourism, aviation, medicine	
MR	By introducing real scene information into the virtual environment, mixed reality technology sets up an interactive feedback information loop between the virtual world, the real world and users, so as to enhance users' sense of reality.	Enhanced version of AR, combination of VR and AR , richer than VR with a wider perspective than AR technology	Interactive wearable 6DOF inside-out integrated device, iphone handheld SR device, PC terminal	Game, design, sports, film and television, social networking, remote cooperation, scenario aware AI role generation	
XR	Extended reality encompasses virtual reality, augmented reality, mixed reality and other immersive technologies. It is an interactive technology between reality and virtual system, and between information and media.	Natural Interaction, Light-weight equipment, Sensory immersion, Negligible technical traces, direct immersion in personalized situational experience	Mobile phone, head display, PC terminal, all-in-one machine, XR screen	Commerce, medical care, military, industrial manufacturing, transportation, tourism, education	1. Rich and attractive learning experience 2. New data analysis and display extraction methods 3. Expanded knowledge acquisition channels 4. Personalized services 5. Reduced cognitive burden 6. Free learning

projected picture that is continuous and undistorted, making it difficult for the naked eye to distinguish the virtual from the real. This extremely realistic way of situational presentation will allow art education to return to its real-life context, enabling learners to perceive and understand the art more intuitively. This situationally immersive teaching mode and teaching narration can solve the problem faced by traditional art educa-

tion, namely, the monotony of teaching methods, and greatly enrich expressiveness in art teaching.

Comprehensive Artistic Education

● *Resource Integration*

The XR teaching model integrates abundant high-quality resources including practical teaching resources, public digital resources (such as XR art exhibitions, XR concerts, XR drama performances, XR museums, XR master classes, and XR public community art), public entity resources and scientific research resources. It extends teaching resources in multiple dimensions and globalizes resource coverage to tackle problems in art learning, experience and practice that result from a lack of art resources.

● *Perception and Understanding*

The new XR teaching model enables learners to perceive and understand teaching content comprehensively through coordinating multiple senses such as sight, hearing, touch, smell and taste. It utilizes artificial intelligence (AI) technology to identify learners, obtain data information in real time, and adjust the self-adaptive teaching module in a timely manner so that learner's perception and understanding of content will better meet their learning level and needs.

● *Cross-Disciplinary Comprehensive Teaching*

The new teaching model systematically integrates a variety of artistic resources into the teaching and provides interdisciplinary comprehensive training and development that will improve learning among students with diverse learning abilities and increase the comprehensive artistic literacy of all students.

In-Depth Interactive Experience

Under the XR teaching model, all artistic activities are closely related to social life, so that 'learning for learning's sake' is avoided and the ideas of 'learning for life' and 'learning is life' are advocated. XR teaching content shortens the distance between educational activities and real life and intensifies the effectiveness, profundity and breadth of the interactive experience.

● *Effective Interactive Experience*

As an educational medium, XR technology is fully integrated with teaching elements such as teaching content, teaching performers and teaching links for education and teaching interaction. The XR teaching model is a breakthrough compared to the traditional teaching model characterized by one-way information transmission, with strong communication by teachers and weak feedback by learners. The XR teaching model

encourages multiple in-depth interactions among people, objects and events. It activates educational elements that traditionally have low efficiency and insufficient interaction and solves the problems of poor communication and unilateral preaching by allowing extensive two-way communications. Moreover, XR combined with AI technology sets collective learning modules and personalized self-adaptive learning modules to meet the different needs of learners. Learners can choose different learning modules according to their learning ability and learning interest, to make the interactive processes more efficient and improve teaching outcomes.

- ***Profound Emotional Experience***

Under the XR teaching model, a learner's strong sense of substitution, artistic emotion and in-depth experience are stimulated. Gamified teaching can arouse learner's interest, make interactions more entertaining and increase learner participation. In the XR teaching field, the XR teaching content is vivid, the information flow is free and convenient, and the teaching interaction becomes simple and easy. Instead of being the authority of information, teachers act as students' companions in situational experiences, teaching narrative and knowledge construction. This equal relationship further encourages interaction, exchange of feelings and sharing of experience. Neuroscience studies indicates that good virtual reality experiences can effectively improve learner's participation, knowledge memory level and self-efficacy.

- ***Extensive Learning Experience***

XR technology can present artistic concepts and images that are unimageable and inaccessible in traditional art education, building an interactive experience of full-time knowledge association and learning construction, and providing learners with broad experience and innovative spaces for learning and creation.

Flexible Teaching Environment

The XR teaching model is characterized by flexibility in time and space, specifically by the free extension of teaching space and time that is possible through the repeatability of the teaching process.

The extension of teaching space in the new teaching model means that venues go far beyond traditional physical classrooms, extending across real physical spaces, public virtual spaces, global digital spaces and into inaccessible space. The XR teaching model, as a bridge from classroom learning to activities outside of school (museums, concert halls, exhibition halls, etc.), integrates internal and external learning modes, and creates close connections between cognition and practice. Teaching space in the form of 'butterfly change fields' will be created through technologies like AI and Internet of xroom (Yang, Zhan, Chen, & Wang, 2021). The vast and intelligent educational space enables learners to enjoy face-to-face interactions with teachers without leaving home. In addition, under the XR model, educational events can be organized without space

limitations, such as when watching first-class artistic performances, viewing teaching demonstrations by famous masters and appreciating national artistic customs with regional characteristics.

The extension of teaching time in the XR teaching model meets users' demands for the ability to learn anytime and anywhere. Students will not have to make appointments with teachers or worry about missing scheduled performances or exhibitions. If students can draw relevant teaching resources and public service resources from the digital cloud, they can instantly immerse themselves in vivid learning situations.

Finally, constancy of the teaching process refers to the fact that XR teaching model guarantees a complete record of the whole teaching process through big data technology. Apart from using notes and memory in reviewing and thinking on learned topics, learners can repeat the teaching process as many times as they want.

Expanded Teaching Scale

After a pre-learning evaluation and construction of the self-adaptive learning module, students can choose between collective teaching modules and personalized learning modules after putting on mixed reality equipment. The same teaching content can provide high-quality teaching services to numerous students without time and space constraints, overcoming the limitations of traditional art teaching in the one-to-one apprenticeship system and greatly expanding the scale of art teaching.

The XR teaching model also standardizes teaching procedures for Chinese traditional art education and reduces teachers' workloads for knowledge sharing and performance demonstration activities, allowing them to divert their energy into other teaching activities such as guiding students to feel, appreciate and create beauty; answering student questions and removing doubts; and motivating students. The simple operation and easy popularization of the XR teaching model alleviates the limitation of scale in traditional art teaching caused by inadequate educational resources.

