

THE INFLUENCE OF BIG DATA ANALYTICS ON EDUCATIONAL POLICY AND TEACHING METHODS: A DECISION-MAKING PERSPECTIVE

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Abstract: Using big data use, decision-making, insights implementation, policy and teaching method as variables, this study constructed a core conceptual framework by introducing the following demographic variables of gender, age, title, and years of teaching experience. Attempting to analyze the differences in the mean values of the perceptions of the respondents' demographic variable groupings for each of the variables of big data use, decision-making, insights implementation, policy and teaching method and the influence of the independent variables on the dependent variables, the study proposed the following research hypotheses: 1. There is a positive correlation between the use of big data and the decision-making process of teachers. 2. The use of big data has a positive influence on the formulation of educational policies. 3. There is a positive correlation between teachers' teaching methods and teaching practices. And using the teachers of University A as a case study, in the overall study, the sample size was calculated as 4755 using simple random sampling method, 470 questionnaires were distributed in this study, 450 questionnaires were returned using simple random sampling method, and the recovery rate was 95.7%.

Through the analysis, this study concludes that the use of big data has a significant effect on educational policy and teaching method, it explains a certain percentage of the variation in educational policy and teaching method and this effect is positive. Decision-making variables have a significant effect on educational policies and teaching methods, which explains a certain percentage of the variation in educational policies and teaching methods, and this effect is positive. Big data use has both direct and indirect effects on policy and teaching method. Decision-making has both direct and indirect effects on policy and teaching method. The direct effect is significant, as is the indirect effect through insights implementation. This study informs subsequent research by scholars, explores future directions for student teaching and learning, and provides perspectives and recommendations for future related research.

Keywords: Big Data Use, Decision-Making, Insights Implementation, Policy and Teaching Methods

Introduction

In contemporary education, the emergence of big data analytics has triggered major changes that have revolutionized educational policy and teaching methods. The integration of digital technologies has led to an exponential growth in data generation and collection in various fields, including education. As Siemens (2013) points out, the last decade has witnessed a surge in digital technology that has facilitated the accumulation of massive amounts of data. This data explosion has paved the way for the emergence of big data analytics characterized by processing and analyzing massive data sets. This study provides an overview of the research conducted at University A focusing on the impact of big data analytics on educational policy and teaching methods from a decision-making perspective.

Big data analytics provides unprecedented insights and opportunities for informed decision-making in education (Dede, 2016). Big data analytics can rapidly analyze large amounts of data, enabling educational institutions to extract valuable insights and patterns from complex data sets. These insights can inform strategic decision-making processes ranging from policy development to instructional design. In addition, big data analytics can help identify trends and correlations that may not be detected by traditional data analysis methods.

The potential applications of big data in education are broad and multifaceted (Liu & Franklin, 2016). One important application is the development of personalized learning pathways. By analyzing student data, including academic performance, learning preferences, and socioeconomic background, educators can tailor content and interventions to meet the individual needs of students. Additionally, big data analytics enable predictive modeling of student learning outcomes, allowing educators to identify at-risk students and implement targeted interventions to support their academic success.

With advances in big data technology, educational institutions are also increasingly utilizing data-driven approaches to enhance policy development and instructional practices (Halverson & Shapiro, 2013). Data-driven decision-making has become a cornerstone of effective educational governance, guiding decision-making related to resource allocation, curriculum design, and program assessment. By harnessing the power of big data analytics, decision-makers can make evidence-based decisions that optimize educational outcomes and promote student success (Kennedy, 2019).

Educators are also adopting data-driven approaches to enhance the teaching and learning experience (Hansen & Reich, 2015). By analyzing student achievement data, educators can identify strengths and weaknesses in instructional practices. This data-driven approach enables educators to adjust instructional strategies in real time to meet the diverse needs and preferences of students. In addition, big data analytics helps monitor student engagement and learning progress, providing valuable insights into the effectiveness of instructional interventions.

Despite the increasing integration of big data analytics into educational settings, empirical

research examining its impact on policy-making and teaching methods remains limited, particularly from a decision-making perspective (Dede, 2017). While anecdotal evidence suggests that big data has transformative potential in education, there is a paucity of comprehensive research illuminating its specific impact on decision-making processes, policy outcomes, and pedagogical practices (West & Borup, 2018).

