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Dilemmas and Countermeasures in the Development of Digital Education in Germany Basic Education

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Abstract: *Taking digital education in Germany basic education as the research object. The paper adopts literature research method to accumulate and dissect the issues existing in German education phenomenon, so as to provide corresponding references. According to the research, all federal governments should avoid "bureaucracy" practices, keep abreast of people's needs in time, optimize the allocation of educational resources and protect the rights and interests of school development in order to solve the dilemma of digital education development. Simultaneously, in order to achieve the healthy development of basic education, cultivate children's digital awareness and digital competence, and enhance their capability to integrate into the digital society,all regions need to provide specialized digital teaching training for school teachers, enhance their digital literacy, and build a solid foundation for the development of digital education under the basic education stage.*

Keywords: *German education, Basic education, Digital education, Dilemmas and countermeasures*

1. Introduction

The digital world has always been a space for students to live, study, entertain and create, and an educational position of equal importance to the real world, and an educational position of equal importance to the real world. In 2016, Germany promulgated "Education in the Digital World" to promote the coexistence of human society and the digital world, and the implementation of this bill plays an magnificent strategic command role in the development of digital education in Germany. In fact, in the process of policy promotion, digital education in Germany has not been substantially developed due to the unfair distribution of educational resources, poor supervision and management of education, and the low digital literacy of teachers, and the business of education has yielded little results, revealing many problems in basic education instead.

As the first country to popularize compulsory education, Germany has a comprehensive education system. While the digitalization of education plays a momentous role in the economic and social processes, the digitalization of basic education in Germany is not as well developed as it could be. Under the tide of digital development, Digital Germany has set out two core objectives: one is the integration of "competences in the digital world" in the curriculum, and the other is to support teachers' teaching in a digital way.[1].In contrast, in both the 2015 and 2018 tests, German students showed a continuous downward trend in their mathematical and scientific abilities. This reflects the fact that mathematics and science education at the basic education level in Germany has not yet reached its predetermined target and that German pupils are underperforming in mathematics and science skills. The German government is aware of the grievous difficulties with the digitalisation of education in the country and has launched the strategy of "Digital Education Offensive". The outbreak of the COVID-19 epidemic has made digital education particularly significant, which is of enormous advantage to the development of basic education in Germany. However, there are numerous problems with the development of digital education in Germany's basic education stage, and the process of digitising education varies from federation to federation. There is an urgent need to explore smart education paths, oriented towards real problem solving, to improve the development dilemma of digital education in Germany's basic education stage.

The new era should look towards the future age of information technology, make rational use of the resources provided by the Internet, profoundly explore the trend of education meeting the requirements of personalised and intelligent development, actively seek cooperation and mutual reference from other countries, and promote the construction of Community of Shared Future for Mankind.

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2. Dilemmas in the development of digital education at the basic education level in Germany

2.1. Inequitable distribution of educational resources

The current total investment of more than 6.5€ billion by the federal and state governments in the construction of campus digital infrastructure, which fully reflects Germany's determination to implement digital education strategy.[2] Education is a slow-burning project, and the provision of seemingly large sums of money without considering the long-term needs of education and the appropriate methods to optimise the allocation of resources can easily lead to a loss of money.

Information technology affects people's learning and lives all the time. Digital education based on online learning platforms serves to narrow the education gap and promote educational equity, but also certain aspects are flawed to varying degrees. While online platforms act as a back-up to digital teaching and learning, providing a medium for the delivery of digital information, different students face different as black and white situations at home: some children have access to diverse, learning-related verbal and emotional interactions in situations related to digital technology, while others have no access to digital media at all, or even suffer from domestic violence, and learning is impossible for them. Therefore, the longer home schooling lasts, the greater the associated disadvantages.[3].The process of financial support for education inevitably leads to educational inequity, with quality educational resources often skewed towards the rich, while there is a lack of internet connectivity for children from poor families under digital education, making it difficult to engage in normal learning activities.