XR-TECAN Teaching Model for Chinese Traditional Art Education

Given the potential value of XR technology in Chinese traditional art education, we propose a new model for Chinese traditional art teaching that borrows design concepts and constituent elements from three frameworks: 1) Intelligent Technology Ecological Structure Framework (Yang & Zhao, 2021), 2) 662-N61 Curriculum Construction Framework (Lyu，2021) and 3) PSSP Intelligent Learning Space Design Framework (Yang, Ding &Chen, 2021).

Following the Intelligent Technology Ecological Structure Framework, the new XR model takes the original concepts of 'basic equipment' and 'cloud digital resources,' dividing these into three layers: 'basic technology layer,' 'equipment environment layer' and 'digital cloud layer,' according to function. Next, the 'educational content' and "teaching process" of the original framework are integrated into a 'content resource

layer' and an 'application implementation layer.' Together, these constitute the five main layers of the new model. The content resource layer contains four elements, XR character Avatars, XR teaching aids and textbooks, XR scene construction and XR resource integration, which together encompass educational performers, teaching contents and educational media.

The application implementation layer is at the core of the new teaching model, applying XR technology to the teaching process and links of Chinese traditional art education. The six teaching links in the 662-n61 Curriculum Construction Framework for vocational education (introduction, analysis, imitation, adjustment, evaluation and research) are modified so that the teaching process of Chinese traditional art education is divided into seven links: introduction, evaluation, analysis, practice, adjustment, appraisal, and research, taking the characteristics of art education into consideration. A "collective teaching module" and "self-adaptive teaching module" are built, and learners choose the appropriate teaching module according to their own needs. The learning modules are updated through digital cloud data and intelligent analysis to make teaching compatible with learning in real time.

The overall framework of the new model is based on the PSSP Intelligent Learning Space Design Framework, and the final XR-TECAN teaching model for Chinese traditional art education is shown in **Figure 1**.

In the following sections, we elaborate further on the XR-TECAN teaching model for Chinese traditional art education, in terms of technology, equipment, content, application and number.

Technology

The XR-TECAN teaching model is a conglomerate of multiple technologies, using extended reality as its core technology and integrating holographic projection, 5G networks, multiple perception, 3D printing, AI and other technologies to achieve connections between virtual and real environments, deep immersion and positive interaction. Holographic projection technology and 5G provide a technical guarantee for the sensitivity and authenticity of interactive feedback during teaching. With 3D printing technology, the constructed virtual images and created XR art works are materialized, making the real generation of virtual world items a reality. AI makes mutual understanding between people and machines possible, and interaction among people, things, environments and numbers smoother.

Equipment

In terms of equipment and environmental support, the XR-TECAN teaching model includes four areas. 1) Recognition and tracking of human and field interactions, including image and speech recognition systems, behavior tracking and a tactile feedback system. 2) A sensing system that is the input and output of information transmission. 3) The terminal equipment, including the XR head display, the 3D naked eye screen, holo-

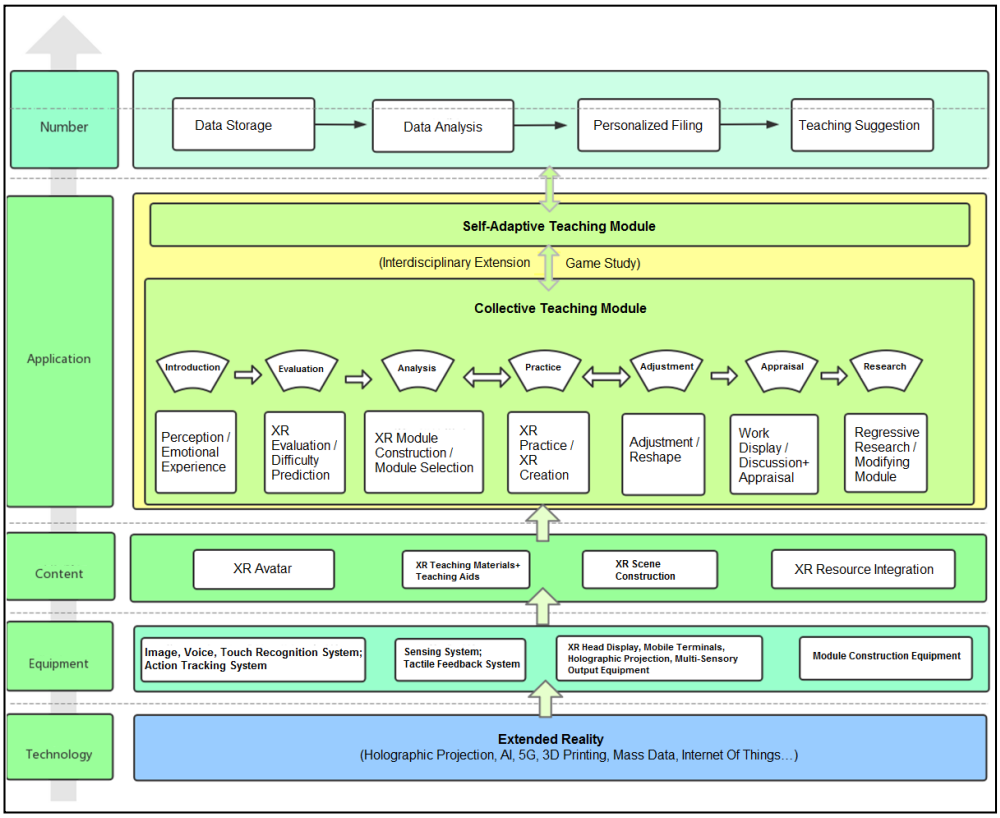

Figure 1. XR-TECAN Teaching Model for Chinese Traditional Art Education

graphic projector, and multi-dimensional output equipment for the effects of smell, taste, touch and sound. 4) Learning module construction equipment, including a 360 °video camera and editing equipment.