The gap in empirical research poses significant challenges for education stakeholders seeking to utilize big data analytics to improve educational outcomes. Without an in-depth understanding of the mechanisms by which big data influences decision-making processes and instructional practices, it may be difficult for policymakers and educators to realize the full potential of big data. In addition, the lack of empirical evidence may hinder efforts to develop effective strategies for integrating big data analytics into educational administration and pedagogy.

Addressing this gap in the literature is critical to advancing scholarship and practice in the field of educational data analytics. By conducting empirical studies that examine the impact of big data analytics on decision-making processes, policy and teaching methods, researchers can provide valuable insights to inform evidence-based practice and transformative educational reform. In addition, empirical research can help identify the barriers and challenges associated with the implementation of big data analytics in educational settings and facilitate the development of strategies to overcome these barriers.

In light of these considerations, this study seeks to examine the impact of big data analytics on educational policy-making and teaching methodology from a decision-making perspective by providing insights into implementation. By providing a comprehensive examination of these dynamics at University A, this study aims to deepen the understanding of the role of big data in shaping educational governance and pedagogy. Through empirical research, this study strives to inform evidence-based practices and policy reforms that optimize educational outcomes and promote student success.

Problem Statement:

In today's digital age, the rapid development of big data technologies has had a profound impact on various fields, and education is no exception. However, there are still many unknown issues and challenges regarding the utilization of big data in educational contexts and its impact on educational policies and teaching methods. Therefore, this study aims to explore the following key questions:

Research Question:

What are the practical applications of big data in education? What are the specific application scenarios and methods of big data technologies in educational data collection, processing and analysis?

What are the mechanisms by which big data influence educational policy and teaching methods? How does big data analytics influence the development of educational policy and teaching method design?

What is the place and role of decision-making processes in educational policy and teaching

methodology? What are the challenges and dilemmas faced by policymakers in utilizing big data for educational decision-making?

What is the relationship between big data utilization and decision-making process? What is the role of insights implementation in big data utilization and educational decision-making processes?

By delving into these key questions, this study aims to provide theoretical and practical insights for understanding the dynamic changes in the contemporary educational paradigm, promoting educational innovation and optimizing educational practices.

Research Objective (s)

Objective 1: To Examine the Influence of Big Data Analytics on Decision-Making Processes within Educational Institutions

This objective focuses on investigating how the utilization of big data analytics influences decision-making processes at various levels of educational governance. By analyzing the extent to which data-driven insights inform decision-making within institutional administration, departmental leadership, and classroom instruction, this objective aims to provide insights into the role of big data analytics in shaping educational policies and practices.

Objective 2: To Assess the Impact of Big Data Analytics on Educational Policy Formulation

This objective seeks to assess the impact of big data analytics on the formulation, implementation, and evaluation of educational policies. By examining policy documents, institutional records, and stakeholder interviews, this objective aims to identify how data-driven insights inform policy decisions related to resource allocation, curriculum development, assessment practices, and student support services. Understanding the influence of big data analytics on policy formulation is crucial for informing evidence-based policy reforms and strategic initiatives.

Objective 3: To Investigate the Influence of Big Data Analytics on Teaching Methods and Instructional Practices

This objective focuses on investigating how big data analytics influences teaching methods and instructional practices within educational settings. By analyzing classroom observations, teacher interviews, and instructional materials, this objective aims to uncover the ways in which educators incorporate data-driven approaches into their teaching practices and the impact of these approaches on student learning outcomes. Understanding the influence of big data analytics on teaching methods is essential for promoting effective pedagogy and enhancing student success in the digital age.

Literature Review

Many studies have emphasized the potential of big data analytics to inform educational decision-making and policy development. For example, some researchers study highlights the role of

learning analytics-the application of big data analytics in education-in providing educators with timely feedback, identifying at-risk students, and personalizing the learning experience. Similarly, Hancock, Goodman, and Denny (2020) discuss how big data analytics can facilitate the identification of educational inequities and the development of targeted interventions to address them.

