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# Impacts of COVID-19 on the Ethiopian Education System

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**Abstract:** *The outbreak of COVID-19 at the end of 2019 lifted 2020 of the world in turmoil. Now, the world is absolutely in a unique environment. In all corners, today, the scientific world accompanies huge consequences from the novel coronavirus. The economic, social, educational, and political aspects of the world get into the abnormal conditions. This paper aimed to provide the current stance of Ethiopia's poorly equipped educational system, by focusing on the impacts of the novel Coronavirus in the provision of education and the government measures to alleviate problems, obstacles, challenges, and opportunities to adapt current reality.*

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**Keywords:** *Ethiopia; COVID-19; School Closure; Pandemic; Education*

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## **Introduction**

**T**ODAY, the novel Coronavirus has hit a scientifically based world. The outbreak of Coronavirus in Wuhan of China in December 2019 brought a catastrophe in multiple dimensions of a human aspect. Since the outbreak, the virus has been addressing globally. Unusually, this novel virus highly hits the developed countries including the USA and Europe. The outbreak of the pandemic damages the developing countries' economic, social, human, and political conditions, mostly, because of their poor health system than the developed countries (S á& Serpa, 2020). The widespread of this virus throughout the world and particularly, in developed countries make everything upside-down.

Currently, COVID-19 contracted more than 1.5 million people and killed more than one hundred thousand people in the world. Relatively, based on the up-to-date statistics, Europe and the USA take the largest number of deaths by COVID-19, although death has registered in more than half the world's countries. This situation disturbs the lives of billions of the population. Therefore, this leads to over seven billion people to feel panic. COVID-19 has been infecting not only ordinary peoples but also the prominent leaders in the developed countries. For example, the UK's Prime Minister, Boris Johnson has become the first leader tested positive and eventually taken into St. Thomas' Hospital, London for treatment in the intensive care unit and now taken out from that room. This situation lessoned diplomats and leaders of the world to stop the diplomatic deal in face-to-face communication. Most of the leaders now continued to lead a country by using video conferences and other electronic media.

Now, both developing and developed countries have common rivalry, COVID-19, exponentially spreading out the virus. To win this battle collectively, politicians, government officials, international organizations, non-governmental organizations, civil and professional association, etc., globally preparing to restrain and minimize the devastating the virus has or may have brought. Compared to the USA and European countries, in Africa, the numbers of infected people are low. However, the World Health Organization (WHO) and other institutions are claiming, as Africa will be one of the continents that will be highly attacked by COVID-19. In the second week of March 2020, WHO declared COVID-19 as a pandemic disease. This institution highlighted international communities to take urgent measures to curb the spreading pandemic.

African countries with poor infrastructure and inadequate health systems, have been adopting this international prevalence and the situation is becoming uncertain. Using their best possible alternatives, they have been taking measures to reduce the spread of the virus, though natural, social, economic, and educational aspects have been continuing to be affected. The focus of this article as a piece of opinion is on the educational sphere of Ethiopia. Specifically, it addresses how changes look like in the educational provision, alternatives that have been taking place to mitigate the challenges, and the possible opportunities that could change the current educational scenario experiencing in Ethiopia.

## **Methods**

In this article, the collection and analysis of publications and other documents directly related to COVID-19 and educational scenarios of this crisis period in a national, continental, and international level used as a methodology. Different legal and working documents in Ethiopia have been analyzed. In addition to reviewing the documents, the author also consulted officially recognized websites where COVID-19 related topics were released.

## **The World's Current Scenario about COVID-19**

The world has been exposed by the global pandemic. Across a period with different places, various types of the pandemic had brought crises on the social, economic, political, educational, and other dimensions of the world. Therefore, the outbreak of COVID-19 as a pandemic is not a new phenomenon. For example, Kidman and Chang (2020) insisted as the international information exchange medium like newspapers remind us about other past deadly virus outbreaks including China's Severe Acute Respiratory Syndrome (SARS) and the Middle East respiratory syndrome (MERS) virus. They have argued, unlike past pandemics, the COVID-19 outbreak happened at a time of the Chinese New Year celebration, which marked the millions of people to return home to celebrate with family and this contributed to the spread of the virus globally. Further, S á and Serpa (2020) also noted that the last international pandemic that the world remembered was the Spanish flu, caused by the influenza virus H1N1 from January 1918 to December 1920. Therefore, publications showed that the current pandemic is not a strange event rather than bad and good memories in the previous viruses.

Through media, politicians and prominent individuals in arts and athletics, keep their message to reach out for the world about the importance of staying at home, about social/physical distancing and procedures to use sanitations frequently. Although these are going hard, the COVID-19 caused by the SARS-CoV-2 virus continues to kill people, deteriorate the global economy at an alarming rate, interrupts the globalization, sustains, and even widens the existing inequalities and brings the closure of social service like schooling.

Starting from its origin, the virus has spread out to Europe, the USA, Middle East, and Africa in a short period. Compared with other continents, now, the pandemic is in its highest stage in Europe and the USA. In Western countries, USA, Spain and Italy respectively leading the first three in the number of confirmed cases and Italy, Spain, USA and France respectively also leads the first four in the number of people died from COVID-19 (figures are taken from the World Health Organization website as of 10 April 2020).

In Africa, the pandemic is not as such in its highest stage but it spreads exponentially day after day. South Africa, Algeria, Cameroon, and Burkina-Faso respectively take the top first four in the number of confirmed cases in this continent. In the number of deaths from COVID-19, Algeria, Burkina-Faso and South Africa took the first

top three ranks in Africa (figures are taken from the World Health Organization website as of 10 April 2020). The number of deaths claimed as the lowest but exponentially growing daily. However, governments, continental institutions, associations, and media, etc., in Africa fear the wave of the pandemic and they have the worst expectation that is to come. On 9 April 2020, the African Union (AU) briefed about COVID-19 in the press by noting the number of cases worldwide has more than one million. It provided a critical update on efforts by member states and finally urged for countermeasures to be taken to minimize potential fatality (messages are taken from the African Union website as of 10 April 2020).

## **Current Situation of COVID-19 in Ethiopia**

Directly or indirectly, no country could escape from the spread of COVID-19 pandemic. Therefore, Ethiopia is on the brink to the virus. Now, Ethiopia has 69 confirmed cases and three deaths (figures are taken from the Ethiopian Ministry of Health website as of 11 April 2020). On 13 March 2020, the first case found from a foreigner, Japanese citizen who came from Burkina Faso to Ethiopia by 4 March 2020 (information are taken from the Ethiopian Ministry of Health website as of 13 March 2020). Since then, the numbers of positive cases are increasing in this poorly established health system of Ethiopia. More than 3,500 cases in Ethiopia have been tested positive for Coronavirus and it is one of the lowest tests in the world when compared with the total population expected to be more than 110 million.

To curve the potential problems of the virus may have and certainly have, the Ethiopian government has been taking its best possible measures. Starting from 16 March 2020, the Prime Minister of Ethiopia has officially announced the closure of schools, including Kindergarten to Higher Education, the prohibition of mass exercise and large meetings and called the people to shelter at home for 14 days. However, it was insufficient to contain the spread of the virus, as many of the people with hand to mouth lives could not lockdown themselves for 14 days. In addition to the above measures with reservations for key workers of the government and non-government organization, all offices are closed, transport services are interrupted, university students are returned to the home and the call for lockdown is still extended.

As I have observed, though the government urges to stay at home for an extended period, many people spending their time out of home even in provinces where virus cases were found and probably the epicenter of the pandemic like Addis Ababa. However, in cities and towns like Bahir Dar, Adama, and Injibara, where positive cases have confirmed with the spread of the virus, and government forces have been enforcing lockdown of every individual except the allowed volunteers for an unspecified period. Continuously, the government, media, and prominent individuals including legendary athlete called the whole people to stop physical contact, to use alcohol and sanitizer that could kill the virus before and after touching something, to frequently wash hands for at least 21 seconds and to stay at home unless they have urgent business. Now, the country is under a state of emergency. Since 10 April 2020, the state of emergency has

been declared and extended for the upcoming five months to control the outbreak of the coronavirus and to minimize the potential risk. To control the spread of the virus in the headquarter AU, City of Addis Ababa, its Deputy Mayor explained that, as the door-to-door testing will begin soon with the help of volunteers and health professionals. He has insisted as the testing will hold in all Woredas, the second-lowest administrative unit of Addis Ababa, starting from those areas expected as a vulnerable for the novel Coronavirus. Many of these actions believed to decrease the impacts of COVID-19 on the overall aspects of the country. The pandemic had had concert impacts on diverse sectors of a country. Exclusively, this paper focuses on the educational aspects and scenarios happening in the education sector right after the outbreak of the Coronavirus in Ethiopia.

## **Impacts of COVID-19 on Poorly Equipped Ethiopia's Education System**

In 188 countries, officially the governments have temporarily closed the school and it affected more than 1.5 billion students, 91% of the total learners globally (this refers to the Official Website of the UNESCO: <https://en.unesco.org/covid19/educational-response>). The education sector is one highly affected by the spread of COVID-19 in Ethiopia. The world including Ethiopia dramatic changed the face of schools and higher education institutions since March 2020. Reich et al. (2020) stated that the situation happened in the first week of March 2020 in the USA and stated as, though the first case has confirmed in the metropolitan city of Seattle in the midweeks of that month, the virus spreads out throughout the country and embarked school closure. They assured as, after days of interruption, most of the schools started online learning to replace the regular classroom. Currently, in the USA, schools running their delivery of education through online and other electronic media (Reich et al., 2020). Months before the USA's above-mentioned educational scenario, COVID-19 drives China's students out of school, and provision has been continuing with the help of updated technologies and internet access to all corners (Zhao et al., 2020). Cognizant to that the online learning harms the students' extracurricular activities including the social skill and communication capabilities that are important for their future career.

Among the sub-Saharan African countries following Nigeria, Ethiopia has the largest number of the population estimated to be more than 110 million by 2020. The numbers of school enrollments are also one of the largest in the region. However, after the government has learned the devastating impact of COVID-19 from Asian and European countries that resulted in a massive number of students had suspended from the school since March 2020. The closure of schools is now a global phenomenon, but unlike other countries, students in Ethiopia provided neither online nor television and radio teaching for weeks. Since, nearly months from the closure, students in all levels are far apart from their learning and alternative methods of learning never employed. Now, school leaders, principals, teachers, supervisors, supporting staff, and all communities in both public and private institutions become idle. Leaving behind the lagged education

at all levels has a double devastating effect on the current as well as in the future of the Ethiopian economy.

Of course, in the first two weeks of the closure, higher education teachers have had the order to communicate with their students via email. They were started to send materials, assignments, and projects etc., to facilitate learning but it was demised a soon as the government announced as the students have to leave campus to back home. After university students left the campus, running learning via the internet or electronic media becomes unthinkable because more than 80% of university students are rural-based without electricity, laptop, smart-phone, desktop, and the world's top expensive internet. Therefore, neither the government nor the universities devised their best possible alternatives to provide learning. Some university students now involve in voluntary activities within their communities to fight the spread of the pandemic. Similarly, instructors have been advised to stay at home and they were limited to get internet access from the university due to this shelter-at-home policy, and subsequently other academic issues have been influenced. This circumstance in Ethiopia might not be an easy way for the students and teachers of higher education institutions to be competent in this highly competitive world.

Top management leaders of the University have been highly engaged in activities that could contain the spread of the Coronavirus. Almost all universities and some high schools are prepared to be uses as isolation spaces for the pandemic virus-infected people. Although universities are lagging from running students' learning, they are contributing critical activities to help poorly established health system to combat the virus. For instance, Bahir Dar University, Debre Markos University, University of Gondar, Wolita Sodo University, Injibara University, Debre Tabor University and Wollo University are some in Ethiopia financially supporting the government and preparing sanitizers, masks, long-lasting foods, shelter and other important inputs used to fight COVID-19 (This refers to the official Facebook page and website of each university).

Similarly, from the nursery school to preparatory school, students' learning has stopped since the day the Prime minister of Ethiopia announced the closure of schools from the global pandemic. Since then, all levels of students were suspended to continue their learning by any means. National examinations have been extended for an unspecified period. Students are in tension due to a lack of clarity from the ministry of education on issues like how the national examination will be prepared and when it will take place. Not only the students but also their parents are worried about the interruptions of normal learning. For elementary school students, after 17 days of interruption, on 3 April 2020, the Ministry of Education has urged the students to follow the educational programs on radio as they declared, "If you have access, you can follow the educational programs via radio". This showed that students' learning is neither mentored by teachers nor supported by their parents. Moreover, Ethiopia has more than 80% of rural dwellers from the total population. They have no access to electricity, radio, and the internet, etc., and the students' parents also are not yet conscious about how to give time at home for their children to engage with educational activities. Therefore, the

COVID-19 pandemic highly affects the Ethiopian education system and it drives it towards the brink of educational collapse.

The aforementioned Ethiopian educational scenario may bring it as an exceptional country with a huge number of students without learning. Right now, UNESCO, United Nations, WB, and other international organizations are warning member states to develop and employ alternative technologies to deliver learning for all students. However, the circumstance of Ethiopia becomes different from this urgent message by organizations. It has been building nutshell inequality at national and international levels. As addressed above, some nations' exemplary online provisions of learning withstanding the limitations in students' side effect in respect to extracurricular activities, they all are better than the Ethiopian stagnant provision by far. This difference not only sustains the existing inequality but also assures a high and long-lasting inequality between countries at international level. Within the nation, a disparity between the rural and urban as well as the haves and have-nots becomes highly notable. As seen from above, the ministry of education provides learning for those students from better family and urban areas. Therefore, students from rural, remote, and poor families suspended from learning and perhaps exposed to exploitation in agricultural activities and daily laborer. The event peaks and sustains the existing inequality not only at a student level but also eventually, at family and community levels. Therefore, the Ethiopian government is not on the stance to take measures that mitigate the challenges facing in the closure of schools as a global crisis.