Content

At the content resource layer, the main elements of teaching with XR technology are shaped. First, teachers and learners, as major participants in teaching, can be packaged or reshaped according to the needs of art teaching situations; these are character avatars. For example, XR technology can dress up and beautify the images of teachers and students. Furthermore, processed images can be used to create artistic images for role-playing. Take Liang Shanbo and Zhu Yingtai as examples. In teaching the drama, teachers and students can not only dress up according to the situation but can also play the characters of Liang Shanbo and Zhu Yingtai, or even become the butterfly after the transformation. Second, XR teaching materials and teaching aids are tailored for the XR teaching model. The materials are no longer text-dominated paper media, but also in-

clude multi-sensory digital media. Mixed reality teaching materials and teaching aids make virtual images realistic, such as astronomical stars, rare metals, or historical celebrities. Augmented reality teaching materials and teaching aids not only present the teaching content, but also apply the teaching information, such as text, sound and animation, onto the real objects, effectively augmenting and supplementing information. When music is played, XR technology can automatically mark the virtual music score and suggest corrections according to the player's performance to help learners clarify key and difficult points in performance. By projecting different textures and colors onto the surface of real objects, XR technology can display the dynamic development process of relevant objects. For example, the weathering process of stone is demonstrated by projecting dynamic texture onto the stone surface; the image of swinging willow branches is projected onto a working fan, and learners feel the artistic concept of a breeze caressing the willow.

Third, XR scene construction technology can present artistic scenes across time and space according to the needs of art teaching, such as a space journey, underwater travel, trip to ancient times, and joint artistic performances by artists at home and abroad. In addition, XR scene construction technology can be cleverly combined with physical props to create the artistic atmosphere of teaching scenes and teaching narration. For example, when building the virtual scene of Chinese landscape painting, a dry ice machine and water mist machine are used to create the fairyland atmosphere of water mist on the river and clouds on the top of the mountain. Finally, XR resource integration includes digital resource integration and physical resource integration. By connecting with the XR field of public art, a joint mechanism for public art teaching is established. Virtual in-classroom learning and practice can be extended to off-line activities. For example, students first learn singing skills through XR technology, next build a virtual concert scene to simulate a stage practice, and then cooperate with offline live concert venues to participate in physical concert performances. In this way, the transition from theory to practice is made smooth.

Application

In the XR-TECAN model, traditional art teaching is segmented into seven links.

Introduction

In Chinese traditional art education, situational experience and artistic perception are the main cognitive sources. Through immersive art scene presentations, learners can intuitively perceive and experience the curriculum material, such as enjoying concerts, visiting art exhibits in museums, and understanding the background era of ancient buildings through ancient scenes.

Evaluation

With the help of an intelligent evaluation system, the XR-TECAN model will test the learners' artistic interactive experience, evaluate their knowledge level and professional skills, and predict possible learning difficulties in follow-up teachings.

Analysis

Big data are used to analyze students' learning behavior and interactive activities. Students' learning characteristics and learning styles are studied and judged, matching teaching modules are built and teaching activities are carried out that combine discipline characteristics, training objectives and progress.

Practice

After completing the preliminary art experience and learning, the XR-TECAN model will create practice and creative situations through XR scene construction and XR resource integration. The XR teaching materials and equipment will then be used to practice and create art. All behavior data will be uploaded to the cloud and a personalized database established.

Adjustment

After analyzing the practice, the XR-TECAN model will identify the deficiencies and gaps in learning, and learners will return to the teaching module again and conduct a new round of exercises and practice. 'Practice' is the essence of Chinese traditional art teaching. Through comparison, improvement, and adjustment, the three links of 'analysis-practice-adjustment' can be repeated for an unlimited number of times.

Appraisal

Taking the generation of guidance and suggestions as the purpose for evaluation, the XR-TECAN model appraises assignment presentation, finds the advantages and disadvantages of learning methods according to learners' strengths and weaknesses, and customizes exercises and practical guidance for them.

Research

Regression, research and analysis are conducted to the whole teaching process.

The whole learning process contains two modules, namely the collective teaching module and the personalized teaching module. Most often, the collective teaching module is adopted in teaching, with extensive interaction, exchange and cooperation between teachers and students. However, each learner can also use a personalized self-adaptive teaching module tailored to their own situation or choose to switch between collective learning and self-adaptive learning.

Game learning and interdisciplinary learning, as two prime characteristics of the new model, penetrate the whole teaching process, making the learning process more

interesting and attractive, and increasing the opportunity for knowledge application in real life.

Number

The digital cloud encompasses data storage, intelligent analysis, personalized data and teaching suggestions, providing stable data support and strategy matching to ensure effective operation of the whole teaching process.

The XR-TECAN teaching model is supported and promoted by five layers: technology, equipment, content, application, and number, moving from bottom to top. The name XR-TECAN teaching model is from the initials of the five words in its main structure: T, E, C, A, N with XR- as prefix, which stands for extended reality. This highlights how the five layers of the model are continuously refined and connected with the seven links of teaching, forming an in-depth collaboration with an internal mechanism.

Application of XR-TECAN Teaching Model for Chinese Traditional Art Education

At present, XR technology has been applied in K-12 education, academic setting in colleges and universities, tourism education, art education, vocational education, and entertainment. The XR-TECAN teaching model for Chinese traditional art education is expected to promote revisions in teaching performers, teaching content, teaching media, and interactive methods.

XR + Teaching Performers

Varying from traditional teaching methods, XR technology not only adds makeup and costuming for teachers and students through augmented reality technology, but also generates a new XR image that fits the needs of the situation through the virtualization and reconstruction of teachers as XR avatars that can simulate human actions and facial expressions. Users can customize the face, hair and clothing of their XR Avatar through the editor (Fan, Hou, Zhang & Liao, 2021).

XR + Teaching Content

Compared with traditional teaching, the XR teaching model focuses on teaching situations and narratives, covers a wider range of knowledge and in more dimensions, weakens the barrier caused by discipline boundaries, displays the knowledge connection between multiple disciplines, and presents knowledge that aligns with the realities of life. Through 360 °degree video shooting and editing of XR scenes, video learning modules and courses can be updated in a timely manner.

XR + Teaching Media

XR technology is employed not only to reform teaching materials and teaching aids, but also to design an educational environment and to build teaching scenes. XR teaching materials and teaching aids are characterized by a wide presentation field and strong presentation capacity. They present the teaching content through multi-sensory channels such as sight, hearing, smell, taste and touch, or project images skillfully onto physical materials of different properties according to the needs of the situation, to make the knowledge presentation concrete, vivid and interesting. Moreover, the XR education environment layout is a breakthrough to the limits of physical teaching spaces, creating a virtual extension across physical space, public virtual spaces (virtual museum, concert hall, exhibition hall, library, science and technology museum, playground, etc.), global digital space and inaccessible space (outer space, human viscera, deep sea, etc.), so that learners can be in these environments without leaving home. In addition, the construction of educational scenes not only allows free extension in space, but also unlimited time extensions. With the accumulating improvement of an XR resource library, XR scenes will enable free extensions across time and space, allowing simulations of the past and projections of the future.