Children from wealthy families have greater access to quality educational resources and the money parents invest in their children can be used to develop their interests. In such a family context, children have a wider opportunity to broaden their horizons and a stronger foundation for all-round development. While children from poor families face even more problems with their family education, as financial pressures and poor learning environments make them significantly more unequal to children from wealthy families in terms of educational issues, such as domestic violence in some families, lack of electronic products and poor living conditions, which do not create the conditions for students to receive a digital education.

Although Germany has a strong talent pool for digital education, the frequent data scandals and school education quality problems make the development of digital education in Germany lack public foundation, and the majority of the German public has a negative attitude towards the digital transformation of education and e digital empowerment of children. Some people even question whether the government can realize the efficient decision-making of digital education. Germany's abundant financial resources and technological R&D capabilities make it difficult to invest in the digitalisation of education, and the informatisation of education has stagnated for this reason.

2.2. Inadequate supervision and management of education

Germany is demanding more competence from teachers and children in basic education. It is clear that students should be able to coexist with digitalisation and that teachers must be digitally literate and up to date to meet the needs of society. Despite the German government's laws and huge investments, due to the laissez-faire power of various states, there is an educational injustice due to the lack of implementation of policy advancement. Germany, as a federal country, states have greater rights. Although the federal and state governments have issued corresponding documents and provided financial support to improve the infrastructure construction of primary and secondary schools, there are many schools, the power is indulged, the supervision is not in place, the measures are not targeted, the implementation effectiveness is not comprehensive and in-depth, which is mainly concentrated on the material level. There are still difficulties to be solved urgently in the implementation of digital education strategy.

While the government promotes digital education agreements for primary and secondary schools, many social organisations such as religious groups, charities and foundations have requested policy support. And some organisations make huge profits by applying for funding under the guise of development difficulties. Despite the large amount of financial grants provided by the government, it is difficult to sustain under the pressure of the enormous applicants, which is easily lead to an uneven distribution of funds.

At the beginning of 2020, the results of the German School Management Survey showed that 2/3 of school administrators said that their school did not have an online curriculum and did not have broadband

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internet in their classrooms.[4]The misuse of funds has put pressure on the government's finances and schools in desperate need of funds to improve their infrastructure are not adequately supported. Alexander Lorz, the current Minister of Education of Hesse, has clearly expressed the problem that the states cannot afford the follow-up funds alone[5].The use of information technology equipment is not immune to problems such as system failures, ageing circuits and casing damage, which aggravate the development pressure of these schools.

The German state system of decentralisation and checks and balances does not apply to the nationwide education reform. The states enjoy absolute sovereignty over culture and education, and the German government's decentralisation of funding, which has resulted in tremendous instances of poor implementation of actual funding. At the same time, the central government's loose supervision of the states and the inconsistent progress of policy advancement in each region have made it difficult to provide practical assistance to poor schools in genuine need of support, resulting in a waste of educational resources, educational inequity and slow progress in digital education reform.

2.3. Low digital literacy of teachers

With a serious lack of funding for the development of basic education, a shortage of digital equipment in many primary and secondary schools and a serious shortage of teachers, there are still numerous problems with the development of digital education in Germany. Infrastructure development in schools, government policy concern, information technology utilization and the digital systems development have improved the working conditions of teachers. How teachers can resist the threats posed by the digital revolution and how they can further improve their personal digital competence is another ambitious obstacle facing Germany. One of the common problems in the digital world is that the overabundance of resources, the blurring of the dividing lines between ministries, which confuses people and makes it easy to talk about mechanisms in isolation from the material world, breeding a void of human purpose and goals.