## **Challenges to Take the Responsive Measures**

Ethiopia has been investing efforts to prepare the teachers, students, and school administrators, etc., for technological advancement to apply in the educational arena. The country has developed the National Information and Communication Technology (ICT) Policy and Strategy document in 2017 aiming to establish the overall framework of ICT development in the country, which could facilitate educational provisions (Inception Report, 2018). The main mission of this document was to make every activity including education in Ethiopia on an ICT assisted (Federal Democratic Republic of Ethiopia [FDRE], 2007). ICT applications in the educational endeavors of Ethiopia have only limited the installation of computers (often without internet) in secondary schools and higher education institutions and centrally disseminated TV plasma for secondary and preparatory levels. Addressing the common learning lessons for specific groups of students in a single station was one of the milestones of integrating ICT in the Ethiopian education system (Assefa, 2017; Birbirso, no date available; Alemu, 2017).

However, this situation has to wake up the government, innovators, policymakers, educators, and other stakes, to have something to be done to support the provision of learning even in the time of crises. For instance, in 2008, only 360,000 peoples of Ethiopia use internet service (Wikipedia). By the year 2012, it has an internet penetration rate of < 2%, but other African countries like Morocco, Egypt, Nigeria, Kenya, Sudan, and Djibouti have an internet penetration rate of 51.0%, 35.6%, 28.4%, 28.0%,

19.0%, and 7.9%, respectively. In Africa, the average internet penetration rate is 15.6% and Ethiopia uses less than 1% of Africa's internet (Atnafu, 2015). In 2016, it shares 0.1% of the world's internet users with a 4% penetration rate and 4,288,023 of the total population (more than 101 million) uses the internet often through mobile phones (available from: <https://www.internetlivestats.com/internet-users/ethiopia/>). Still this condition in Ethiopia has not improved significantly, even when compared with other Sub-Saharan countries.

Let alone the availability of internet and computer for students and teachers like other countries, the accessibility of television and radio is under a question mark in Ethiopia. Since the country is in complete lockdown, providing learning by assuming as the students are accessible to television and radio is a serious problem because almost more than 80% of students are in a rural area, they cannot move to urban areas to get access of television and radio, library and even to consult their teachers. Even, those students who have access to media for learning may face challenges including technical problems, frequent electric power interruptions, environments they have may not be suitable to attend live lessons attentively and families may not be able to support their disadvantaged children as the teachers do. This haphazard provision of learning only for a very small portion of the students may arouse emotional and psychological problems in both types of students who are accessible and non-accessible to it. In the remote rural area, one of my family's neighbors' daughter who is in the grade six called me and said, "learning is providing in the urban area through radio, I can't access it, I don't have a radio to follow, in the family, nobody is understanding what is going on in my education, does it mean I am excluded from learning? What will happen between students from radio accessed and not accessed areas after the condition becomes normal?..." These all are heart-breaking questions that show emotional and psychological disruptions of the students. Taking into account these challenges and disparities in the provision, the government is moving its efforts forward in some stages for the primary and secondary school students' learning. However, still, neither government nor Minister of Science and Higher Education has said something about the solutions to provide learning for millions of university students interrupted from their education since 16 March 2020.

## **Researcher's Remark**

The current stand of the Ethiopian government to run the students learning in a situation of complete lockdown is somehow encouraging for some levels like the primary and secondary schools. Although the government has been struggling to mitigate the effects of COVID-19 through providing learning, challenges are highly visible. Most of the hindrances have related to digital technology and mismanagement. The rural-based lives of the population, expensive and limited access to the internet, unavailability of computers, smartphones and other important devices in almost all households have challenged the provision of education during this period. Moreover, poorly managed

infrastructure, limited and in most case absence of access to electric power, lack of knowledge to manage technologies all form obstacles for students' learning.

To understand the impact of the novel Coronavirus on the Ethiopian education, in terms of failure and success the television and radio aired learning for the secondary and the primary schools, the fundamental questions need to be raised and answered will determine its status. Questions include: having one of the World's few confirmed cases of the virus, to what extent school closure for an extended period has supported by scientific findings? Are all secondary school students in rural, urban, and suburban areas have had access to television? Does electric power/engine have addressed and well-functioning in all areas of the country? Are students and parents knowledgeable and skilled to manage the television's technical problem? Do all households have more than one television to solve conflicts of interest in the family or to minimize the disruptions? Do students stay in the house without engaging in other activities? Are the parents getting awareness or training to help, encourage, and monitor their children's learning? How students' learning to be assessed in television and radio aired learning? How students take notes and ask questions in television and radio learning? Can parents leave home to work by giving responsibility for children to manage their learning through television and radio? Has there any mechanism that teachers can help students in centrally aired education and how? These are some points needed to be scrutinized to figure out the circumstances of strange provisions of education in Ethiopia.

In media, newspapers, and websites, all viewed the event of COVID-19 pandemic as an obstacle to the country's journey towards prosperity. However, this panic from all corners of the country must be taken as a challenge and glorious opportunity for the application of technology in the education systems of the country. Moreover, the situation has to turn the countries effort from both the government and private sectors toward innovating new technologies for educational provision, and to stable the current challenges and to save future generations through opening the platform for international competition. To do so, the government has to allow the involvement of the international private companies in telecommunication and internet supply to provide educational technology, and application and installations of other important infrastructures in rural and urban areas of the country.

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# Opening or Solidifying? The Trend of the Intergenerational Mobility in China since the Implementation of the Reform and Opening-up Policy

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**Abstract:** Based on the findings of the China General Social Survey, this study aims to analyze the trend of the intergenerational mobility in China since the implementation of the reform and opening-up policy by evaluating the absolute and relative mobility rates through the mobility table. The intergenerational mobility level in China is relatively high from the perspective of the absolute mobility rates. Besides, the overall trend is upward and social openness is quite high. However, the intergenerational mobility level is relatively low and gradually declining from the perspective of the relative mobility rates that reflect the equality of mobility opportunities. In addition, the social class structure shows a tendency of solidifying. While the absolute mobility rates reflect the efficiency of the intergenerational mobility, the relative mobility rates reflect its fairness. However, since the implementation of the reform and opening-up policy, Chinese society appears to be in a state of inadequate equality but with high efficiency. In this study, we generally regarded education as a critical factor of the intergenerational mobility. Lately, China has implemented a series of education policies, including the resumption of university entrance examination policy, compulsory education policy, and college enrollment expansion policy. The Chinese government endeavors to enhance national education attainment and sustain absolute mobility at a higher level. Nevertheless, the differences in education attainment of offspring from different social classes have increased gradually, making education inequality a significant factor of lower relative mobil-

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ity. Thus, the government should increase the intergenerational mobility level by creating a healthy and stable economic development environment and improving education inequality.

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**Keywords:** *Social Class; Solidifying; Intergenerational Mobility; Education Inequality; Reform and Opening-up Policy*

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## **Introduction**

**T**HE intergenerational mobility denotes the extent and pattern of the relationship between parents' and adult children's socioeconomic status (Torche, 2015). Typically, socioeconomic status is captured by social class, where a higher correlation between parents' and offspring's social class implies lower intergenerational mobility. Alternatively, the social class structure is more profound and the social openness is lower. Scholars mainly believe that the intergenerational mobility level denotes the extent of inequality of opportunities, which primarily ascertains the inequality of results. The lower the intergenerational mobility level, the more serious social inequality is (Becker & Tomes, 1979).

Since 1978, Chinese society has witnessed revolutionary changes when the Chinese government began implementing the reform and opening-up policy. However, criticism on the low intergenerational mobility level or the solidification of the social class structure is emerging, with keywords like “the second rich generation,” “the second official generation,” and “the second poor generation” frequently appearing in the media. The existing literature concurs that education is a crucial factor in achieving individual social status attainment. Since the implementation of the reform and opening-up policy, changes in China's education sector have garnered worldwide attention. A series of prominent education policies, such as the policy of resuming the college entrance examination, compulsory education, and college enrollment expansion, have markedly enhanced the education level of Chinese citizens, thereby providing Chinese people with more opportunities of intergenerational upward mobility. However, the rising tuition fees in colleges and universities, as well as challenges of job hunting for college students, has paved the way for the opinion of uselessness of education. Consequently, many people, including scholars, are pessimistic about the intergenerational mobility of Chinese society; they believe that children of disadvantaged groups can hardly increase their social status by only through education.

The phenomena mentioned above raises the following questions: what is the intergenerational mobility level in China? What factors affect the intergenerational mobility? What role does education play in the intergenerational mobility? Hence, this study aims to use the China General Social Survey (CGSS) data as a basis to empirically investigate the level and trend of the intergenerational mobility in China, address the practical question of whether the social class structure is solidifying, and examine the reasons for the intergenerational mobility, especially educational factors. Perhaps, this study can provide empirical evidence to the government to improve social inequality.

## **Literature Review**

First, if empirical methods are used to investigate the intergenerational mobility level in China, we must understand the measurement methods of the intergenerational mobility level. Sociologists have primarily used methods such as mobility tables, log-linear

models, and log-multiplicative layer effect models, whereas economists have preferred intergenerational income elasticity. In the mid-1950s, scholars like Glass and Berent (1954) and Handlin, Lipset, and Bendix (1959) proposed mobility table, which is one of the most fundamental analysis tools for the intergenerational mobility research and belongs to the descriptive statistical method. Based on the mobility tables, the indexes of the intergenerational mobility rates and the intergenerational mobility distance can be calculated. In the mid-1970s, some researchers used log-linear models or log-multiplicative layer effect models based on the mobility tables (Erikson & Goldthorpe, 1992; Xie, 1992). However, the tendency to pursue sophisticated statistical techniques has limited the intergenerational mobility research to the exploration of the correlation between the social status of parents and offspring, ignoring the general interest of the intergenerational mobility research such as the determinants and consequences of the intergenerational mobility (Treiman & Ganzeboom, 2000). The intergenerational income elasticity proposed by economists focuses on the correlation between the permanent income of parents and their offspring; this can be used to assess the intergenerational mobility level and elucidate the mechanism of the intergenerational mobility to some extent. However, the intergenerational income mobility often experiences life-cycle bias and measurement errors. Thus, considering the estimation bias of the intergenerational income elasticity, using sociologists' method to measure the intergenerational mobility level seems more appropriate. Although log-linear models or log-multiplicative layer effect models can more precisely measure the intergenerational mobility level, the mobility rates based on the mobility tables remain crucial means for several scholars to study the intergenerational mobility level.

The trend of the intergenerational mobility has always been a hot topic in the research of the intergenerational mobility. The existing literature usually believes that since the implementation of the reform and opening-up policy, although the social class structure of Chinese society is continually evolving, it has become increasingly "hierarchical." From the viewpoint of occupational status mobility and social class mobility, the existing research can be roughly categorized into two groups: (a) one group believes that industrialization and urbanization provide opportunities for social members to be upward, and the social class structure is opening (Lu, 2004); (b) one group believes that the class reproduction is in a dominant position and the social class structure is increasingly solidifying or even broken (Li, 2002; Li, 2011; Sun, 2003). For now, the latter point dominates the discussion. From the standpoint of income mobility, the existing literature rarely involves the analysis of the intergenerational mobility trend in China. Moreover, research conclusions vary considerably because of different sample selection and estimation methods. Furthermore, some studies indicated that the intergenerational mobility level has gradually increased from a rapid level to gradually stabilized level (Chen & Yuan, 2012); while some considered a general downward trend (Li & Zhou, 2014), others considered an overall upward trend (Yang & Zhang, 2015).

Overall, the existing research notably deviates on the trend of the intergenerational mobility in China since the implementation of the reform and opening-up policy. Besides the analysis tools and data resources, it is primarily because several studies did

not realize the difference between absolute mobility rates and relative mobility rates when evaluating the mobility rates. The absolute mobility rates are basic indicators to assess the intergenerational mobility, which can observe the fundamental situation of the intergenerational mobility in the entire society. During rapid economic and educational development, everyone tends to be more outstanding than their parents in theory such as higher education level, higher income, and higher occupational status. The higher absolute mobility rates depict intergenerational progress in this sense. The relative mobility rates illustrate the opportunity equality of the social class mobility and can more precisely reflect the social openness, which implies that the absolute and relative mobility rates are not necessarily synchronized. Thus, it is essential to comprehensively discuss the level and trend of the intergenerational mobility of Chinese society from the two indicators, respectively.

## **Data**

The research data were obtained from the CGSS database released by the National Survey Research Center at the Renmin University of China. The CGSS used the multi-stratified, multistage PPS (probability proportionable to size sampling) random sampling method to collect data at multiple levels of society, communities, families, and individuals systematically and comprehensively. The survey from 2010 to 2019 was the second phase of the sample survey, with a sampling target of 31 provincial administrative units nationwide (excluding Hong Kong, Macao, and Taiwan). To date, data from 2010 to 2013 and 2015 have been publicly released. The analysis database contains the age of respondents and the occupation information of parents and offspring. Owing to various missing values of the occupation variables in the database, to expand the sample size, we merged the data of 2013 and 2015 to form mixed cross-sectional data. The laborers that entered the labor market after the implementation of the reform and opening-up policy were primarily born after 1960; thus, those who were born between 1960 and 1999 were selected in this study. After data cleaning, the sample size of the analysis database was 7654.