XR + Interactive Methods

Interaction is core to any art education activity, connecting the teachers, teaching content and teaching media. Through cognitive experience, teachers and students perceive the high resolution simulated situations created by XR technology from the multi-sensory dimensions of sight, hearing, smell, touch and taste. Also, XR teaching materials can interpret the process of change that artistic works intend to express (for example, the stone weathering and wind blowing willow branches mentioned above in Section 3). In teacher-student interactions, the huge knowledge base provided by XR can compensate for any teacher insufficiency in interdisciplinary comprehensive knowledge, enabling interdisciplinary comprehensive development of the students. When XR works as media to impart knowledge, teachers can focus on observing and analyzing students' learning behaviors. Technologies like tactile feedback, facial emotion and gesture recognition are used to analyze learners' demands, evaluate teaching behavior, build self-adaptive learning files, and provide personalized teaching guidance. Cognition, practice, experiment and creation in the XR teaching field are performed autonomously and flexibly. Practical creation and physical works can be integrated into XR scenes and the created XR virtual works can be printed in different proportions. Therefore, two-way transmission between virtual and real environments can occur.

Conclusion

The XR-TECAN teaching model for Chinese traditional art education caters to the learning habits and cognitive traits of modern people, especially the current generation

of digital natives. It breaks through bottlenecks in art education, such as monotonous teaching methods, limitations in learning time and space, limited education scale, high requirements for teachers and a lack of immersion experience. With this new model, Chinese traditional art teaching can be upgraded from 'integration of environment and body' to 'unity of mind and body.' (Xu, et al, 2021) The XR-TECAN teaching model is expected to help evolve a new ecology where anyone can learn art, at anytime and anywhere, in an interesting and easy way. With the power of new technologies, we anticipate Chinese traditional art education will make greater differences in the digital age than ever before.

Acknowledgement: This work was supported by 2021 teaching reform and innovation project of colleges and universities in Shanxi Province. This article is part of the Research on the Role of Subject Consciousness of College Students in 'Ideological and Political Course" and Network Teaching.

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Received: 29 September 2021
Revised: 30 September 2021
Accepted: 29 October 2021

ORIGINAL ARTICLE

Educational Research in the Context of Rural Revitalization: Take Papers of CNKI Database from 2000 to 2021 As an Example

Wei An, Jie Wu

Education Bureau of Zhoucun District, Zibo City, Shandong, China

***Abstract**: For a long time, rural revitalization has been a topic of concern. After it was put forward in the form of a policy in 2017, it has further received research feedback in many fields, and the education field is no exception. This article is based on the quantitative analysis of the reports in the CNKI database, with rural revitalization as the theme of educational research from 2000 to 2021. We summarized its development trends and research priorities. We found that after 2017, there has been a surge in education research related to rural revitalization, focusing on three aspects: vocational education, teacher plight, and education construction. At present, the rural revitalization strategy is still in its infancy. Grasping the research focus in time and referring to international experience can provide a more comprehensive theoretical basis for the realization of rural revitalization, promote the flexible change of research focus, and facilitate the effective implementation of policies.*

Science Insights Education Frontiers 2021; 10(1):1381-1397.
Doi: 10.15354/sief.21.or052

How to Cite: An, W., & Wu, J. (2021). Educational research in the context of rural revitalization: Take papers of CNKI database from 2000 to 2021 as an example. Science Insights Education Frontiers, 10(1):1381-1397.

***Keywords**: Rural Revitalization, Rural Education, Vocational Education, Teacher Team Building, Policy Building*

CHINA's development contradictions have been changing. The people's growing demand for a better life and unbalanced and inadequate social development are the main contradictions at this stage in China. This is particularly prominent in China's urban and rural issues. To promote rural development, China has successively introduced related policies. In 2017, the rural revitalization strategy was put forward; in 2018, the "Guiding Opinions" were issued. The foothold of this strategy and guidance is the modernization of agriculture and rural areas, and the development goals of industrial upgrading, technological progress, and sound systems are put forward. The rural revitalization strategy proposed by China takes economic construction as the explicit goal, but it also has a cultural perspective. The development of rural economy and culture cannot be satisfied by existing development forces. Therefore, investment in policies, financial resources, and human resources is required. After all, external investment is only a temporary solution. Rural revitalization should focus on long-term development. Such a development plan requires the village to have its endogenous motivation and a sound talent training mechanism. In turn, it can independently cultivate talents suitable for local development and gradually promote the development of the rural economy and the improvement of culture. This coincides with the idea that other countries in the world attach importance to rural education.

It is not rare to focus on rural development at the national level worldwide, such as *Rural Renewal Planning in Germany*. In some countries, development policies are directly linked to education and training. For example, Australia has implemented *Vocational Education and Training* to improve rural vocational skills.

Completing a comprehensive well-off society and poverty alleviation in 2020 marks a significant advancement in China's rural education. On May 14, 2021, the Ministry of Education and other four departments issued the Opinions on the *Effective Linkage of the Consolidation and Expansion of Educational Poverty Alleviation and the Effective Connection of Rural Revitalization*. As a result, the development goals at this stage have been clarified; that is, while consolidating the previous achievements in education poverty alleviation, it will further promote the faster development of rural education.

About the Author: *Jie Wu, Education Bureau of Zhoucun District, Zibo City, Shandong, China. E-mail: jtj6413175@126.com*

Correspondence to: *Wei An, Education Bureau of Zhoucun District, Zibo City, Shandong, China. E-mail: zhcshyanw@163.com*

Conflict of Interests*: None.*

In this context, analyzing the defects of rural education at this stage, exploring the path of education to achieve revitalization, and timely retrospect the internal development of education under rural revival is the proper meaning of research education. In 2021, the "Opinions on the Implementation of the Rural Revitalization Strategy 2018-2022" issued by the Central and State Council is more than half of the process, and the historical task of poverty alleviation has just been completed. At such a critical time node, summarize the education field's thinking on rural revitalization and the measures that have been implemented since the policy was put forward in 2017, and make a timely grasp of the current research direction. It is conducive to a clearer understanding of the development route in the latter half of the "Guiding Opinions" construction plan. It can also make up for research shortcomings and improve the internal construction of education.

China divides the objectives of the rural revitalization strategy into three time periods, namely, "significant progress will be achieved in the rural revitalization strategy by 2020; decisive progress will be made by 2035, and rural revitalization throughout the year by 2050".