Big data is capable of rapidly collecting and storing massive amounts of information (Zhao et al., 2019). The key to creating value from big data lies in big data use, which has been integrated into various industries with the rapid development of big data technology. Big data, as the name suggests, consists of many data sets, and these data are collectively very large in volume and many categories, in addition, these data sets can not be captured, organized and analyzed with traditional analytical tools, but big data can do the work that traditional tools can not be done, it can be real-time for the enterprise to obtain and organize the data it needs, and to come up with scientific theories for the enterprise's reference. Ghasemaghaei (2019) emphasized the importance of utilizing big data as a vital business resource that can create value for the business. The term "big data" began to be mentioned in the journal *Science* in 2008 as the volume of data continued to grow and traditional number processing tools were unable to handle the huge data sets. In addition to its own large scale, big data also has diversity and high speed, and some scholars also believe that it has value and authenticity.

Another application of big data in education is predictive modeling, which uses statistical algorithms to predict future outcomes based on historical data (Davenport & Harris, 2017). Predictive modeling helps educators identify trends, patterns, and correlations in student data, allowing them to anticipate challenges, strategically allocate resources, and proactively intervene to support student success.

The significance of insights implementation lies in its ability to bridge the gap between data analysis and actionable outcomes. Without effective implementation strategies, data-driven insights may remain untapped potential to produce meaningful improvements in educational practice. Therefore, understanding the mechanisms of insights implementation is critical to maximize the benefits of big data analytics in education.

Policy guidance refers to the government's efforts to guide, regulate, and incentivize the direction, structure, and scale of economic and social activities through the formulation and implementation of a series of policies, plans, and measures. The purpose of policy guidance is to realize the country's macroeconomic goals, promote sustainable economic and social development, and improve people's well-being. Policy guidance plays a key role in different fields and levels, including macroeconomic policy, industrial policy, regional policy and social policy. At the same time, policy guidance helps to realize the government's effective regulation of the market economy and promote the sustainable development of the economy and society.

Wang (2020) pointed out in the Draft of Educational Discourse: Teaching methods are a series

of teaching activities that occur under the guidance of teaching principles, toward teaching goals, and using teaching means to teach teaching content." In other words, teaching method is the whole process of activities that occur in teaching.

Some researchers pointed out in his Theory of Teaching that "the teaching process, the combination of the teacher's teaching method and the student's learning method, and the method that finally achieves the teaching goal, are all called teaching methods." Later Wang (2020) and others mentioned in Pedagogy that "Teaching methods are the methods adopted to achieve the teaching objectives, including the teacher's teaching and the students' learning." This statement is also affirmed.

Big data analytics in education involves collecting, processing, analyzing, and interpreting massive amounts of data to generate insights and inform decision-making. By utilizing advanced analytics, educational institutions can extract valuable information from student data, learning management systems, and administrative records to improve educational outcomes.

Educational Policy:

Educational policy encompasses a range of decision-making and a range of actions taken by policymakers to shape the structure, governance, and funding of an educational system. Policies may address issues such as curriculum development, assessment practices, teacher training, and resource allocation (Biesta & Gewirtz, 2017). The development and implementation of educational policy plays a critical role in shaping teaching methods, instructional practices, and student achievement.

Teaching Methodology:

Teaching methods are strategies, techniques, and approaches used by educators to promote learning and engage students in the educational process. Teaching methods will vary depending on factors such as subject matter, student needs, and instructional goals (Hattie, 2012). Effective instructional methods are critical to increasing student engagement, motivation, and achievement.

Insights Implementation:

Insights implementation involves translating data-driven insights into actionable strategies and interventions that drive positive change in educational practice. Effective insights implementation requires collaboration among educators, administrators, policymakers, and other stakeholders to identify key findings, develop strategies, and implement interventions (Bryk et al., 2015). Insights implementation is a critical link between big data analytics and educational outcomes.

The relationship between big data use and education policy:

Big data has a profound impact on education policy by providing decision-makers with timely, relevant, and actionable information to inform decision-making. By analyzing student data, demographic trends, and performance indicators, policymakers can identify areas of need, strategically allocate resources, and develop policies that promote equity and inclusion in education (Beauchamp, 2020). Big data analytics enable decision-making to monitor and evaluate the effectiveness of policies,

identify areas for improvement, and make evidence-based adjustments as needed.