## **Methods**

Both absolute and relative mobility rates can be calculated on the basis of mobility tables, thereby enabling the analysis of the intergenerational mobility level. The social positions of parents and offspring are often measured by “social class,” whereas the EGP class classification is a commonly used social class classification method proposed by Erikson, Goldthorpe and Portocarero (Erikson & Goldthorpe, 1992). Thus, considering the 11-class EGP social class classification and the related research (Ganzeboom, Luijkx & Treiman, 1989), we can classify the EGP social classes into six categories based on the occupational information. Referring to the Goldthorpe’s work experience mobility model (Li, 2008), the six social classes can be further clustered into three major classes as follows: (a) professionals, administrators, and managers: regarded as the upper social class; (b) routine nonmanual employees and small proprietors: regarded as

the middle social class; (c) skilled workers, unskilled workers, and agricultural workers: regarded as the lower social class. **Table 1** shows the final classification of the social classes.

Based on the mobility tables, we can calculate the mobility rate indexes reflecting the intergenerational mobility level. The mobility rates primarily include the absolute and relative mobility rates.

The absolute mobility rates primarily include inflow rates, outflow rates, hereditary rates, upward mobility rates, downward mobility rates, and total mobility rates. The inflow and outflow rates reflect the mobility state of each social class, including horizontal and vertical mobility. The inflow rate of a certain social class can denote the source of the parental social class, that is, the ratio of *the frequency of a certain cell to the marginal distribution of the column*. Conversely, the outflow rate of a certain social class can denote the flow direction of the offspring, that is, the ratio of *the frequency of a certain cell to the marginal distribution of the row*.

The hereditary rates, upward mobility rates, and downward mobility rates can reflect the mobility state of a certain social class, as well as that of the whole society. The hereditary rates signify horizontal mobility, whereas the upward and downward mobility rates reflect vertical mobility. The hereditary rate of a certain social class suggests that the status of the offspring's social class did not change relative to the status of the parental social class. In other words, it is the ratio of *a certain frequency on the diagonal in the mobility table to the marginal distribution of the row*. In this case, the hereditary rate is the special case of the outflow rate. Of course, the hereditary rates can also indicate that no change occurs in the status of the offspring's social class relative to the parental social class in the whole society. The hereditary rates can be evaluated by the ratio of *the sum of frequencies on the diagonal of the mobility table to the sample size*. The upward mobility rate of a certain social class indicates the upward probability of the offspring's social class relative to the parental social class, whereas the downward mobility rate indicates the downward probability of the offspring's social class relative to the parental social class. For a certain social class, the sum of the hereditary rate, upward mobility rate, and downward mobility rate is equal to 1. For the entire society, the upward mobility rate denotes the ratio of social members flowing to higher social classes in the vertical social mobility; it is *the sum of the frequencies of the cells below the diagonal of the mobility table divided by the sample size*. The downward mobility rate denotes the ratio of social members flowing to lower social classes in the vertical social mobility; it is *the sum of the frequencies of the cells above the diagonal in the mobility table divided by the sample size*.

The total mobility rate implies the overall state of the vertical mobility of the whole society. As the hereditary rate is the opposite of the total mobility rate, the total mobility rate equals 1 minus the hereditary rate. The total mobility rate denotes the intergenerational mobility level in the whole society; the higher the value, the higher the intergenerational mobility level. For the whole society, the sum of the upward and downward mobility rates is the total mobility rate.

**Table 1. Classification of Social Classes in China.**

Category	EGP Class	Description	Major Classes
Professionals, Administrators & Managers	I + II	Large proprietors, administrative staff, Professionals, etc.	Upper Social Class
Routine Non-manual Employees	IIIa + IIIb	General office staff in administration, commerce, sales, services, etc.	Middle Social Class
Small Proprietors	IVa + IVb	Small proprietors with or without employees	Middle Social Class
Skilled Workers	V + VI	Lower grade technicians and manual supervisors, skilled manual workers	Lower Social Class
Unskilled Workers	VIIa	unskilled and semi-skilled manual workers in non-agricultural industries	
Agricultural Workers	IVc+VIIb	Agricultural manual workers, farmers, fishermen, hunters, etc.	

The relative mobility rates primarily include intergenerational inheritance indexes, intergenerational inflow indexes, intergenerational outflow indexes, intergenerational upward mobility indexes, and intergenerational downward mobility indexes. The calculation of the relative mobility rates depends on the mobility ratio indexes. The relative mobility rates can be evaluated by establishing the table of mobility ratios, which is a two-dimensional contingency table of the mobility ratios between social classes of parents and offspring. The mobility ratio of a certain social class is evaluated by the ratio of *the actual frequency of a certain cell in the table of mobility ratios to the expected frequency*. If the mobility ratio is 1, it implies that the offspring from any social class are completely randomly distributed in a certain social class. If the mobility ratio is  $> 1$  or  $< 1$ , it implies that the probability of offspring from other social classes flowing a certain social class is higher than or less than the probability of the offspring inheriting the certain social class.

The intergenerational inheritance index denotes the intergenerational inheritance level of a certain social class; the higher the value, the more notable the intergenerational inheritance effect of the social class is and the lower the level of intergenerational mobility is. Numerically, the intergenerational inheritance index is the values on the diagonal of the mobility ratio table.

The intergenerational inflow and outflow indexes measure the possibility of vertical mobility of a certain social class from the perspective of equal opportunity. The intergenerational inflow index denotes the possibility of children from other social classes flowing into a certain social class; the larger the index, the more likely the offspring from other social classes are to enter the certain social class, the higher the intergenerational mobility level is, and the lower the intergenerational inheritance effect is. On the other hand, the intergenerational outflow index denotes the possibility of the offspring outflows from the parental social class to another social class; the larger the index, the more likely the offspring from a certain social class are to enter other social classes, the higher the intergenerational mobility level is, and the lower the intergenerational inher-

itance effect is. The calculation formulas of the intergenerational inflow and outflow indexes are shown in formula (1):

$$VR_j = \frac{\sum_{i \neq j} b_{ij}}{n - 1} \quad (1)$$

where  $b_{ij}$  denotes the mobility ratio,  $i$  is the parental social class, and  $j$  is the offspring's social class. In other words, it is the value of a certain cell in the table of mobility ratio. Then,  $n$  is the total number of social class. The intergenerational inflow index denotes the possibility that parents are not from the social class  $j$ , while the offspring inflows to the social class  $j$ . The intergenerational outflow index denotes the likelihood that parents are from the social class  $i$ , whereas the offspring outflows from the social class  $i$  to another social class.

The intergenerational downward and upward mobility indexes can measure the direction of the vertical mobility of the whole society from the perspective of equality opportunities. Equations (2) and (3) present the calculation formulas of the intergenerational downward and upward mobility indexes, respectively:

$$UR_j = \frac{\sum_{j < i} b_{ij}}{\frac{n(n - 1)}{2}} \quad (2)$$

$$DR_j = \frac{\sum_{i < j} b_{ij}}{\frac{n(n - 1)}{2}} \quad (3)$$

where  $b_{ij}$  denotes the mobility ratio,  $i$  is the parental social class,  $j$  is the offspring's social class, and  $n$  is the total number of social class.

Notably, when calculating the mobility rates, we adopted the "superiority" method to measure the parental social class. We compared the social class status of the father and mother, and adopted the higher as the value of "the parental social class." Compared with the method of only using the value of the father's social class, the "superiority method" can depict the family influence on the class status of offspring comprehensively.

## The Trend of the Intergenerational Mobility and its Reasons

The trend of the intergenerational mobility in China can be illustrated by evaluating the intergenerational mobility level of different birth generations entering the labor market

after the implementation of the reform and opening-up policy. Based on the birth year, respondents who entered the labor market after 1978 were roughly categorized into four birth generations as follows: (a) post-1960s generation (birth year: 1960–1969); (b) post-1970s generation (birth years: 1970–1979); (c) post-1980s generation (birth year: 1980–1989); and (d) post-1990s generation (birth year: 1990–1999).

The four generations mentioned above have experienced social changes in different periods of China's reform and opening-up policy, and their education and employment have different characteristics, which determine their social class status to a large extent. The post-1960s generation primarily received education during the "cultural revolution" and before the reform of the market economy system. The education of the post-1960s generation was markedly influenced by the "cultural revolution" and the planned economy system. The post-1960s generation mostly entered the labor market at the beginning of the reform and opening-up policy, and their employment was significantly affected by the social environment. The post-1970s generation chiefly received education after the "cultural revolution," or after the implementation of the reform and opening-up policy; they began entering the labor market at the beginning of the reform and opening-up policy or the preliminary stage of the market economy system reform. Although their education and employment are influenced by the planned economy system comprehensively, a rather large number of people were also affected by the transition from the planned economy system to the market economy system. The post-1980s generation began receiving education during the deepening of reform and opening-up policy or the early stage of the market economy system reform; their education process was in the stage of legalization of compulsory education and college enrollment expansion in China. The entire post-1980s generation began entering the labor market in the process of the gradual improvement of the market economy system, and their employment was considerably affected by the market economy system. Finally, the post-1990s generation began receiving education after the establishment of the market economy system; their education process is in the stage of free compulsory education and higher education popularization in China. Furthermore, the employment of the post-1990s generation is affected by slowing growth of economy in China.

### ***The Absolute Mobility Rates***

Based on the mobility table, we can calculate the hereditary rates, upward mobility rates, and downward mobility rates of each social class. Owing to limited space, the mobility table is not presented in this study. As is shown in **Table 2**, generally, the proportion of offspring who inherit parental social class is not high. The highest hereditary rate is in the class of agricultural workers (42.8%), whereas the lowest is in the class of skilled workers (13.4%). From the viewpoint of upward mobility rates, the probability of upward mobility in the lower social classes, such as skilled workers, unskilled workers, and agricultural workers, is significantly higher than the probability of upward mobility in the middle social classes, including routine nonmanual employees and small proprietors. From the perspective of downward mobility rates, professionals, administrators,

**Table 2. The Hereditary Rates, Upward Mobility Rates and Downward Mobility Rates of All Social Classes in China since the Implementation of the Reform and Opening-Up Policy (%).**

Social Class	Hereditary Rate	Upward Mobility Rate	Downward Mobility Rate
Professionals, Administrators & Managers	37.7	0	62.3
Routine Non-manual Employees	14.1	28.2	57.7
Small Proprietors	36.1	30.0	33.9
Skilled Workers	13.4	56.8	29.7
Unskilled Workers	22.7	63.6	13.7
Agricultural Workers	42.8	57.2	0

**Table 3. The Total Mobility Rates, Upward Mobility Rates and Downward Mobility Rates of Different Birth Generations in China (%).**

	Whole Nation	The Post-1960s Generation	The Post-1970s Generation	The Post-1980s Generation	The Post-1990s Generation
Total Mobility Rate	61.77	51.58	64.21	70.60	67.67
Upward Mobility Rate	46.73	36.90	48.55	55.69	53.57
Downward Mobility Rate	15.04	14.67	15.66	14.91	14.10

and managers, routine non-manual employees who are in the upper or middle position of the social class structure have a higher risk of downward mobility. From the standpoint of the comparison of upward and downward mobility rates, for professionals, administrators, and managers, routine nonmanual employees and small proprietors who are in the upper or middle position of the social class structure, the upward mobility rates are usually lower than the downward mobility rates. For skilled workers, unskilled workers, and agricultural workers who are in the lower position of the social class structure, the upward mobility rates are usually higher than downward mobility rates. Hence, the level of mobility among different social classes is satisfactory in China.

Through the mobility table, the absolute mobility rates, such as total mobility rates, upward mobility rates, and downward mobility rates, of the whole society can be evaluated; they can reflect the overall level of the intergenerational mobility in the whole society (**Table 3**). Based on the overall national value, the total mobility rate of Chinese society is quite high, and the flow direction is primarily upward, and the upward mobility rate is markedly higher than the downward mobility rate. From the perspective of the value of four birth generations, the total mobility rates of Chinese socie-

ty exhibit a continuous rising trend; however, it has declined marginally in recent years. However, the direction of the intergenerational mobility was always upward. The conclusions presented above are basically consistent with Gu (2016), who held that the level of the absolute mobility rates in Chinese society has been increasing continuously and the intergenerational mobility was primarily upward.

### ***The Relative Mobility Rates***

First, we analyzed the overall level of the intergenerational mobility of Chinese society since the implementation of the reform and opening-up policy from the perspective of relative mobility rates.

As shown in **Table 4**, the mobility ratios on the diagonal of the table, namely the intergenerational inheritance indexes, are significantly  $> 1$  (mean value: 2.18). The intergenerational inheritance index of routine nonmanual employees and professionals, administrators, and managers are notably larger. Except the intergenerational inheritance indexes, the mean value of the other 30 intergenerational mobility ratios was 1.01, and approximately 13 intergenerational mobility ratios were  $< 1$ . The mean value of intergenerational outflow and inflow indexes was 1.01 and 1.05, respectively, demonstrating that the offspring probably inherit their parental social class, but children from various social classes still have some opportunities to change their original social class status. Generally, the intergenerational mobility level in China is relatively low; however, society remains open to some extent.