Based on the division of this period, it can be seen that the current stage is still in the early stage of the strategic layout of rural revitalization. During this period, education-related policies include *Guiding Opinions on Comprehensively Strengthening the Construction of Rural Small-scale Schools and Rural Boarding Schools* issued by the General Office of the State Council (hereinafter collectively referred to as *Two Types of Schools*). It pointed out that "the running of two types of schools is an important task for implementing the strategy of rejuvenating the country through science and education, accelerating the modernization of education, and a basic requirement for implementing the strategy of rural revitalization and promoting the equalization of basic public services in urban and rural areas." In addition, the Ministry of Education has also set up a major pedagogical bidding project, "Research on Rural Education Modernization in Rural Revitalization Strategies," in conjunction with the issue of educational modernization that has permanently been attached to it, intending to concentrate scientific research forces while promoting the parallel development of rural revitalization strategies and educational modernization.

Since the rural revitalization strategy was first proposed in 2017, the research on the two-way relationship between policies and disciplines has become a research hotspot. There are various research positions and perspectives, but there is no macroscopic experience of this research yet. It summarizes the outlook of education for rural revitalization, the achievements made in 2018-2021, and the main problems faced at this stage. This research uses the relevant documents collected in China National Knowledge Infrastructure (CNKI). It uses the quantitative analysis method software Citespace to organize and analyze the research on "village revitalization" in the past 30 years. Then, based on the analysis results, the literature in the field of education under the background of rural revitalization is sorted out to clarify the features of the current research stage and provide references for subsequent teaching practice, theoretical analysis, and policy implementation.

Data Sources and Research Methods

The research data in this article comes from CNKI. Set "rural revitalization" as a keyword in the literature search. The total number of journal articles published under this topic in the past 20 years was 27,300. Since the research object of this article is education research in the context of rural revitalization strategy, it is necessary to filter the preliminary inspection data further.

Data Sources

By searching CNKI's research that set the keyword as "rural revitalization," after placing the publication period from 2000 to 2021, more than 20,000 academic journal articles and 14 articles under the theme of "rural revitalization" can be retrieved as research results. The number of articles published in academic journals was small and stable from 2000 to 2016. However, it has gradually increased since 2017, reached its peak in 2019, and dropped slightly in 2020.

On this basis, the subject "Education" was superimposed to search, and the number of academic journal articles obtained was 2,702. The first article was published in 2012, and there has been a surge since 2018, and it will reach its peak in 2020.

However, it is worth noting that some of the keywords of rural education research carried out in the context of rural revitalization will appear in the form of "rural education." Still, the main text discusses the effect of "rural revitalization" on educational development. Therefore, if the theme is set as "rural education" and the full-text search of "rural revitalization" is superimposed, 1,606 journal studies can be obtained. Based on relevant data, we can get a trend chart of the research done in education in the past 20 years in the context of "rural revitalization".

The change in the number of publications of related articles is closely related to the trend of China's policy. In 2017, the "rural revitalization" strategy was first mentioned. In 2018, the *Guiding Opinions* were issued, and the preliminary plan for 2018-2022 was put forward. In 2019, the number of policy studies had increased sharply. In 2020, although it is still included in the development plan of the "rural revitalization" strategy, the overall focus is on poverty alleviation to achieve a comprehensive well-off society, and the research enthusiasm is slightly reduced. In 2021, the Central and State Council issued the *Opinions on Comprehensively Promoting Rural Revitalization and Accelerating Rural* Modernization, which made it clear that "rural revitalization" has become the focus of this year's policy. Combined with the National Strategic Plan for Rural Revitalization (2018-2022), research on the background of "rural revitalization" will be the focus and hot spot for a while.

Analysis of the Proportion of Educational Research and Keyword Analysis

In all the papers published in academic journals with the keyword "rural revitalization", classified by subject, the top 40 in the field of education are: "Higher Education" 565 (1.46%), "Vocational Education" 441 (1.14%), "Agricultural Basic Science" 423 (1.09%), "Adult Education and Special Education" 366 (0.94%), "Education Theory and Education Management" 262 (0.68%). The above articles totaled 5.31%. The results obtained can see the proportion of rural revitalization in the overall background.

Furthermore, the subject of "rural revitalization education" is used to search for specific research points in education.

The top 20 major categories are: agricultural economy, education theory, and education management, vocational education, adult education, and special education, political parties and mass organizations, higher education, culture, secondary education, computer software, and computer software applications, talent science and labor sciences, the party of China, elementary education, basic agricultural sciences, agricultural economics, ideological and political education, middle school politics and international politics, preschool education, library information and digital libraries, tourism, architectural science and engineering.

On this basis, further keyword searches are carried out to clarify the entry point of research. It is manifested in the overall subject background of pedagogy; the current Chinese scholars' research focus is on strengthening professional quality-related education, rural teachers-related issues, and the direction of rural cultural construction.

Analysis of Research Authors and Source Journals

• Authors of Educational Research in the Context of Rural Revitalization Strategy

By analyzing all the documents under the theme of "rural revitalization education" in the CNKI from 2000 to 2021 (January to June), the principal authors are Dequan Zhu of Southwest University, Wenwu Hao of Shaanxi Normal University, and Zhengde Xiao of Hangzhou Normal University. Among them, Dequan Zhu is devoted to the research of vocational education. He is involved in the relationship between vocational education and the rural revitalization strategy and the subject development of vocational education itself. Wenwu Hao is committed to researching the construction of village and township schools. He is bidding for the "Research on the Modernization of Rural Education in the Revitalization Strategy of Rural Areas", a major project of China's National Social Science Foundation of Education. Zhengde Xiao's research center explores the role of teachers in the context of rural revitalization and expands the boundaries of the part of teachers.

• The Source of Journals in the Context of Rural Revitalization Strategy

The literature comes from core journals and the Chinese Social Science Citation Index (CSSCI). In addition, researchers choose to publish more articles: *Education Research, Journal of Southwest University (Social Science Edition), Exploration and Contending, Modern Distance Education Research, and Guizhou Social Sciences.*

Education Research is a social science journal dedicated to education theory and education management. The researcher's educational research under the background of rural revitalization published above mainly focuses on the theoretical construction of a macro perspective, such as the symbiotic relationship between urban and rural education. Southwest University is located in the southwest of China, and adjacent to Sichuan, Qinghai, Yunnan, and Guizhou, there are a large number of rural areas that need to be improved. Therefore, the educational research under the background of rural revitalization in this university is geographically reasonable.

Therefore, articles published in the *Journal of Southwest University (Social Science Edition)* are mainly based on the local conditions of rural areas to carry out a variety of research methods. *Exploration and Contending* is a comprehensive education journal. Most of its publications and research discuss the pattern of education construction under rural revitalization from the perspective of high-level education. The journal of *Modern Distance Education* focuses on adult education and special education, so the publication of articles is biased towards continuing education and the leading role of teachers. The journal focus of *Guizhou Social Sciences* is similar to that of the *Journal of Southwest University (Social Science Edition)*, but it has specific concerns about ethnic minority regions.