According to Germany's D21 Digital Society annual report for 2017-2018, the most widespread digital skill among the population is "web search", but only 70% of the population master this ability.[6]This means that 1 in 4 people in Germany has the ability to search the Internet. In other words, a quarter of the people in Germany do not have the most basic digital skills. In the 2013 International Computer and Information Literacy Survey (ICILS), the digital skills of German pupils are also low, with one third of pupils having a medium level of computer and information literacy. German students' digital abilities were also relatively backward. The study also points out that the IT potential of young people in Germany is underdeveloped, that a digital divide is beginning to emerge among pupils, and that the ratio of digital devices in German schools and the ICT competence of teachers are below the international average. The monitoring report for primary and secondary schools shows that school management, teachers and students are willing to use digital media, but are unable to fully exploit the role of digital in teaching and learning in all subjects due to the limited teaching staff and basic school facilities, and that teachers and pupils lack the material conditions to improve their digital skills, which means that the goal of digitalisation in education is still far from being truly realised.

Almost all school students or dropouts in Germany are uncomplimentary about the numerical skills of their teachers. In an online survey commissioned by Forsa and conducted by Stifterverband, two thirds of the 1,000 people aged 14-21 rated their teacher's approach to digital learning as 'not very good' or 'not good'.In the international special assessment of the PISA study, Germany scores extremely terrible in international comparisons. In terms of digital training for teachers, Germany ranks almost last. Only a minority of primary and secondary school teachers in Germany actually use multimedia for teaching, and some older teachers, despite their intention to use it, find it difficult to put it into practice because of their lack of digital information literacy.

The epidemic crisis in COVID-19 has increased teachers' workload considerably, and the long hours they work can easily lead to reduced motivation and damage to their physical and mental health, making their digital development unsustainable. The German agreement on digital education in primary and secondary schools places emphasis on the construction of digital equipment, but does not include digital competency training for teachers in its framework, reaulting in the vacancy of the digital competencies of German teachers. In schools where digital education is lagging behind, teachers' digital teaching equipment is difficult to secure and teachers' opportunities for further training are even more vague.

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3. Countermeasures of Digital Education Development in German Basic Education Stage

3.1. Optimising the allocation of educational resources

Internet information technology provides an effective way to network educational resources. High-quality educational resources are no longer limited to the developed urban areas, and the high sharing of the network enables the villages and towns of Unicom to enjoy the opportunities brought by the technology, thus opening up the pattern of urban-rural integration. At present, there are still information barriers caused by incomplete infrastructure in backward villages. To optimise educational resources, it is necessary to build a complete resource bank, integrate existing resources, and use chips and USB sticks to concentrate quality educational resources in virtual space, breaking time and space constraints, so that students in remote areas can also acquire knowledge in a timely manner.

Germany's digital education strategy has contributed to ameliorate the infrastructure, narrow the education gap and achieve equity in education. The state governments should take into account the interests of various parties and the needs of long-term development when investing in education, and adjust the structure of education funding to optimise it. When investing in funds, we should make a reasonable fund plan in advance, and go to the invested areas in advance to conduct on-the-spot investigation and research, so as to clarify the local education needs. While setting the vision for a broader long-term future, we should earnestly understand the local situation, improve the conditions for running schools in the region, ensure the supervision of funds in all links, optimize the allocation of educational resources and realize the digital transformation of education. It is worth mentioning that when providing equipment for each school, attention should be paid to the local facility repair capacity, and the funds needed to repair the facilities should be included, so as to alleviate the barriers and further stimulate the vitality of running schools.

Perfecting the infrastructure construction in poverty-stricken areas will immensely advance the digitalisation of education in Germany. The digitalization of education in backward areas holds great potential, which will give more funds to poor schools and families, and enhance the hematopoietic capacity of education in this area. Benign family education and school education echoing each other often produce a 5+2>7 effect, providing more educational assistance for children in backward regions, narrowing the gap with students from wealthy families, and providing opportunities for more children to develop their potential.

Optimizing the allocation of educational makes it possible for poor people to have access to schools and good schools, so as to attract teachers, retain talents, stimulate the potential of digital education and promote the development of education digitally in poor areas in order to move rapidly towards revitalisation.