Regarding the intergenerational outflow index of a specific social class, the intergenerational outflow index of all social classes is around 1, except for agricultural workers, suggesting that the offspring from most social classes have equal opportunities to change their original social class. In addition, the intergenerational outflow index of professionals, administrators, and managers is close to 1; however, the offspring of professionals, administrators, and managers tend to flow to social classes of middle social status, including routine nonmanual employees and small proprietors. The likelihood of upward mobility of the offspring from routine nonmanual employees and small proprietors is higher than the likelihood of downward mobility. Moreover, the possibility of upward mobility of the offspring from skilled and unskilled workers is higher than the possibility of downward mobility; however, they mainly flow to social classes of middle social status, that is, routine nonmanual employees and small proprietors. The intergenerational outflow index of agricultural workers is the lowest, who not only have relatively few upward mobility opportunities but also mostly flow to social classes of low social status, namely skilled and unskilled workers. Hence, the findings suggest that the intergenerational mobility of Chinese society is more inclined to be short-distance mobility, which corroborates Guo (2009) and Gu (2016).

Regarding the intergenerational inflow index of a specific social class, except for skilled workers and agricultural workers, the intergenerational inflow indexes of all other social classes are  $> 1$ , suggesting that most social classes tend to absorb the offspring of other social classes. The intergenerational inflow indexes of professionals,

**Table 4. The Intergenerational Mobility Ratios and Related Indexes in China since the Implementation of the Reform and Opening-Up Policy (N=7,654).**

Parent \ Offspring	Professionals, Administrators & Managers	Routine Non-Manual Employees	Small Proprietors	Skilled Workers	Unskilled Workers	Agricultural Workers	Intergenerational Outflow Indexes
Professionals, Administrators & Managers	<b>2.28</b>	2.05	1.08	0.65	0.69	0.41	0.98
Routine Non-manual Employees	1.7	<b>4.92</b>	1.16	0.5	1.39	0.09	0.97
Small Proprietors	1.52	1.68	<b>1.42</b>	0.88	0.91	0.4	1.08
Skilled Workers	1.2	1.54	1.28	<b>1.57</b>	1.42	0.26	1.14
Unskilled Workers	1.15	1.41	1.16	1.3	<b>1.5</b>	0.44	1.09
Agricultural Workers	0.59	0.51	0.88	1.02	0.99	<b>1.36</b>	0.8
Intergenerational Inflow Indexes	1.39	1.44	1.11	0.87	1.16	0.32	-

**Table 5 intergenerational upward and downward mobility indexes of the whole country and four birth generations**

	The Whole Nation	Post-1960s Generation	Post-1970s Generation	Post-1980s Generation	Post-1990s Generation
The Intergenerational Upward Mobility Indexes	1.2	1.39	1.15	1.07	1.04
The Intergenerational Downward Mobility Indexes	0.85	1.16	0.84	0.75	0.6

administrators, and managers and routine nonmanual employees are at the top of all indexes and > 1, which signifies that the offspring of other social classes have more opportunities to flow to the two classes. Nevertheless, the offspring of routine nonmanual employees and small proprietors have relatively more opportunities to enter the two classes than the offspring from social classes with lower social status. The intergenerational inflow index of small proprietors is in the middle of all indexes. The offspring of other social classes tend to flow to the class of small proprietors, except for agricultural workers. The intergenerational inflow index of skilled workers is lower, and the offspring of other classes tend to enter this class; however, the offspring of unskilled

workers and agricultural workers with lower social status tend to enter this class. The intergenerational inflow index of unskilled workers is also higher, but the offspring of skilled workers and routine nonmanual employees tend to enter this class. Moreover, the intergenerational mobility ratio of agricultural workers is 1.36, and the intergenerational inflow index of this class is significantly  $< 1$ , demonstrating that agricultural workers are not only more likely to inherit the social class from their parents but also not inclined to absorb offspring from other social classes. Thus, the class of agricultural workers is highly closed.

Next, the trend of the relative mobility rates of Chinese society since the implementation of the reform and opening-up policy can be assessed by evaluating the relative mobility rates of the four birth generations – post-1960s generation, post-1970s generation, post-1980s generation, and post-1990s generation. **Figure 1** shows the trend of the means of intergenerational inheritance indexes, intergenerational inflow indexes, and intergenerational outflow indexes. Moreover, the means of the intergenerational inheritance indexes decreased significantly at first and then increased slowly over time; both means of the intergenerational outflow and inflow indexes were basically declining and gradually deviated from 1, suggesting that the offspring have fewer opportunities to change their original social class, a certain social class is less likely to absorb the offspring of other social classes, and social openness is gradually declining.

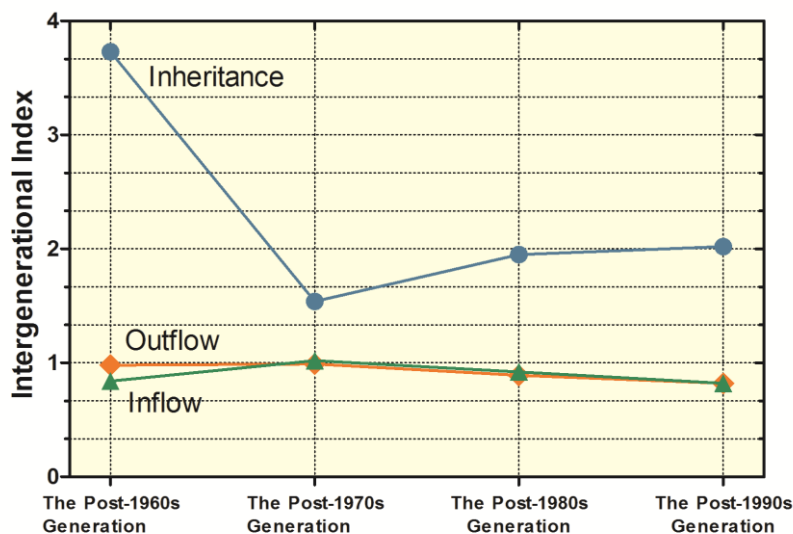
Thus, from the perspective of relative mobility rates, the intergenerational mobility level in Chinese society has been gradually declining since the implementation of the reform and opening-up policy, which are in line with Li (2002) and Li (2011).

Next, the intergenerational upward and downward mobility indexes for the whole country and the four birth generations were calculated to further analyze the directional trend of the intergenerational mobility. As shown in **Table 5**, for the entire nation, the intergenerational upward mobility index is higher than the intergenerational downward mobility index, that is, the likelihood of the intergenerational upward mobility is relatively higher. From the perspective of each generation, both the intergenerational upward and downward mobility indexes exhibited an upward trend at first and then a downward trend; however, the intergenerational upward mobility indexes were always higher than the intergenerational downward mobility indexes. Thus, since the implementation of the reform and opening-up policy, although all social classes have more opportunities to flow upward, the trend is gradually declining. The views presented above differ from Guo (2009), who not only believed that the possibility of intergenerational upward mobility in China had been greater but also gradually increased.

### ***The Reasons for the Intergenerational Mobility in China***

The analysis of the absolute mobility rates revealed that the intergenerational mobility level of Chinese society has been quite high since the implementation of the reform and opening-up policy, primarily because of the following reasons:

First, China's economy has continued to develop rapidly since the implementation of the reform and opening-up policy. Based on the statistics of the National Bureau



**Figure 1. The Trends of Means of the Intergenerational Inheritance Indexes, the Means of the Intergenerational Outflow Indexes and the Means of the Intergenerational Inflow Indexes.**

of Statistics of China, the GDP growth rates in three periods since the implementation of the reform and opening-up policy has been excellent: the average GDP growth rates was 11.5% during 1982–1988, 11.9% during 1992–1997, and 10.1% during 2002–2011. China’s sustained and rapid economic growth has provided a solid economic foundation for the intergenerational mobility.

Second, the economic structure, especially industrial structure and career structure, was changed by technological progress. While it changed the pattern of employment positions, it also provided more new jobs and promoted the intergenerational mobility. **Figures 2 and 3**, respectively, show the proportion of the output value of the three major industries in GDP and the changes in the number of employees in the three major industries during 1978–2018. We found that since the implementation of the reform and opening-up policy, the proportion of the output value of China’s primary industry in GDP decreased markedly, the proportion of the output value of the secondary industry in GDP decreased gradually in the fluctuation, and the proportion of the output value of the tertiary industry in GDP increased steadily increased. In such an industrial development pattern, the employee composition of the three industries also changed correspondingly. For instance, with the decline of the contribution of the primary industry to economic growth, abundant agricultural workers poured into cities and towns, who gradually were in the ranks of skilled and unskilled workers in the secondary industries, such as construction, and became “migrant workers.” The steady development

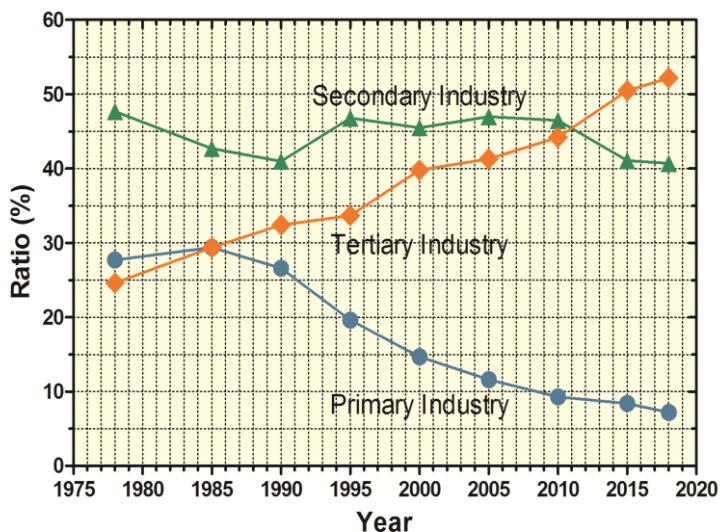


Figure 2. The Proportions of the Output Value of the Three Major Industries in China's GDP from 1978 to 2018. (Source: China Statistical Yearbook)

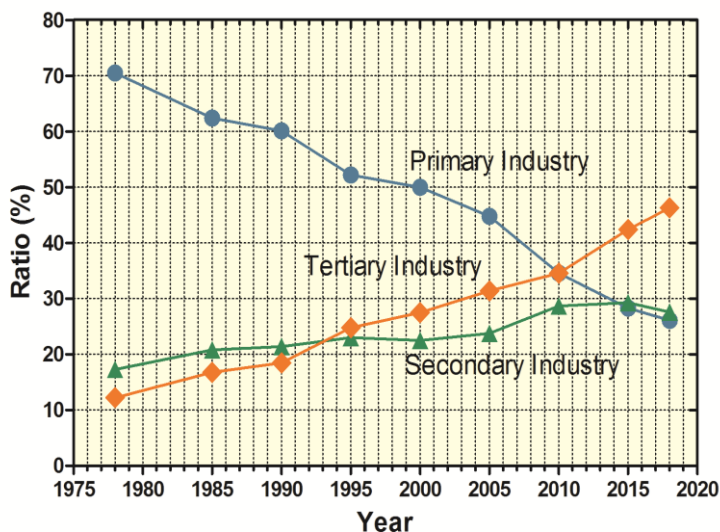


Figure 3. The Changes in the Employee Composition of the Three Major Industries in China from 1978 to 2018. (Source: China Statistical Yearbook)

of the tertiary industry, such as commerce and service industry, led to the rapid growth of private entrepreneurs, whose flexible employment forms could absorb more people from lower classes. In addition, with the adjustment of China's industrial structure, especially the rapid development of high-tech industries and new service industries, a great deal of new occupations, such as software engineers, financial planners, online media editors, electronic game or animation designers, mushroomed rapidly, which objectively provided more jobs.

Third, in the context of rapid economic growth, China's marketization and urbanization levels continue to improve. The loosening of the household registration system and the reform of the personnel system render the labor market mechanism increasingly mature. The employment system is ever more flexible, and the channels realize that social mobility is progressively smoother. For example, many rural Chinese can realize upward mobility, although they mainly flow to social classes of lower status such as unskilled workers and skilled workers. Nevertheless, the change is rather meaningful for the offspring of agricultural workers who are in the lowest position of the whole society.

Fourth, the wave of reform and opening-up drastically changed the traditional employment system. Especially in the 1990s, numerous employees in the government or state-owned enterprises resigned; they started a business and became private entrepreneurs. In addition, China implemented the reform of state-owned enterprises in the late 1990s, resulting in the unemployment of massive employees in the original state-owned enterprises. Thus, more employees in the state-owned system moved out. Meanwhile, the process of urbanization engaged many farmers in commercial activities. Consequently, a new force in Chinese society, private proprietors, rose; this group primarily includes individual businessperson, small- and medium-sized private proprietors, and large private proprietors. Private proprietors, especially early entrants, completely enjoyed the dividends of the market economy; their income level was also relatively high. The large private proprietors are even at the top of the social class structure. The individual industrial and commercial businesspersons and small- and medium-sized private proprietors are mostly in the middle of the social class structure because of the limited authoritative resources and lower social reputation. With the reform and development of the market economy, the disadvantaged groups have more opportunities to break the barriers of the identity system and realize the intergenerational upward mobility.

Fifth, in the early 1980s, China strictly implemented the family planning policy, which advocated only one child per couple. The policy significantly affected urban residents, especially people in the state-owned system. With the implementation of the family planning policy, the number of children of urban residents, especially those from superior classes, reduced relatively, creating plenty of room for children of rural and inferior classes to realize upward mobility.