Methodology

With probability-based sampling methods, the sample size can be determined through the population collection process. For example: the sample size suitable for calculation, the sample size used in the study was determined using The Taro Yamane Sample Size Formula (1973), and the sample size was determined using a 95% confidence level and a permissible value. The sampling error is 5% or 0.05. The overall sample is 4755. When n = number of samples used in the study . N = size of the overall population, e = random sample error is set to 0.05 .

The sample size and the formula for calculating it are given below:

$$n = \frac{N}{1+Ne^2}$$
$$n = \frac{4755}{1+4755 \times 0.05^2}$$
$$n=369.31$$

The minimum sample size was calculated to be 369. therefore, approximately 369 participants were required for the study. Practicalities and potential attrition must be considered when determining the final sample size.

A questionnaire on big data use, decision-making, insight, policy and teaching method was designed and distributed to the faculty members of University A in this study. Based on the valid questionnaires collected, the extent to which various factors influence policy and teaching method was statistically analyzed to obtain more comprehensive data and feedback. Participants filled out the questionnaire online through Questionnaire Star (www.wjx.cn) and the following are the main steps of the questionnaire survey:

Questionnaire Design: For each research variable, a set of relevant questions will be designed to obtain students' opinions and views on this questionnaire. The questionnaire will include a cover page that briefly describes the purpose of the study, as well as instructions on consistency and privacy protection.

Sample selection: Teachers from the sample schools will be invited to complete the questionnaire. Sample selection will be based on the sampling method and sampling frame to ensure a diverse and representative sample.

Distribution: The questionnaires can be distributed electronically through online survey tools (e.g., Question star, etc.) and we will ensure that the questionnaires are complete and correct.

Questionnaire collection: We will ensure that the questionnaires are collected in a timely manner and that the data is organized and cleaned in preparation for subsequent data analysis.

The researcher distributed 470 questionnaires to the faculty members of University A. After eliminating some useless data, 450 valid questionnaires were returned with a validity rate of 95.7%.

Results

Based on the model summary and ANOVA analysis provided, we can draw the following conclusions:

Model Summary:

In this model, there is a moderate positive correlation between big data use and educational policy and teaching method ($R = 0.590$). The model explains 34.9% of the variation in educational policy and teaching method ($R\text{-squared} = 0.349$). The adjusted $R\text{-squared}$ value was 0.347, considering the number of independent variables in the model. The standardized estimate of error is 5.83492, which indicates the average difference between the predicted values of the model and the actual observed values.

ANOVA Analysis:

The $F\text{-statistic}$ value of the regression model is 239.768 and the significance level is less than 0.05, which indicates that the overall regression model is significant, suggesting that big data use has a significant impact on educational policy and teaching method.

Coefficient Analysis:

The standardized coefficient of big data use is 0.590, and the $t\text{-statistic}$ value is 15.484, and the significance level is less than 0.05, indicating that big data use has a significant impact on educational policy and teaching method.

Taken together, based on the results of the model analysis, we can conclude that big data use has a significant impact on educational policy and teaching method, that it explains a certain percentage of the variation in educational policy and teaching method, and that this impact is positive.

Model Summary:

In this model, there is a moderate positive correlation ($R = 0.674$) between decision-making variables (decision-making) and educational policy and teaching method. The model explains 45.4% of the variance in educational policy and teaching method ($R\text{-squared} = 0.454$). The adjusted $R\text{-squared}$ value was 0.453, taking into account the number of independent variables in the model. The standardized estimated error is 5.33984, which indicates the average difference between the predicted values of the model and the actual observed values.

ANOVA Analysis:

The $F\text{-statistic}$ value of the regression model is 373.212 and the level of significance is less than 0.05, which indicates that the overall regression model is significant, indicating that the decision-making variables have a significant effect on educational policy and teaching method.

Coefficient Analysis:

The standardized coefficient of the decision-making variables is 0.674 and the $t\text{-statistic}$ value

is 19.319 with a significance level less than 0.05, indicating that the decision-making variables have a significant impact on educational policy and teaching method.