3.2. Safeguarding the rights and interests of school development

The basic education stage needs to nurture adaptable talent in line with the needs of society and the trends of national development, ensuring that schooling is linked to the social environment so that the new generation can shoulder the social burden and contribute to the success of the digital revolution. The digital world places higher demands on children's abilities to coexist with digitalisation, to keep pace with the times and to meet the needs of society, and a rational distribution of educational resources can provide children with equitable opportunities to exploit their educational potential.

Grundschulverband thinks: "The primary school's task is to realize the educational needs of children in the society and the educational needs of children in the society. Schools should ensure the existence of culture and democracy, and teach young people the knowledge, skills and abilities needed to maintain and further develop our society, so that the next generation can take responsibility for the country and transform the society. "[7]Primary school stage is not suitable to bind students' nature, and school should be a place for life and entertainment, so that students can develop freely in this space. The development of students' digital ability endows them with the ability to live a full life. However, in today's rapidly changing social environment, information technology is still used as an auxiliary tool to help teaching and relieve teaching pressure in the field of education.

The government should adhere to sustainable development while providing funding for education. While providing funding for schools to invest in infrastructure construction, the policy benefits and funding required for subsequent equipment maintenance should be taken into account to avoid more onerous funding pressure due to equipment failure in schools, resulting in a vicious cycle of education

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development.

Therefore, reasonable development rights, magnificent information equipment and adequate recreational space are of great significance for the sustainable development of basic education.

3.3. Strengthening digital training for teachers

With the rapid development of technology, the advent of the digital age and the changing international situation, education needs to adapt to or stay ahead of the development of society and train new people for society in order to promote the deeper integration of digital education and the prosperity of social productivity. In 2016, a survey of junior middle school teachers in Germany's "Digital Federal State Indicators for Schools" research found that 85% of teachers in Germany agreed to learn more computer-mediated teaching skills during college training. More than 4/5 of the teachers also agreed to strengthen the corresponding training content in the teacher internship stage[8].To strengthen the training of teachers' digital teaching, it has become an important means in the teaching field that teachers should learn to use information technology to assist teaching when imparting knowledge, saving time for preparing lessons, elevating the efficiency of preparing lessons, diminishing the difficulty of preparing lessons, and spend more time enriching teaching skills and improving teaching ability.

The advent of the digital age has transformed the work of teachers, who need to further improve their digital skills, keep up with the pace of development and complete their comprehensive knowledge in order to better meet the "digital revolution ".Teachers have been given an increasingly important and unique role to play in the digital development of their students, and as the guides and prophets of their students, they need to avoid neglecting their role as masters of their students, and to guide them in a rational and timely manner in the digital context.

In terms of educational policy, a clear and well-balanced educational plan shows the way forward for teachers, who aim to support their instructional design with digital technology in a way that enables them to use digital media appropriately in the teaching and learning process. Teachers' goal is to support teachers' teaching design by means of digital technology, so that teachers can use digital media to deal with problems reasonably in the teaching process. Improving teachers' digital ability by stages, helping teachers understand digital teaching and digital learning will help teachers better adapt to the requirements of each stage of development and make timely adjustments. The promotion of online teaching tools plays a certain role in promoting the development of the states. The application of digital platforms and the supplementation of teaching content promote each other and link up with each other, and they are constantly developed and improved in the process of the application of learning platforms. By implementing the idea of lifelong learning, teachers are able to update their educational content and improve their skills in time for teaching.

The development of digital education contains both risks and ardent hopes. Germany has made unremitting efforts in digital education in the basic education stage, in order to digitise education for economic growth, promote scientific and technological development, create employment opportunities, improve people's quality of life and enhance international competitiveness. The development of education in Germany is faced with new opportunities and challenges brought by digitalization, and the process of exploring digitalization of education can't be smooth sailing. Digitalization of education has a long way to go, and it needs long-term consideration to realize transformation.

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