Sixth, China began resuming the college entrance examination in 1977. A considerable number of people entered universities by taking the college entrance examination, thereby becoming a group with higher identity after graduation. This group at-

tained the intergenerational upward mobility by receiving higher education and entering the workforce after the implementation of the reform and opening-up policy; they jumped from what might have been a lower social class to a higher one.

Seventh, in the field of education, besides the policy of resuming the college entrance examination, two other events hugely affected the intergenerational mobility. In 1986, China enacted “Law on Compulsory education.” In 1999, Chinese universities began implementing a large-scale enrollment expansion policy. With the popularization of compulsory education and higher education, children from lower social classes could receive the most basic national education and have more opportunities to receive higher education, which undeniably helped people from the bottom of the society to realize upward mobility.

While we have clarified the reasons for the higher level of the intergenerational mobility in the sense of absolute mobility rates, from the perspective of relative mobility rates, the intergenerational mobility level in Chinese society is relatively low, even is slowly declining. The reasons are not quite affirmative but analyzed as follows.

The lower level of the intergenerational mobility as measured by the relative mobility rates may imply that the mobility opportunities for different social classes are not equal in China. Since the implementation of the reform and opening-up policy, the inequality in Chinese society has become even more prominent. Notable differences exist in the economic capital, social capital, and cultural capital possessed by different social classes, which is further transmitted to children under the circumstance of unequal opportunities. Furthermore, intragenerational inequality is transmitted to intergenerational inequality, which further aggravates intragenerational inequality; such a cycle will make social inequality even more severe in the future.

We also analyzed the reasons for the slow decline of the intergenerational mobility in China since the implementation of the reform and opening-up policy. The majority of the post-1960s generation began receiving education during the Cultural Revolution. Affected by social unrest, the educational level of the post-1960s generation is universally low, and family backgrounds exert relatively little influence on their educational attainment. From the perspective of employment, the post-60s generation mostly started working after the Cultural Revolution and at the beginning of the implementation of the reform and opening-up policy, just at the time when children could not inherit the occupation of their parents and had to hunt jobs autonomously. Thus, family backgrounds also exerted relatively small impacts on their social status. For the post-60s generation, the impacts of family backgrounds on their education and social class status were relatively small; the influence of education to promote the intergenerational upward mobility is relatively big. Thus, differences in intergenerational mobility opportunities among social classes are relatively small and the social class structure is of high openness relatively. The post-1970s generation began receiving education after the Cultural Revolution and started working before or at the beginning of the market economic system reform; both their education and employment were markedly influenced by the era of planned economy. Although education and other induced factors play a prominent role in promoting the intergenerational upward mobility, the impact of family

backgrounds on education attainment and social class status attainment is also increasing. Meanwhile, the inequality problem of the mobility opportunities among social classes is gradually emerging. The post-1980s generation began receiving education before or at the beginning of the reform of the market economy system and began entering the labor market during the reform of the market economy system. During the period when the “post-1990s generation” group received education, China’s basic education and higher education gradually changed from expanding quantity to pursuing quality, and the educational competition among different social classes even began shifting to the field of private tutoring, causing a prominent problem of educational inequality. When the post-1990 generation entered the labor market, the economic growth slowed down gradually and the employment situation became increasingly severe, making it more challenging for them to obtain good job opportunities. Thus, although the market economy is developing rapidly, for the post-1980s and post-1990s generations, the contradiction between efficiency and fairness is increasingly prominent. Furthermore, family backgrounds have an increasing influence on education attainment and social class status attainment, and the gaps in intergenerational mobility opportunities among different social classes have further expanded.

## **Conclusions**

Based on the CGSS in 2013 and 2015, we studied the trend of the intergenerational mobility in China since the implementation of the reform and opening-up policy by evaluating the absolute and relative mobility rates based on the mobility table. The main conclusions of this study are as follows.

First, the intergenerational mobility level measured by the absolute and relative mobility rates is not consistent. From the perspective of the absolute mobility rates, the intergenerational mobility level in Chinese society has been relatively high since the implementation of the reform and opening-up policy. No problem of solidification exists in China’s social class structure and the society maintains relatively high openness. From the perspective of relative mobility rates, the intergenerational mobility level in Chinese society is relatively low and has been declining gradually since the implementation of the reform and opening-up policy. A certain degree of solidification exists in China’s social class structure. Two problems worth noting are as follows. First, the intergenerational inheritance effects of all social classes in Chinese society are relatively apparent; however, under the limited intergenerational mobility level, the overall trend of the intergenerational mobility is still upward. Besides, every social class has certain opportunities to flow to other social classes, but mobility is mostly short distance flow.

Second, education is a major factor affecting the intergenerational mobility level in China. Since the implementation of the reform and opening-up policy, China’s economy has been developing rapidly. In addition, China has implemented a series of major educational decisions such as the resumption of the college entrance examination, compulsory education policy, and college enrollment expansion policy. Then, the educational level of Chinese citizens has been generally promoted. However, differences in

the educational attainment of children from different social classes are also expanding gradually, and educational inequality is increasingly prominent. Furthermore, the role of education in promoting the intergenerational upward mobility is weakened, thereby declining relative mobility rates.

Third, there are few samples of the post-1990s generation in the analysis database because of limited data. We could not comprehensively describe the trend of the intergenerational mobility in the recent and future periods. However, based on the analysis of the reasons for the intergenerational mobility during the period of implementation of the reform and opening-up policy, the conclusions mentioned above can still be drawn. From the viewpoint of the absolute mobility rates, although China's economic growth is slowing, the overall social development remains stable, which determines that the absolute mobility rates of Chinese society could maintain a high level in recent years. From the perspective of the relative mobility rates, specific differences exist in the economic capital, social capital, and cultural capital owned by different social classes, which could be difficult to change in a short period and might even be further differentiated. Thus, the relative mobility rates of Chinese society might still be low in recent years.

Fourth, the absolute mobility rates depict the efficiency of the intergenerational mobility, while the relative mobility rates denote the fairness of the intergenerational mobility. However, since the implementation of the reform and opening-up policy, Chinese society seems to present a state of insufficient equity but quite efficient. Under the condition of the market economy, fairness is inevitably subordinate to efficiency; however, once the problem of fairness intensifies, it could lead to social conflicts and eventually affect efficiency. On the one hand, the contradiction between efficiency and fairness illustrates the mobility opportunities brought by economic marketization, while it also explains the necessity of government policy to ensure equal opportunities. Currently, China's economy experiences a stage of high-quality development instead of rapid growth and is facing a challenge of avoiding the middle-income trap. Meanwhile, social inequality has become increasingly prominent. Striking a balance between fairness and efficiency is, indeed, a difficult problem in front of the Chinese government.

Overall, from the perspective of the absolute mobility rates, China's social class structure has become increasingly open since the implementation of the reform and opening-up policy. However, from the perspective of the relative mobility rates, the social class structure displays a specific phenomenon of solidification. The key to maintaining a high level of absolute mobility is to create a healthy and stable environment for economic development, while ensuring a high level of relative mobility needs effective measures to improve social inequality, of which education equality is essential.

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# The Influence of Teacher's Job Satisfaction on Students' Performance: An Empirical Analysis Based on Large-Scale Survey Data of Jiangsu Province

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**Abstract:** *It is essential to know how teacher's satisfaction affects the performance of students. Using the data of the 2016 Annual Monitoring of the Academic Quality of Students in Basic Education in Jiangsu of China, this study applied a hierarchical linear model to analyze the impact of teacher's satisfaction on the academic performance of elementary students. Results showed that both the self-realized satisfaction with the education work and the relationship between colleagues and students displayed a significant effect on students' performance, whereas the satisfaction with the supervisors and administrative, the rationality of the payment, and the environment for further development did not show a significant impact on students' performance. So based on these data, we suggest that it is critical to create a better self-realized condition for teachers to realize a good relationship with colleagues, and build up an incentive system for them to better stimulate their teaching enthusiasm.*

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**Keywords:** *Elementary School; Teacher Satisfaction; Students; Academic Performance; Hierarchical Linear Model*

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**H**OW to effectively improve students' performance is always the focus of a school. The study by Hattie (2008) demonstrated that teachers play a critical role in improving the performance of students. A low payment to teachers leads to a negative psychological change that in turn affects the learning effect of students (Wang & Wang, 2018; Sun, 2017). School administrative believes that the evaluation of the teaching performance by students is a good way to stimulate teachers to improve their teaching quality and the learning outcomes of students. From the reversed "U-shaped" relationship between teachers' income and their psychological status, i.e., teacher's psychological status improves with the increase of the income, reaches its peak and then starts to decline (Wang & Wang, 2018; Sun, 2017). Besides, plenty of teachers commented that the mismatch between the payment and workload, lack of opportunities for further development, relationship and limited time with family, all lead to less commitment to work (Jin, 2001). These showed that the material stimulation only cannot completely solve the problem of teacher motivation. If the school administrative aims at better performance from teachers, it is a feasible way to meet their psychological needs.

## Literature Review

How to effectively improve students' performance is always the focus of a school. The study by Hattie (2008) demonstrated that teachers play a critical role in improving the performance of students. A low payment to teachers leads to a negative psychological change that in turn affects the learning effect of students (Wang & Wang, 2018; Sun, 2017). School administrative believes that the evaluation of the teaching performance by students is a good way to stimulate teachers to improve their teaching quality and the learning outcomes of students. From the reversed "U-shaped" relationship between teachers' income and their psychological status, i.e., teacher's psychological status improves with the increase of the income, reaches its peak and then starts to decline (Wang & Wang, 2018; Sun, 2017). Besides, plenty of teachers commented that the mismatch between the payment and workload, lack of opportunities for further development, relationship and limited time with family, all lead to less commitment to work (Jin, 2001). These showed that the material stimulation only cannot completely solve the problem of teacher motivation. If the school administrative aims at better performance from teachers, it is a feasible way to meet their psychological needs.

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Deci & Ryan's self-determination theory believes that human beings have innate potential for psychological growth and development. However, it does not mean that teachers would exert their potential and realize independent development under any conditions, because people's self-determination is strongly based on the fully satisfaction of the individual needs and environmental information (Deci & Ryan, 1985). The basic psychological need theory, one of the main branches of self-determination theory, explains the need of autonomy indicated that ability and belonging exist across different cultures and contexts (Yan et al, 2003). Cognitive evaluation theory discusses the enhancement of intrinsic motivation caused by social environment such as reward, feedback and communication, and the weakening effect caused by threat, command, stressful evaluation and mandatory target as well (Liu et al., 2003). Therefore, the work performance of teachers may be related to their psychological state and the effective way to improve their performance would be realized through meeting their needs and making them have a positive psychological state.

Teacher's satisfaction with the job reflects a positive identification and experience of the organizational role (Mao & Tang, 2015). The teachers' satisfaction can be promoted through shaping the school culture atmosphere of democracy and cooperative learning (Koh, 1995; Marks & Louis, 1997), and promoting their sense of belonging and work performance (Banerjee, et al. 2017; Chen, 2008; Keaveney & Nelson, 1993). However, Lee et al. (2010) did not find a significant relationship between teacher's satisfaction and student performance with the addition of environmental factors and work atmosphere. Similarly, Iqbal et al. (2016) divided teachers' job satisfaction into six dimensions including income, promotion, work itself, colleague relationship, work environment and supervision behavior, and they also reached a similar conclusion (Iqbal et al., 2016). Although the conclusions were inconsistent, it shows, at least in part, that the relationship between teacher's satisfaction and student performance is influenced by many factors. A meta-analysis found a significant positive correlation between teacher's job satisfaction and student performance with the region and size of the study being important variables (Iaffaldano & Muchinsky, 1985). This again indicated that the effect of teacher's job satisfaction on students' performance varies greatly in different situations, so it is necessary to make specific analyses according to different situations.

In China, studies conducted from the perspectives of teachers' working environment, individual characteristics, teacher-student relationship, etc., laid a foundation for the classification of teachers' satisfaction dimensions.(Jiang et al, 2006). Given the lack of direct evidence, it is difficult for administrative to get support in the process of motivating teachers. A small number of empirical studies on the teacher's satisfaction, they used variance analysis or regression analysis, which only analyzes single-layer data and are difficult to solve the problem of data that include nested structure, of which a multi-level data analysis model is a more appropriate method. Our study was based on the large-scale survey data of students' academic performance, and teachers' job satisfaction during the compulsory education in Jiangsu of China in 2016, and we adopted a multi-layer linear model to analyze the relationship between teachers' satisfaction in

different dimensions and students' academic performance. Therefore, this study aimed to answer three basic questions as below:

*Q1. What is the relationship between teachers' job satisfaction and students' performance?*

*Q2. Which aspect of teacher satisfaction can significantly promote student achievement?*

*Q3. What measures should school administrative take to effectively improve students' performance by improving teachers' job satisfaction?*

## **Methods**

In this study, student performance is the explained variable, and the average value of teacher satisfaction at the school level is the explanatory variable. After controlling for relevant factors, the relationship between teacher satisfaction and student performance was analyzed with a hierarchical linear model.

## **Participants**

Since 2006, Jiangsu of China has implemented the monitoring of the academic quality of students in compulsory education stage every two years, and the sample covers the students from Grade three to Grade eight in all cities and districts with the province. The monitoring forms the academic data of students with high quality and relevant influencing factors, which provides the data basis for the implementation of this study. In the monitoring process of 2016, the research group simultaneously issued the questionnaire of teacher satisfaction and student learning status, and obtained the complete data for analysis.