Research on the Research Perspectives and Results of Various Education Fields from the Perspective of Rural Revitalization

• Vocational Education Research under the Background of Rural Revitalization

The achievements of rural vocational education are directly invested in rural construction and agricultural production and play the most direct role in the development of rural areas. Therefore, taking vocational and technical education and training as the core and forming a modern education system with rural characteristics (Du, 2018) can become the backbone of the strategic layout of rural revitalization.

· *An Analysis of the Obstacles to the Development of Rural Vocational Education*

From the perspective of the development trend of China's vocational education research, since the *Decision on Accelerating the Development of Modern Vocational Education and Modern Vocational Education System Construction Plan (2014-2020)* were promulgated in 2014, the quality of rural vocational education research Gradually improve.

Liu (2018) proposed that vocational education should promote its development while promoting the "hollow" governance process in rural areas and achieve mutual promotion and interaction. Based on the original research direction and research insufficiency of vocational education in China, combined with foreign research perspectives on the relationship between vocational education and rural development, it focuses on the relationship between vocational education and rural "hollowing" governance and expects to achieve both. Elements and structure are coupled to achieve coordinated development and benign interaction. In addition to proposing expectations, the author also predicts the resistance to achieving the target development pattern. In the current situation where rural vocational education lacks research and judgment on actual needs, it is difficult for vocational education to keep up with the requirements of industrial upgrading. The congenital defects of the teaching staff make it impossible to provide public services for rural needs effectively. Vocational education itself has a situation where cities are solid and rural areas are weak. The "short-board effect" restricts the rural areas from getting the education investment they deserve. Multi-party governance makes the subject unclear, and the policy cannot be effectively implemented.

- ***Prospects for the Development Direction of Vocational Education under the Background of Rural Revitalization***

Rural vocational education is the fundamental driving force of rural revitalization and cultivates the talents needed to develop rural revival. It directly concerns all aspects of agricultural production and life. The value orientation of rural vocational education can firmly guide the construction of follow-up education. In the past, the value orientation of rural vocational education was relatively static and one-sided, unable to meet the requirements of the times. Some scholars pointed out that the value orientation of rural vocational education should be "livelihood, life and ecology" (Xie & Yan (2019). While promoting the cultivation of rural technical talents, rural revitalization should be realized (Zhu & Shi, 2021), to discover the dual-track parallel of educational development and rural revitalization.

Zhu & Yan (2020) stipulated the logical path for the development of rural vocational education, that is, through the capacity building of the "self-system" of education, across other fields of "other-systems", and integrating the "super-system" of rural society. Furthermore, it demonstrates the publicity of rural vocational education and the continuous development of modernity in the form of results in multiple fields.

- ***The Establishment of a New Training Model under the Background of Rural Revitalization***

The vast majority of the current agricultural labor force belongs to physical and traditional experience farmers. They lack professional self-confidence, lag behind in product awareness and personality concepts, and cannot realize the recognition and pursuit of "self-worth" in the process of rural revitalization and agricultural modernization. Ma & Zhu (2019, 2020) put forward the concept of building a modern apprenticeship and the

logic behind the construction of this talent training method through a series of articles. The modern apprenticeship system refers to the combination of work and studies teaching methods, with school-enterprise integration as the implementation path, allowing enterprises and workers to cultivate new-type professional farmers and construct a cross-border identity between quasi-professionals and students.

This training model advocates the establishment of production, education, and school-enterprise cooperation systems. Through apprenticeship contracts, school-enterprise cooperation, and education system provision, they promote the cultivation of modern farmers who are "professional free," "professional self-confidence," and "modern self-consciousness." Constructing a modern apprenticeship to cultivate a new type of professional farmer analysis framework, allowing educated persons to receive training in the field of work-study alternation, enhance professional participation, and gradually develop farmers' "modern personality." We need to actively pursue the maximization of interests in modern agricultural industrialization and marketization and become the leading force in the modernization of agriculture and rural areas.

• Research on Teacher Issues in the Context of Rural Revitalization

The research related to teachers in rural education is quite diverse and has become the intersection of multiple research fields.

· *The Plight of Teachers' Self-Development*

Among the measures to vigorously strengthen the development of rural compulsory education, the support for areas with weak rural education has a relatively prominent characteristic of focusing on "hardware" rather than "software". Pang et al. (2020) pointed out that this characteristic is most pronounced in rural elementary schools. In addition, the existing rural teachers have the problems of low professionalism and severe age structure imbalance. Therefore, to ensure the support of talents in rural education, it is necessary to provide teachers with solid salary, staffing, and title policies and specify reasonable training supplementary policies. The authors pointed out that it is not appropriate to one-sidedly emphasize academic qualifications in the teacher supplement policy but should consider the degree of subject adaptation to estimate the integration of new teachers.

One of the difficulties faced by teachers' personal development is the evaluation of professional titles. The number of senior professional titles of rural teachers is relatively low, and promotion is difficult. This restricts the professional development and remuneration of rural teachers. The predicament of the current rural teachers has restricted the professional attractiveness of rural teachers (Pang et al., 2019). Specifically for the preschool education teacher group, Hong et al. (2021) surveyed the number of rural preschool teachers, teacher faculty, salary, and professional development through designing questionnaires on the preschool teachers in the central region. They found that the number of preschool teachers in the central area is still unable to meet the *Pre-*

school Faculty Staffing Standards (Interim) requirements. The proportion of teachers with relevant professional backgrounds and preschool teacher qualification certificates is relatively low, teachers' salaries are low, and there is insufficient development space. Under such a pattern, where the education undertakings in western China have received more guarantees, the data shows a "collapsed" appearance. Researchers define this phenomenon as "central collapse".

· *The Predicament of Teacher Responsibilities*

The researchers pointed out that the current rural education environment is not conducive to teachers' performance. Rural teachers have both the role of school education and influence on rural customs. However, it is difficult for rural teachers to play their professional role in the natural environment due to the obstacles of teachers' self-preparation dilemma, the constructive dilemma of resources, and the adaptability dilemma of reforming ecology.

In addition to the reasons mentioned above that hinder teachers' responsibilities, Tang & Wu (2019) focuses on parents' solidified thinking and expected effects on teachers' performance. The main impact of parents' solidified thinking is that rural parents have cognition that learning is useless, or have too practical expectations for the effectiveness of education, and lack an objective understanding of the long-term value of education, which hinders the effectiveness of teacher education. Furthermore, the expected effect on teachers' performance is that China has carried out basic education reforms in recent years, and not every reform has an apparent impact. Therefore, teachers will lose the motivation to accept the new overhaul, hindering teachers' development.