Accordingly, we adopted a two-stage stratified sampling method to collect data. First, the samples were distributed at the county (district) - school level, and then the work satisfaction survey of teachers was carried out at the school level according to the random principle. On this basis, 128,356 valid student samples and 14,466 valid teacher samples from 1,732 elementary schools were obtained via data matching and sorting.

## **Variables**

### ***Student Level Variables***

The student performance data were the total scores of elementary school Chinese and mathematics. The other variables included in this study were gender, only-child situation, parental educational background, and family economic situation. The questionnaire considered the family finances as the number of mobile phones, televisions, computers and cars that their families owned. In the calculation, according to the average market price, mobile phones, computers, televisions and cars were assigned to 2,000 CNY (~\$185 USD), 5,000 CNY (~\$711 USD), 8,000 CNY (~\$1,138 USD) and 200,000 CNY (~\$28,448 USD), respectively, and the sum was divided into 3 grades

from low to high. Descriptive statistics of student-level variables are shown in the **Table 1**.

### ***School Level Variables***

The school level variables were derived from the teacher satisfaction survey questionnaire. Following the Hendrix questionnaire (Abu-Saad & Hendrix, 1995) that divided the teacher's job satisfaction into five dimensions: leadership and management, development environment, reasonable return, self-fulfillment of education and teaching work, and work relationship, with the Likert five-point method each. Four to five questions were set for each dimension, and the average is calculated by summing the dimensions. The internal consistency value of each dimension was between 0.739-0.938, and the KMO value was between 0.658-0.888, indicating that the questionnaire has good reliability and validity. After obtaining the teacher's personal survey data, the average of the teacher's professional title, teaching age, educational background, daily workload, and satisfaction was calculated by the school to obtain school-level data. Descriptive statistics of school-level variables are shown in the **Table 2**.

### **Calculation Models**

In this study, the control variables of each layer were screened as previous studies did (Mu et al., 2016; Pan & Zhang, 2017; Zhao, 2011) Because we focused on the impact of average teacher satisfaction on the average student score at the school level, which was the impact of teacher satisfaction on the mid-layer intercept; in this case, the random slope model, the coefficient and the standard error in the intercept model analysis were not much different. The inclusion of the random slope had little effect on the coefficient of the second layer variable. Therefore, this study used the zero model, the random effect variance model and the random intercept interpretation model for analysis (Yang, 2006). The model settings are as follows:

#### ***Model 1***

Student-level equation,

$$Y_{ij} = \beta_{0j} + R_{ij}, R_{ij} \sim N(0, \delta^2) \quad (1)$$

School-level equation,

$$\beta_{0j} = G_{00} + U_{0j}, U_{0j} \sim N(0, \tau^2) \quad (2)$$

$Y_{ij}$  is the total score of the mathematics and literary industry level test of  $i$  students in  $j$  school,  $\beta_{0j}$  is the total average score of  $j$  school,  $R_{ij}$  is the random error of individual students, which indicates the difference between the  $i$  student of  $j$  school and the average grade of school;  $G_{00}$  is The overall average score,  $U_{0j}$  is the school's random error, indicating the difference between the average school grade and the overall average grade.

**Table 1. Definition and Assignment of Students' Level Variables.**

Code	Meaning	Assignment	M (SD)	Min (Max)
SCORE	Score	Continuous variables. The sum of a student's Chinese and Math test scores.	1018.32 (172.18)	371.44 (1,456.96)
GENDER	Gender	0: Female; 1: Male.	0.54 (0.5)	0 (1)
CHILD	Only-Child Situation	0: No; 1: Yes.	0.4 (0.49)	0 (1)
EDU_FA	Father's Educational Background	1. Middle school or below; 2. High school (or vocational high school, technical secondary school, technical school);	2.21 (0.93)	1 (4)
EDU_MO	Mother's Educational Background	3. College (or junior college); 4. Postgraduate	2.5 (1)	1 (4)
ECON	Economy Background	There are three levels of household durable goods value. 1. At least 1/3; 2. Medium 1/3; 3. 1/3 at most.	1.75 (0.67)	1 (3)

### Model 2

Formula (1) is added to the individual variables of the students to examine their influence on the scores of the students, and the following model is obtained.

Student-level equation,

$$Y_{ij} = \beta_{0j} + \beta_{1j}GENDER + \beta_{2j}CHILD + \beta_{3j}EDU\_FA + \beta_{4j}EDU\_MO + \beta_{5j}ECO2 + R_{ij}, R_{ij} \sim N(0, \delta^2) \quad (3)$$

School-level equation,

$$\beta_{0j} = G_{0j} + U_{0j}, U_{0j} \sim N(0, \tau^2) \quad (4)$$

$\beta_{1j} \sim \beta_{4j}$  respectively indicate the degree of influence of the student's gender, whether it is the only child, the father's years of education, the mother's years of education and the family's economic situation.

### Model 3

In the formula (4), the variables of the five dimensions of the teachers and teachers at the school level were added. The random intercept model in the multi-layer linear model was used here. The only group effect in the model was the random intercept  $\beta_{0j}$ , which indicates the influence of the school-level variables on the average score of the  $j$ -th school students. The regression coefficients of the remaining individual levels were set to be fixed.

<b>Table 2. Definition and Assignment of School's Level Variables.</b>				
<b>Code</b>	<b>Meaning</b>	<b>Assignment</b>	<b>M (SD)</b>	<b>Min (Max)</b>
YEAR	Teaching Age	1. 5 years or less; 2. 5-10 years; 3. 11-15 years; 4. 16-20 years; 5. 20 years or more	3.52 (0.9)	1 (5)
TITLE	School Title	1. Elementary school level 2 and below; 2. Elementary school level; 3. Elementary school senior level; 4. Middle school senior level and above	2.34 (0.54)	1 (4)
EDU	Educational Background	1. High school, technical secondary school or middle school; 2. Junior college; 3. Undergraduate; 4. Graduate student (including master's degree in education)	2.79 (0.34)	1 (3.67)
WORKLOAD	Daily Workload	1. 5-7 hours; 2. 8-9 hours; 3. 10-11 hours; 4. 12-13 hours; 5. 14 hours or more	2.21 (0.42)	1 (4.25)
CITY	City Location	0: Township; 1: Urban area	0.52 (0.5)	0 (1)
HOLEDER	Holder	0: Private office; 1: Public office	0.93 (0.26)	0 (1)
LEADERSH	Satisfaction with leadership and management	1. Very dissatisfied; 2. Dissatisfied; 3. Does not matter; 4. Satisfied; 5. Very satisfied	4.25 (0.45)	2.2 (5)
CONDITION	Satisfaction with the development environment		4.2 (0.45)	1.5 (5)
PAYMENT	Satisfaction with the reasonable return		3.44 (0.6)	1.63 (5)
REALIZED	Satisfaction with self-realization of educational work		4.05 (0.42)	2.11 (5)
RELATION	Satisfaction with working relationships		4.36 (0.32)	2.22 (5)

Student-level equation,

$$Y_{ij} = \beta_0j + \beta_1jGENDER + \beta_2jCHILD + \beta_3jEDU\_FA + \beta_4jEDU\_MO + \beta_5jECO2 + R_{ij}, R_{ij} \sim N(0, \delta^2) \quad (5)$$

School-level equation,

$$\beta_0j = G00 + G01 CITY + G02 YEAR + G03 TITLE + G04 EDU + G05 WORKLOAD + G06 LEADERSH + G07CONDITION + G08PAYMENT + G09REALIZED + G010RELATION + G011HOLEDER + U0j, R_{ij} \sim N(0, \tau^2) \quad (6)$$

$G_{01} \sim G_{011}$  indicate the school area, teacher teaching age, professional title, educational background, daily workload, satisfaction of teachers in five dimensions, and the influence of school nature on student achievement, respectively.

## **Results and Discussion**

Based on the above multi-layer linear model settings, the study obtained the following analysis results as shown in **Table 3**.

### **Model 1**

The results of the model 1 showed that the point estimation of the student-layer variance was 18,765.008, which was significantly higher than the point estimate of the layer two effect variance (12,377.042), indicating that the difference in student achievement is majorly from individual factors, and the difference in student performance between different schools was significant ( $\chi^2 = 76,695.007$ ,  $p < 0.001$ ). The Intra-class-correlation (ICC) was about 0.3974, which indicated that about 40% of students' grades came from the difference of schools. There are invariable inter-group variations that are suitable for multi-layer linear models.

### **Model 2**

Based on the model 1, gender, only-child situation, father education, mother education and economic status were introduced to obtain the random effect covariance model. The analysis showed that these five independent variables significantly affected student achievement ( $p < 0.001$ ). First, the gender factor has a coefficient of -24.55, indicating that female students have a higher academic performance than male students. This is consistent with the findings of Li (2010) and Fortin (2015). They believed that the lack of enthusiasm for boys in the face of "test-oriented education" and the "equality of men and women" in family education investment in the context of the "one-child" policy offer the possibility of outstanding results for girls (Li & Sun, 2012; Zeng, 2000). Second, the only child is more likely to achieve higher grades, because families with multiple children would dilute family resources and more contradictions existed (Nie et al., 2016; Zhen et al., 2014). Again, in the years of parental education, the higher the education level of the father, the higher the student's score, and the mother's education level is negatively correlated with student's performance. The latter conclusion is inconsistent with another study (Liu, 2010) but similar to Hu (2007) conclusion. We proposed that this may be related to the level of anxiety of the highly educated mothers and the academic pressure they imposed on their children. Finally, in terms of family economics, students will have higher grades when they had a better financial situation. Many studies also found that a better family economic situation could provide more educational resources for their children that thereby promoted their school performance (Tao & Yang, 2007; Zhao, 2011).

**Table 3. Analysis Results of Two Horizontal Linear Models.**

	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>
	Coefficient	Coefficient	Coefficient
Intercept	1,009.47 (2.73)***	967.955 (2.94)***	387.31(45.23)***
<b>Student level</b>			
<i>GENDER</i>		-24.55 (0.79)***	-24.46 (0.79)***
<i>CHILD</i>		32.980 (0.93)***	32.94 (0.92)***
<i>EDU_FA</i>		19.084 (0.584)***	18.86 (0.584)***
<i>EDU_MO</i>		-24.99(0.55)***	-24.86(0.55)***
<i>ECO2</i>		2.67(0.64)***	2.72(0.64)***
<i>Variance Estimation</i>	18,765.008	12,672.128	10,041.41
<b>School level</b>			
<i>YEAR</i>			9.41 (4.17)**
<i>TITLE</i>			-1.77(11.47)
<i>EDU</i>			52.54(8.21)***
<i>WORKLOAD</i>			27.49(5.88)***
<i>LEADERSH</i>			7.68 (9.15)
<i>CONDITION</i>			9.65(8.82)
<i>PAYMENT</i>			-5.71(6.43)
<i>REALIZED</i>			43.58(11.58)***
<i>RELATION</i>			31.29(13.94)**
<i>CITY</i>			12.564(4.86)**
<i>HOLDER</i>			12.55(10.36)
<i>Variance Estimation</i>	12,377.042	17,517.994	17,521.278
ICC	0.3974	0.5803	0.6357

Note: Standard Error (SE) in parentheses; the result of variance estimation is the standardized residual estimate, which is significant at  $p < 0.001$  level; \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.001$ .

### Model 3

Overall, of the school-level variables, teachers' teaching age ( $\beta = 9.41$ ), education level ( $\beta = 52.54$ ), and daily workload ( $\beta = 27.49$ ) were significantly positively correlated with student achievement ( $p > 0.1$ ). The teacher's title ( $p < 0.1$ ) had no significant effect on student achievement. This showed that as the teaching age grows and the level of education increases, teachers would have more educational experience and knowledge reserves, which will have a positive effect on improving student achievement. The current job title of teachers was related to their actual work and student achievement. There was not much contact with these factors, which is the reason why the indicator is not significant (Xiao, 2013).

Our analysis showed that the more satisfied the teacher with the supervisor and administrative ( $\beta = 7.68$ ), the higher the student's scored, whereas the relationship between the two was not significant ( $p > 0.1$ ). Although good leadership may improve

teachers' job satisfaction, this improvement still needs to interact with institutional culture, teaching confidence and other factors that eventually influence student achievement (Koh et al., 1995). We did not find a significant relationship between teachers' satisfaction with the environment of further development and student achievement, which is agreement with Iqbal's conclusion (Iqbal et al., 2016) but inconsistent with some local studies that demonstrated that in China too much emphasis is made on the professionalism of teachers' morality, rigorous screen-out, painstaking research, demand for social interaction, respect, and self-realization. When their further development had problems, the professional mentality may inactivate the effects of the environment and returns (Zhang, 2011). Our study also found that teachers' self-realization ( $\beta = 12.56$ ) and job relationship satisfaction ( $\beta = 12.55$ ) were significantly positively correlated with student's achievement ( $p > 0.1$ ), which is consistent with Banerjee's conclusion (Banerjee et al., 2015) and domestic research findings. They showed that teachers' special occupational attributes make them have stronger self-fulfillment and belonging feeling. When teachers' self-realization is satisfied, their performance will in turn make a good contribution to the improvement of students' performance (Shi & Wu, 2001).

From the perspective of the survey organizer, the performance of students in public schools was higher, but the difference between the two types of schools was not significant statistically. In terms of urban and rural variables, urban students had higher grades, which are in line with general expectations, because students in urban areas had advantages in resource and thus are more likely to achieve better results relatively (Zhao, 2011).