· *Promoting Rural Teachers to Play More Responsibilities in Rural Construction*

China released the *Rural Teacher Support Plan (2015-2020)* in 2015. By 2020, the Ministry of Education has issued the *Notice on Further Implementing the Living Subsidy Policy for Rural Teachers*; simultaneously, the Development and Reform Commission and other four departments jointly issued the *Opinions on Strengthening the Construction of Rural Teachers in the New Era*. This reflects the policy level's continuous attention to the development of rural teachers and the current shortcomings caused by teacher problems. Its focus can be roughly divided into two aspects: external stimulus and internal reinforcement. The measures to focus on external development include: guiding the flow of outstanding talents to the countryside, strengthening the training of rural teachers who meet the requirements of the new era, improving the social reputation of rural teachers, and improving the treatment of rural teachers and the humanistic environment of the living environment. The measures for construction from within the teacher group include: coordinating and increasing the living allowances for rural teachers, coordinating and optimizing the arrangement of rural teachers, and stimulating the endogenous motivation of teachers to contribute to rural education.

Judging from the thinking of the existing research, most of them are consistent with the trend of the policy. Basically, it can be divided into the following directions:

First, Call for Policy Support and Make Specific Suggestions for Policy Construction.

The study by Tang et al. (2020) pointed out that among the favorable factors that affect the professional role of rural teachers, national policy support ranks first with a ratio of 85.8%. Du (2018) pointed out that it is necessary to build education measures that focus on rural education and clarify policy directions. Finally, Pang et al. (2019) gave some detailed suggestions on the professional title system in terms of teacher treatment, including quota setting, job ratios, and policy preference for exceptional circumstances. Zeng & Gao's (2018) research was based on the implementation of the Rural Teacher Support Plan, and on the specific conditions of 12 counties in 6 provinces in the central and western regions, and explored the problems that still exist in the construction of the rural teacher team after strengthening policy support. It is deduced that the current policy has shortcomings on the structure of teachers and insufficient personalization of professional training content. These problems are more prominent in smaller schools. Based on this, they put forward the concept of empowering rural small-scale schools and teachers in small-scale rural schools. Provide personalized assistance to the teaching unit of "small-scale rural schools".

Second, Improve Professionalism and Cultivate Personal Beliefs.

Zeng & Gao (2018) pointed out that after the state has made targeted support at the policy level, the personal literacy of teachers still has the problem of low information technology application ability. Meanwhile, the researcher also pointed out that the unreasonable structure of the teacher team is typical in rural schools. As a result, most teachers need part-time teaching, but their subject literacy is insufficient, and it isn't easy to meet the teaching standards. Accordingly, it is necessary to provide teachers with comprehensive training.

• Exploration and Research of Educational Construction Path under the Background of Rural Revitalization

Given the gap between the current education level and the goal of rural revitalization, scholars have proposed solutions to various problems in the overall vision of education.

· *The Practical Path for the Reform of Basic Education in Rural Areas*

First, the Layout of Rural Basic Education Schools

Jin et al. (2019) proposed that under the economic rational scale effect value orientation, some regions have implemented measures to withdraw sites and merge schools, the one-sided pursuit of resource concentration, and the lack of scientific demonstration of resource distribution planning has caused a deviation in the layout of educational resources.

Under the background of differences in economic development, insufficient coordination of regional governments, and social transformation, it isn't easy to adjust educational resources objectively. These problems together led to the decline of rural schools and caused children in poverty-stricken areas to face issues such as long-distance and difficulty in going to school. The reduction in the number of students in school has, in turn, made the countryside lose its attractiveness to the workforce, resulting in rural revitalization with a hollow workforce. The authors propose corresponding rectification plans for resource allocation in this situation: (i) Take urban and rural areas as a whole for planning. (ii) Formulate scientific planning standards so that the layout of rural schools can be based on evidence. (iii) Use a variety of methods to promote the endogenous development of rural schools.

Second, the Dual Barriers to Urban and Rural Education Caused by Resource Tilt

Liu & Feng (2019) conducted a particular study and pointed out that after the promulgation of *Several Opinions on Promoting the Integrated Reform and Development of Urban-Rural Compulsory Education in Counties* in 2016, some measures to simultaneously coordinate rural and urban educational resources have been launched. For example, the *Rural Revitalization Strategic Opinions* require the construction of a development system that integrates urban and rural areas and integrates regions. This kind of thinking can be used for reference in allocating educational resources and with the help of the policy background to obtain better implementation effectiveness.

· *The Conception of Targeted Training for Higher Education Boosting Rural Development*

Investing in rural construction by college students who have received higher education is an efficient way for rural areas to quickly obtain a large amount of high-quality human capital. Song (2019) analyzed the resistance of college students returning to their hometowns to start a business. He believes that the current design of the entrepreneurial policy for college students focuses more on "using entrepreneurship to drive employment" and aims to solve the employment problem. Still, the entrepreneurial risk is not fully controlled, resulting in a lack of motivation for college students to start a business. At the same time, there are still the problems of insufficient attractiveness of the rural environment, low enthusiasm, and inadequate experience of college students to return to their hometowns to start a business. Based on this, he put forward the idea of solving policy inclination, assistance in risk management, and flexible adjustment of policies to make this method obtain more excellent benefits.

The construction idea of higher education is to improve the training mechanism of agricultural talents and strengthen the construction of related disciplines. The "Mid-term Plan for Rural Practical Talents and Agricultural Science and Technology Talents (2010-2020)" pointed out that the proportion of rural practical talents with specific knowledge and skills in the rural labor force is only 1.6%. The main reasons for this situation are the current unreasonable educational background and employment struc-

ture of agricultural-related talents. As a result, few agricultural-related talents enter the countryside, the difficulty in maintaining talents in the rural areas, the mismatch between the training talents and the required talents, etc. Liu & Xue (2018) gradually cultivated high-quality talents for rural construction from the perspective of improving the government-led diversified talent training mechanism, building a highland of agriculture-related talents, strengthening school-enterprise cooperation, and establishing a talent database to enhance the connection between supply and demand.

Cheng & Chen (2019) used a specific case from Huazhong Agricultural University to point out the implementation path of the rural revitalization strategy of the agricultural university to assist in implementing the rural revitalization strategy.
Ren & Tang (2021) proposed a long-term idea of achieving coordinated development in teacher training and rural education. With rural education talents, educators who are suitable for the environment will be cultivated, and school-based textbooks ideal for rural areas will be developed simultaneously, integrating local concepts.

Areas That Need to be Deepened in Educational Research under the Background of Rural Revitalization Strategy

The research on rural revitalization strategy is currently in its infancy, and a timely grasp of the unreached areas of the study will help grasp the direction of the next stage of development.