## **Conclusion and Suggestion**

This study started from the demand of materials and spiritual of teachers, and integrated the five perspectives of autonomy, ability, attribution, remuneration and communication. We found that the satisfaction degree of self-realization and working relationship had a positive relationship with student achievement. It provides not only an empirical basis for teachers to improve their mental state, but also shows the outstanding professional spirit of our teachers. Therefore, the following aspects should be emphasized in the process of teacher management:

### **First, School Leaders Should Create Self-Realization Conditions for Teachers.**

Teachers' satisfaction with self-realization is critical for affecting students' performance, which means that assisting schools to achieve professionalism can help to improve students' performance. School administrative should help teachers deepen their professional understanding, enhance professional enthusiasm, and avoid simple material stimulation and "institutional construction" through value guidance and cultural creation. Considering that professional development is the main content of teachers' self-

realization, schools should provide teachers with better development conditions, such as providing them with more opportunities for on-working learning and school-based training.

### **Second, Administrative Should Establish Flexible and Diverse Teacher Incentive Models.**

Our study showed that, from the point of improving students' performance, the simplification of material incentives is not as effective as enhancing their internal enthusiasm. Supervisors need to regard teachers as groups with emotional needs via abandoning the simple "economic man" hypothesis, and establish a reward system to focus on the professional characteristics of teachers. Emphasis should be put on teacher's high-level needs for social interaction, respect and self-realization, to realize a superior administrative level.

### **Finally, School Administrative Needs to Create a Good Working Atmosphere with Good Colleague Relationship.**

In order to improve student achievement, schools often emphasize on the competitions of classes and classmates. However, our data showed that teachers' satisfaction with a more harmonious relationship with colleagues and students can improve students' performance indicating that schools should not exert excessive pressure on teachers and students. We advocate teamwork among teachers, and create a work atmosphere of unity, and make progress through collective preparation and cooperation. Teachers should teach students in accordance with their aptitude, promote equal exchanges with students, and create conditions to promote understanding among students, parents and the society to maintain the dignity of teachers.

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# **Effectiveness of Autonomous Learning Materials for Students during the COVID-19 Pandemic: A Case Study of the Daxie Second Elementary School in Ningbo, Zhejiang, China**

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*Abstract: Autonomous learning materials play a vital role in developing students' autonomy. By providing students with appropriate autonomous learning materials to meet their self-diagnosis learning needs, this can effectively improve students' academic performance. During the COVID-19 pandemic, students' learning changed from offline to online. However, in this process, how should teachers and students choose in the face of the rich autonomous learning materials online? This study took students from two elementary schools in Ningbo of Zhejiang Province as the research objects to determine whether autonomous learning materials are conducive to students' autonomous learning. Further, under the same background, answered whether different autonomous learning materials have different effects on student performance. We selected a total of 449 students in the second and fifth grades of the two elementary schools, and after excluding extreme values, 229 were enrolled in the experimental group and 220 were in the control group. The study found that (i) under the influence of COVID-19, the use of autonomous learning materials was effective for most disciplines; (ii) compared with audio and video learning materials, protocol-guided learning materials improved students' academic performance much higher. Based on this, we suggest that in the teaching process, teachers should select and use autonomous learning materials in a targeted manner to achieve the purpose of promoting learning.*

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**Keywords:** *COVID-19; Autonomous Learning Materials; Elementary School; Protocol-Guided Learning; Effectiveness*

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**A**UTONOMOUS learning materials are considered to be “learning materials for students with clear teaching goals and learning requirements, free choice of methods, timely feedback, a considerable number of different language levels and language skill practice” (Sheerin, 1991), that is, “with its own design, the learner can directly understand and absorb the contents contained in the textbook to achieve the purpose of learning.” This extremely flexible learning material can get rid of the limitations of time and space, cultivate students’ independent learning skills and attitudes, adapt to the different experiences, interests, abilities, and needs of individual learners, and then adjust the learning theme, speed, path, depth and breadth accordingly (Yang, 2000).

It is generally believed that the mere existence of autonomous learning facilities does not promote autonomous learning. Autonomous learning materials play a vital role in successfully implementing autonomous learning goals and cultivating students’ ability and motivation for autonomous learning. By providing learners with relevant Autonomous learning materials to meet their self-diagnosis learning needs, they have developed into autonomous learners (Cooker, 2008; Morison, 2005).

Since 2010, the Daxie Second Elementary School in Ningbo of Zhejiang Province had independently developed school-based materials suitable for student learning – task lists and protocol-guided learning (including the use of task lists for grades one to three, and the use of a protocol for grades four to six). After years of accumulation, the school had formed a relatively complete protocol-guided learning (task list) research, writing, and guidance procedure. Task lists and protocol-guided learning in various disciplines and grades have been taking on a paradigm. During the pandemic period, the school gave a full play to the autonomy and school-based nature of protocol-guided learning (task list), organized teachers to decompose the key and difficult knowledge based on the textbooks, syllabus and various reading materials, and asked different questions and supported with a certain number of targeted practical questions. The formed learning protocol was issued to students so that they can form the habit of self-directed learning, strive to improve the quality of students’ home study, cultivate their self-directed learning ability, and minimize the negative impact of the pandemic on the teaching in the upcoming new semester.

## **Background**

In 2004, the Association for Educational Communications and Technology (AECT) defined autonomous learning resources as containing people, tools, various technologies, and materials to help students learn. The learning materials were divided into education-purposed such as traditional textbooks, multimedia courseware, etc. and non-education-purposed such as electronic encyclopedias, electronic newspapers, software platforms, audiovisual materials, etc. (AECT, 2004).

As the material basis of autonomous learning for students, the choice of learning materials determines students’ interest in learning itself, their understanding of knowledge, and the vividness of their learning process (Nan, 2015). Hassan et al. (2012)

believe that the preparation of Autonomous learning materials designed according to the teaching principles and following the learning content and teaching rules can maximize the learner's academic performance. At the same time, it can enable students to choose their learning strategies according to their characteristics and different learning purposes, cultivate students' self-reflection and self-evaluation awareness and strengthen students' autonomous learning ability (Wang, 2009).

However, "Do different types of learning materials produce different effects for students, and what kind of learning materials are more suitable for students' autonomous learning?" has been becoming a hot topic.

Shi et al. (2016) used 207 seven-grade students from a middle school as objects and used a questionnaire survey to explore the impact of e-schoolbag on students' 1 classroom learning effectiveness. Through the analysis of the pre- and post-test data of the mathematics, it was found that students who used e-schoolbag had significantly higher performance than those who did not use e-schoolbag, indicating that the use of digital learning resources such as e-schoolbag can effectively improve their learning effectiveness.

Besides, the use of video materials such as IMOOC to guide students in an autonomous learning discovery network platform provides a great space for students to communicate independently (Wang, 2017). Deeply aggregated video resources have a significant effect on improving academic performance, curriculum interest, and increasing classroom interactivity (Feng et al., 2016).

In the face of emerging digital learning resources, there are also autonomous learning materials formed by combining traditional paper materials with digital materials, thereby realizing huge innovations in educational materials, promoting the formation of a student-centered teaching model, and ultimately improving the learning flexibility and personalization (Sabrina, 2010). In particular, materials designed and developed by teachers or researchers are more conducive to student learning than those without systematic design (Song & Sun, 2013).

Most of the above studies have found that the correct use of autonomous learning materials is positively correlated with the improvement of student performance. However, the research results were all based on the normal teaching in the school, as well as the face-to-face guidance of teachers or the counseling agencies. Therefore, it is difficult to say whether the use of autonomous learning materials can also improve students' academic performance without the guidance of teachers and counseling agencies, so the robustness of their data needs to be further improved.

This study carried out during the pandemic isolation. This special event got teachers cannot teach normally, and various counseling agencies also canceled their offline courses, so the above-mentioned two confounding factors were well controlled. The two schools that participated in this study actively responded to the requirements of the pandemic prevention and control, adopted autonomous learning at home. The difference was the choice of autonomous learning materials. The school in the experimental group adopted school-based learning materials, i.e., protocol-guided learning

materials, while the students in the control group watched the video of famous teachers or live broadcasts and recordings, etc. through the national and local resource platforms.

Therefore, in this study, the Daxie Second Elementary School in Ningbo of Zhejiang adopted protocol-guided learning as its autonomous learning materials as the main intervention variable. Through research, this study aimed to answer the following two questions:

1. *Does the use of autonomous learning materials help students improve their academic level without the guidance of teachers and counseling agencies?*
2. *Do school-based protocol-guided learning and teacher's live recording videos have different effects on students' academic performance?*

## **Research Design**

### **Objective**

As mentioned above, the use of autonomous learning materials can effectively improve students' academic performance. However, in previous studies, the influence of the two confounding factors like teacher guidance and educational agency counseling could not be ruled out. Therefore, the robustness of their research results needs to be further improved. Based on this, our research, on the one hand, is to verify the effectiveness of students' independent use of the autonomous learning materials during the COVID-19 period; on the other hand, to test whether different autonomous learning materials possess a different effect on their learning outcomes.

### **Subjects**

We selected the second and fifth-grade students of two elementary schools in Ningbo, Zhejiang Province, China as the subjects. Among them, the Daxie Second Elementary School in Ningbo was used as the experimental group, and the protocol-guided learning materials were prepared by teachers according to the students' learning contents and academic conditions. The control group was another elementary school in Ningbo, and the live broadcasting and recorded video as the autonomous learning materials.

To better control the influence of the students' pre-conditions and pretest differences on the study results, we first investigated the students' family background, parents' educational level and other factors to exclude the interference of these related factors. After obtaining the pre-test results, we matched the experimental data with the control ones and matched the reference sample according to the students' total scores in Chinese and mathematics. After deleting the samples with missing test results, we finally got 229 and 220 valid samples in the experimental and control groups, respectively. The two schools that participated in this study were public schools with a good reputation. No significant differences exist between the two schools in terms of teachers, students, and school conditions.

## **Intervention**

In this study, after controlling other related variables, autonomous learning materials were set as the only variable. The experimental school students adopted protocol-guided learning. This is learning material designed by teachers, with students as the main body, problems as the core, practice as the guarantee, and learning method acquisition as the fundamental (Xia, 2020).

To ensure the quality of students' online learning, the control school used teaching videos and live broadcasting videos provided on cloud platforms such as national public resources, local education, and school network as students' autonomous learning materials.

In terms of teaching methods, online teaching has become the only teaching method because classroom teaching cannot be carried out. During the COVID-19 pandemic period, the experimental school organized the teachers of each course to design protocol-guided learning (task list) according to the learning objectives of the textbooks and students' academic conditions to make the knowledge organized and systematic. Teachers will upload protocol-guided learning (task list) to the class group before class, and ask students to prepare according to the protocol and complete the questions. The teacher designs or adjusts the teaching micro-classes according to the situation of the preparation work submitted by the students. After the students have prepared through the protocol, they perform autonomous learning according to the high-quality micro-classes uploaded by the teachers and complete the classroom training in the process. After finishing the course, the teacher will arrange a small amount of homework according to the learning situation. Students complete post-practice exercises and upload their homework to class groups, and then checked and appropriately guided by teachers eventually (Xie & Yang, 2020).

The control school also adopted online teaching and guidance, and arranged students to watch live or recorded video according to the teaching plan or progress every day, and completed the exercises arranged by the teacher in the process, and arranged the exercises according to the learning course after the study. Students uploaded the completed exercises to the online class QQ or WeChat group, and the teachers guided them after the correction.

## **Test Tools**

The test tools for the pre- and post-tests were all unified standardized test papers prepared by the Teaching and Research Office of Ningbo, Zhejiang Province. The personnel preparing the test papers have rich teaching experience. The test papers compiled by them have shown good reliability and validity in the past years. The pre-test results were selected from the 2019 Ningbo Elementary School unified final exam results, and the post-test results were the city-wide unified test results conducted on April 28, 2020.

In both the experiment and the control groups, student performance was used as an indicator of teaching effectiveness. The students in the experimental group mainly

used the protocol-guided learning compiled by teachers to conduct targeted autonomous learning. The teacher published the prepared protocol through the online platform, and the students received it and completed it. The teacher timely understood and summarized the completion, and took the problems with a high error rate as the key issues in online classroom teaching. This completed the task of learning while cultivating students' autonomous learning ability. The autonomous learning materials of the students in the control group mainly came from the video of famous teachers from the national resource platform and local education platform or the live broadcasting and recordings of teachers of the school. Through this study, we tried to clarify whether the differences in autonomous learning materials have an impact on students' academic performance.

## **Research Process**

This study started planning in late January 2020, officially started in early February 2020, and ended in late April 2020.

The end of January 2020 is the preparation stage. At this stage, the two schools first determined the participating students and teachers. Through matching and comparison, the situation of the participating teachers and students was the same, and there was no significant difference. Second, teaching content and progress were coordinated. Finally, the materials needed for the study were prepared and the specific flow of the study was determined.

From February to the end of April 2020, the implementation phase lasted 10 weeks. At this stage, the two schools used different autonomous learning materials for teaching.

## **Results**

Before the outbreak of the pandemic, all schools in China had finished the 2019 winter semester. Therefore, before the study, the students of both schools used classroom teaching for daily learning. We used the final test scores of the Chinese and Mathematics as the pre-test data. During the pandemic period, students from both schools conducted autonomous learning using different learning materials at home. To verify the effectiveness of autonomous learning materials, the two schools used a unified standardized test paper to test the two subjects of Chinese and mathematics of the two schools as post-test data. All data were analyzed using the SPSS20.0 for independent sample t test, and the score analysis is shown in **Table 1**.

From **Table 1**, the pre-test data of the two groups of second and fifth graders had similar average values in the two subjects of Chinese and mathematics. Among them, the mean value of the fifth-grade Chinese subjects in the control group was higher than that of the experimental group, with a t value of -0.816; and the second-grade mathematics subject had the largest t value of 0.891, and the average difference between the two groups was about 1.2. The p-values of Chinese and mathematics in the second and fifth grades were both greater than 0.05. This showed that there were no significant differences between the two groups in the normal teaching environment.

**Table 1. Statistical Analysis of Students' Pre- and Post-Test Results.**

		Pre-Test		<i>t</i>	<i>p</i>	Post-Test		<i>t</i>	<i>p</i>	Exp. Effect
		Mean	SD			Mean	SD			Cohen's <i>d</i>
<b>2nd Grade (Ne=100, Nc=95)</b>										
Chinese	Exp.	88.31	7.96	0.28	0.77	77.06	16.03	1.18	0.23	-0.21
	Ctrl.	87.84	14.56			80.00	18.54			
Math	Exp.	91.51	7.72	0.89	0.37	84.52	11.54	3.17	0.002	0.33
	Ctrl.	90.35	10.29			77.34	19.23			
Total	Exp.	179.82	14.15	0.72	0.47	161.58	24.75	0.95	0.34	0.03
	Ctrl.	178.18	17.27			157.34	36.17			
<b>5th Grade (Ne=129, Nc=125)</b>										
Chinese	Exp.	78.24	7.20	0.82	0.42	80.27	14.69	5.13	0.00	0.75
	Ctrl.	79.65	18.18			68.03	22.61			
Math	Exp.	80.25	17.50	0.39	0.69	70.91	24.02	9.56	0.00	1.15
	Ctrl.	79.28	21.58			42.35	23.55			
Total	Exp.	158.49	22.56	0.12	0.90	140.19	40.78	5.78	0.00	0.74
	Ctrl.	158.93	32.77			110.38	41.39			
<i>Note: Exp.: Experiment Group; Ctrl.: Control Group; SD: Standard Deviation. Ne: Number of the experiment group; Nc: Number of the control group.</i>										

Except for the fifth-grade mathematics of the control group (mean: 42.352), all subjects had completed basic learning tasks, and the post-test averages had reached the qualified level (the standard of qualified level means that the average value is greater than or equal to 60% of the total score). Therefore, it can be concluded that the autonomous learning of students is only effective for some disciplines.

It can also be seen from the post-test results that the two groups had differences in the learning situation of the students in Chinese and mathematics. Compared with the previous average test scores, the second and fifth-grade students had a large difference in the average scores of Chinese and mathematics in the post-test. The fifth-grade students were particularly obvious. Their mathematics *t* value is 9.562, and the average difference between the two groups was close to 29. The results of the students in both groups were significantly different ( $p < 0.01$ ). In the second-grade mathematics, the *t* value was 3.179 and the *p*-value was 0.002. There was a significant difference in mathematics between the two groups in between the second graders, with a *p*-value greater than 0.05 in Chinese. However, overall, the students in the experimental group were generally better than those in the control group who did not use autonomous learning materials.

## Discussion

### 1. *Under major emergencies, is the use of autonomous learning materials conducive to student learning?*

Autonomous learning materials are an important part of autonomous learning equipment. Sufficient autonomous learning materials have a significant positive correlation with learners' language level, needs, and learning style. Well-organized and appropriate autonomous learning materials can promote learners' self-directed learning (Sheerin, 1991).

Compared with the previous test scores, the average post-test scores of the two groups had decreased significantly. The reason for this phenomenon was the lack of autonomous learning ability of elementary school students, especially those from the rural area because they cannot complete the learning tasks independently without the direct guidance of the teacher. According to the data of Balkundi (2006) and Yao (2020), the human capital owned by teachers plays an essential role in changing students' academic performance.

However, we also found that except for the fifth-grade mathematics subject in the control group, and all other post-test scores reached the pass line, indicating that the use of learning materials has a significant impact on student learning without the guidance of teachers. This also demonstrates the idea advocated by Nuthall (2005) that a quarter of the specific concepts and principles of student learning are mainly acquired through the use of learning materials, designing activities by oneself, or collaborating with peers.

Based on this, we believe that under major emergencies, when teacher classroom teaching and guidance cannot be carried out, whether it is a school-based learning resource designed by the teacher or an open network video resource, the proper and reasonable use of autonomous learning materials is conducive to students' academic improvement.

## ***2. Do different autonomous learning materials have different effects on students' academic performance?***

The two schools participating in this study selected the video resources provided by the national, local, and school cloud platforms and the school-based protocol-guided learning resources prepared by the teachers according to the syllabus and textbooks through collective discussions as the autonomous learning of students during the pandemic period. These were the only variables set in this study.

Previous studies believed that protocol-guided learning fully considered the student's subjective status, and students carried out activities such as learning, questioning, and inquiry-based on the content of the protocol (Chen, 2013), which was conducive to students' timely discovery and feedback of problems, and thus to obtain more targeted guidance, and finally solved the problems in full interaction and communication between teachers and students (Xu & Du, 2015). Through this study, we found that the experimental group using protocol-guided learning as autonomous learning materials had significantly higher post-test scores than the control one. This result is consistent with the data of Zhou et al. (2020), and further demonstrates the validity of pro-

protocol-guided learning in previous studies with specific research data as scientific evidence (Ou, 2017).

Based on this, we believe that, compared with other autonomous learning materials, adopting Chinese localized protocol-guided learning based on student subjectivity and learning as student autonomous learning materials is more conducive to the improvement of students' academic level.

## **Conclusions**

Based on the above results, this study draws the following main conclusions:

**1. *Under the influence of COVID-19, when students learn autonomously, the use of autonomous learning materials is effective for most disciplines.***

Through the method of comparative research, this study separately analyzed the students' academic performance in normal teaching and COVID-19 pandemic environments. The results showed that although the overall scores during the epidemic are lower than those in the normal teaching environment, the scores of most of the subjects have reached the qualified level. These data reflect that the use of autonomous learning materials has a certain degree of positive guidance. By relying on their efforts, students can actively improve their ability to learn and explore knowledge.

**2. *Compared with audio, video, and other materials, using protocol-guided learning as autonomous learning materials, students' academic performance has been improved to a higher extent.***

A large number of studies reported that protocol-guided learning not only has an important impact on students' academic performance, but also plays a pivotal role in learning ability, independent exploration, and innovation. Zhang et al. (2013) believed that protocol-guided learning, as a student's autonomous learning materials, fully stimulates students' ability to think independently and cooperate, which is a scientific and effective program to promote students' autonomous learning ability.

This study is a further exploration of previous studies. By analyzing the post-test results of the two groups during the pandemic period, it was found that the overall learning performance of the experimental group using protocol-guided autonomous learning materials was significantly higher than the control group using live broadcast and recorded video as autonomous learning materials, which reflects the use of protocol-guided Learning materials can more effectively promote the improvement of students' academic level. Therefore, compared with using live broadcast and recorded video as autonomous learning materials, adopting China's localized protocol-guided learning based on student subjectivity and learning situation as autonomous learning materials is more conducive to the improvement of students' academic level.

## **Suggestion**

According to the above conclusions, to reasonably choose autonomous learning materials and cultivate students' autonomous learning abilities and motivations, we recommend:

**1. Teachers should be good at using autonomous learning materials.**

The use of autonomous learning materials is not only a wealth of learning materials for students, but also a tool to cultivate students' autonomy and inquiry awareness. Therefore, teachers should make reasonable use of autonomous learning materials so that they can play the largest role in the students' learning process.

**2. Schools and teachers should be targeted in choosing autonomous learning materials.**

The academic conditions of different schools in different regions are different, and the differences in students' cognitive levels are also obvious. Therefore, designing corresponding autonomous learning materials in a targeted manner, with the help of these materials in conjunction with the corresponding autonomous learning mode, can help students improve their academic performance.

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## **How to Make a Systematic Review’s Meta-analysis High Quality?**

*By Pigott, T.D., & Polanin, J.R.*

**T**ERRI Piggott at Loyola University Chicago and Joshua Polanin at AIR co-authored a “Methodological Guidance Paper: High-Quality Meta-Analysis in a Systematic Review” published in *Review of Education Research*.

A meta-analysis synthesizes the quantitative findings of many studies on a given topic. The guidance paper outlined the characteristics that made a meta-analysis in a systematic review high quality, discussing unbiased screening and coding procedures, establishing a protocol for carrying out a review, reasoning the best practices for computing effect sizes, and finally reported the data.

The authors concluded that “the role of researchers using systematic review and meta-analysis is to produce both high-quality analyses and to interpret those results in ways accessible to a wide audience. A high-quality systematic review and meta-analysis is difficult and time-consuming to produce; it is worth the effort to ensure that the results inform future research and policymaking through clear discussion of the results. Researchers should consider preparing different summaries of their review tailored to their audience of researchers, policymakers, and practitioners.”

*Source: Review of Educational Research, 2020; 90(1):24-46.*

## **The Effect of Linguistic Comprehension Training on Language and Reading Comprehension**

*By Rogde, K., Hagen, Å. M., Melby-Lervåg, M., & Lervåg, A.*

**K**RISTIN Rogde and colleagues from the Campbell Collaboration have completed a systematic review that examined the effects of linguistic comprehension instruction on generalized measures of language and reading comprehension skills. Examples of linguistic comprehension skills include vocabulary, grammar, and narrative skills.

The authors searched literature dating back to 1986, and identified 43 studies to include in the review, which contains samples of both pre-school and school-aged participants. Randomized controlled trials and quasi-experiments with a control group and a pre-post design were included. Key findings of the review are as follows:

- The linguistic comprehension programs included in the review display a small positive immediate effect on generalized outcomes of linguistic comprehension.
- The effect of the programs on generalized measures of reading comprehension is negligible.
- Few studies report the follow-up assessment of their participants.

According to the authors, linguistic comprehension instruction has the potential to increase children's general linguistic comprehension skills. However, there exists variability in effects related to the type of outcome measure that is used to examine the effect of such instruction on linguistic comprehension skills.

*Source: Campbell Systematic Reviews, 2019; 15(4):e1059.*

## **Preschool Teachers' Personality and Their Beliefs in Developmentally Appropriate Practices**

*By Wong, P.Y.*

**A** RECENT study published in *Frontiers in Psychology* examined how teachers' beliefs and practices were related to their personalities in preschool settings.

Among a sample of 544 preschool teachers in Hong Kong, which included pre-service and in-service teachers, Wong (2019) used questionnaires to examine how teachers' beliefs in developmentally appropriate practices were related to their personality.

The questionnaire included the Myer-Briggs Type Indicator (MBTI), which is a personality inventory that measures four dimensions of personality, namely "Extroversion-Introversion", "Sensing-Intuition", "Thinking-Feeling", and "Judging-Perceiving". Moreover, the Teacher Beliefs and Practices Survey were used to measure teachers' beliefs and their instructional activities about developmentally appropriate practices. The findings are as follows:

- The predominant personality type profiles of preschool teachers were "Sensing-Feeling-Judging". The in-service teachers in the sample were characterized by the dominance of sensing (86.7%), feeling (64.0%), and judging (83.4%).
- Extroverted and intuitive teachers tended to hold stronger beliefs in developmentally appropriate practices, in contrast to introverted teachers and sensing teachers.
- Teaching experience also contributed to preschool teachers' beliefs in or the use of developmentally appropriated practices, which might minimize the limitations that linked to the sensing type personality found in the majority of preschool teachers.

However, the author remarked that although random sampling was used, which was only from one tertiary institution. Therefore, readers should be cautious about the generalizability of the results.

*Source: Frontiers in Psychology, 2019; 10:2822.*

## Writing Supported by Virtual Reality

By Huang, H.L., Hwang, G.J., & Chang, C.Y.

In a recently published article in *British Journal of Educational Technology*, co-authored by Hwang & Chang (2019) examined how the spherical video-based virtual reality (SVVR) approach can support descriptive article writing in Taiwan senior high school writing classes.

In traditional language learning activities, as the authors identified, there is usually no chance for students to develop in-depth feelings about the context of topics, resulting in low learning motivations and limited expression in the writing process.

To provide in-depth experiences and to facilitate students' descriptive article writing, the study introduced an SVVR system that used 360-degree photos or videos in a VR environment supporting students before they started to write. Two classes of 11th graders participated in the study, 30 students being allocated to the experimental group, and 35 students to the control group. After students understood the writing tasks and read a descriptive article text about the Jade Mountain in Taiwan, the students in the experimental group used the SVVR to experience the ascent of the Mountain, while students in the control group only watched videos and saw photos of the Mountain. The study was conducted in 2 weeks with 3 hours of class per week. Before and after that, a pre-test and a post-test on their writing performance and questionnaires were conducted. The results showed that:

- While students' writing performance in both groups was similar in the pre-test, students who learnt with the SVVR approach obtained better post-test results in terms of content and appearance than students in the control group, but not in the organization or the vocabulary use.
- Students learning with the SVVR approach also outperformed control group students in creativity tendency and writing self-efficacy in the post-test.
- However, the experimental group students and control group students did not differ in learning motivation and cognitive load in the post-test.

The authors suggested that SVVR is worth promoting in school settings for language courses and experiential learning activities, because it is a low-

tech and low-cost way to provide deep experience in specific learning contexts.

*Source: British Journal of Educational Technology, 2019. In press. Doi: 10.1111/bjet.12893*

## **Note to Contributors**

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