The Theoretical Research of Education Ontology in the Context of Rural Revitalization Has Limitations

- ### First, there was a Small Amount of Research in the Theoretical Field of Teaching and Curriculum Design

The part of the current research involving the teaching design of rural schools stays in the guidance of ideas and lacks a systematic and effective teaching plan. The study frequently mentions the concept of the urban-rural gap but remains at the material level and value level analysis. It did not point out the differences in knowledge system, cognitive style, and learning mode between urban and rural students. There was no prerequisite for studying suitable teaching programs for rural students.

- ### Second, the Range of Research was Narrow

The research on rural teaching in the United States, Australia, Canada, and other countries not only pays attention to the cultivation of human capital and the awareness of agricultural ecology but also involves the study of the system of special education. Although the previous data shows that “adult education and special education” has a con-

siderable amount of publications, the specific research content is biased towards economic development through the training of adult production skills, and "special education" has become a gap. There is a particular academic journal of *Rural Special Education Quarterly* in foreign countries, which discusses related issues of the educated group with special needs, reflecting the comprehensive and balanced focus. Comparing China's current educational research in rural revitalization with the international research environment, there is a research blowout due to the proposal of policies. There are also many pieces of study focusing on the same issue where the line of sight is too narrow. On the contrary, the narrowing of the research field presents a simplification of the problem, which does not coincide with the complexity of the rural situation. Chinese scholars can adjust the research focus and pay as much attention as possible to all groups related to education to improve the "happiness" mentioned in rural revitalization in a balanced way.

• Third, There was a Lack of Research on the Negative Effects of Policies on Education

The current research direction is mainly focused on the supporting role of education in reaching the goal of rural revitalization and how to maximize the professional part of teachers. However, as for the changes and innovations in the disciplines that support the revitalization policy in the education field, there is a lack of necessary attention. As a result, it has not risen to the level of theoretical research.

· *Lack of Dynamic Attention to Changes in Data*

Education serves as a driving factor for rural revitalization to provide talent support for the development of society and changes itself, and forms an innovation in the education system. This change has both distinctive characteristics of the times and the environment. The current research focuses mainly on promoting rural economic construction by educational practice and strengthening talent reserves. There is no research on the changes within education that education itself has produced in response to developmental changes. This is a worthy part of the subsequent research. Tracking a large number of curriculum practices and summarizing the course results may promote the deepening of pedagogy's research. This part of the research first appeared in the agricultural disciplines of higher education and belonged to the "most important" higher education reform research project. If it can be further expanded to basic and vocational education, it will complement the current lack of original teaching theory.

The researcher pointed out the problems in the number of rural teachers, the ratio of teachers to students, the age of teachers, and the number of staff. The scope of the discussion is basically placed on a national scale, and a few studies have selected specific cases in individual regions for analysis. However, reviewing the *China Education Statistics Yearbook* showed that since the "Rural Teacher Support Plan" was put forward in 2015, the data from 2016 to 2019 has changed significantly, including the number of preschools in the basic situation of preschool education. 83,884 in 2015 increased

to 98,688 in 2019; border provinces such as Qinghai, Ningxia, Xinjiang, and Yunnan had the largest increase. Although the number of preschool teachers is not accurate to the province, it is also worth exploring the root causes behind the data changes from an overall perspective. The details of the significant pattern change still need to be studied by scholars. In addition to the longitudinal data analysis of chronological changes in a single region, the horizontal errors between provinces should also be considered compatible to explore the reasons for the dislocation of regional differences and various teaching elements. While tracing the data changes and the root causes behind them, it is worth noting whether the teaching results have made substantial progress. This part of the current research volume is relatively small, and it is worthwhile to focus more on it.

Another focus of the research on rural teachers is the internal construction of rural teachers. The internal construction situation most directly reflects the ratio of the number of teachers to the personnel composition of all types of teachers. According to the China Education Statistics Yearbook 2019, the total number of faculty and staff in rural elementary schools in 2019 was 1,795,347, of which 1,679,354 were full-time teachers, 63,394 were substitute teachers, and 14,761 were part-time teachers. Among them, the number of substitute teachers in Beijing and Zhejiang was zero, and the number of substitute teachers in Tianjin, Shanghai, Guizhou, and Yunnan was less than 100. Substitute and part-time teachers in rural elementary schools in Henan Province account for 5.3% of the total staff, and in middle schools was 1.46%. Whether it was the latest 2019 data or 2016 data, Henan ranked first in the country. What kind of background allows Henan Province to have a large group of rural substitute teachers and part-time teachers? What are their treatment and teaching levels? These are all issues worthy of further investigation. However, the number and proportion of part-time teachers in Yunnan and Guizhou, a large rural population, were not high. What is the source of their formation? It can be compared horizontally with provinces with a large proportion of part-time and substitute teachers.

In the context of rural revitalization, the number of rural teachers, the improvement of the professional training of original teachers, and the specific implementation of similar policies in particular regions have not yet been sufficiently studied. Moreover, research comparing the situation before and after implementing rural revitalization-related policies is not very sufficient. Therefore, if the effectiveness of the policy is to be judged, it is imperative to follow up on the results of the policy promptly.

· *Unbalanced Efforts in Various Fields of Education*

The current research focus is mainly on vocational education, and the research in this field is also relatively comprehensive. In contrast, the research on preschool education and compulsory education appears to be out of balance. The current research in these fields is mainly on the distribution of teaching resources such as teachers, focusing on guiding policies to invest in this stage of education. However, the research on pedagogy and subject ontology is still in its infancy. The Humanities and Social Science Project of the Ministry of Education of China, *Theoretical and Practical Exploration of Rural Education to Promote Rural Revitalization-Taking Zhejiang Anji* as an Example is wor-

thy of attention. At present, the research results on the teacher professional development model in the form of "the famous teacher studio" made by Tong et al. (2021) are rare cases derived from the specific practice and theoretical research.

In the follow-up research, we refer to the research paradigm of agriculture-related disciplines in vocational and higher education. In basic education, the research point of view is placed on the construction of the subject itself, and basic education content and teaching methods suitable for rural areas have been explored.

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Received: 29 September 2021
Revised: 30 September 2021
Accepted: 29 October 2021

Science Insights Education Frontiers
pISSN 2644-058X eISSN 2578-9813

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Science Insights Education Frontiers
Vol. 10, No. 1, 2021
pISSN: 2644-058X
eISSN: 2578-9813
DOI: 10.15354/sief

Science Insights Education Frontiers Vol.10, No. 1, October 2021 Insights Publisher