Taken together, based on the results of the model analysis, we can conclude that the decision-making variables have a significant impact on educational policy and teaching method, which can explain a certain percentage of the variation in educational policy and teaching method, and that this impact is positive.

Total model:

The model is highly significant ($p < 0.0001$) with a high R-squared value (0.8176), indicating that the predictor variables explain a significant portion of the variance in insights implementation.

Policy and teaching method model:

This model was also highly significant ($p < 0.0001$) with a moderate R-squared value (0.4372), indicating that the predictor variables explained a significant portion of the variance in policy and teaching method. Notably, the coefficient for big data use was significant ($p = 0.0336$), suggesting that it had a direct effect on policy and teaching methods, albeit a smaller effect than the indirect effect through insights implementation.

Total effects model (policy and teaching method):

The total effects model for policy and teaching method showed high significance ($p < 0.0001$), indicating a large combined effect of the predictor variables on policy and teaching method.

Indirect effects:

The bootstrap analysis reveals an indirect effect of big data use on policy and teaching method through insights implementation with a coefficient of 0.7133. This suggests that a portion of the effect of big data use on policy and teaching method is generated through insights implementation.

Overall, big data use has both direct and indirect effects on policy and teaching methods. The direct effects, while significant, are relatively small compared to the indirect effects mediated through insights implementation. Therefore, it can be concluded that insights implementation partially mediated the relationship between big data use and policy and teaching methods. Further research into the mechanisms of this mediation may provide valuable insights.

Summary of Analysis:

Aggregate modeling:

The model was highly significant ($p < 0.0001$) with a high R-squared value (0.7949), suggesting that the predictor variables explained a significant portion of the variance in insights implementation.

Policy and teaching method Model:

This model was highly significant ($p < 0.0001$) with a moderate R-squared value (0.4720), indicating that the predictor variables explained a significant portion of the variance in policy and teaching method.

Total effects model (policy and teaching method):

The total effects model for policy and teaching method showed high significance ($p < 0.0001$), indicating that the predictor variables explained a large portion of the variance in policy and teaching method combined.

Direct Effects:

The direct effect of decision-making on policy and teaching method was significant ($p < 0.0001$), indicating that decision-making had a direct effect on policy and teaching method.

Indirect Effects:

An indirect effect of decision-making on policy and teaching method through insights implementation was observed through bootstrap analysis with a coefficient of 0.2777.

Overall, decision-making had both direct and indirect effects on policy and teaching method. The direct effect is significant and there is an indirect effect through insights implementation.

Discussion

This study provides insights into the utilization of big data in the educational context, decision-making processes and their combined impact on educational policy and teaching methods, which are analyzed in detail through advanced statistical techniques. In discussing the findings of this study, we will address the following aspects: implications for theory, practice and future research.

Implications for theory

The field of education has always been one of the core areas of social development, and the findings of this study have important insights and implications for the development and improvement of theories related to the field of education. In this section, we will explore in detail the impact of this study on the theory of educational policy making, the theory of pedagogical method innovation, and the theory of educational decision-making science, as well as the far-reaching significance of these impacts.

1. Theories of Educational Policy Making

The findings of this study have important insights and implications for the development of educational policy making theory. Traditional theories of educational policy-making tend to ignore the importance of data in the decision-making process and favor qualitative analysis. However, the empirical findings of this study highlight the importance of data-driven decision-making in educational policymaking and provide new ideas and rationale for the improvement of existing educational policymaking theories. Through big data analysis, educational policymakers are able to more accurately grasp the current situation and trends in the field of education, and deeply understand the impact of different policy choices in order to formulate more scientific and effective educational policies (Smith et al., 2020).

This finding has far-reaching significance for the development of theories of educational policy

making. First, it facilitates the transformation of traditional theories to data-driven decision-making, making educational policy-making more scientific and precise. Second, it provides educational policymakers with more decision-making support and guidance, which helps optimize the allocation of educational resources and improve the equity and quality of education (Jones & Sutherland, 2020). Therefore, this study provides an important theoretical and empirical foundation for the development and practice of educational policy making theory.

2. Theories of Innovation in Teaching and Learning Methods

Another important research finding is the important role of big data in supporting innovation in teaching methods. Traditional theories of pedagogical method innovation tend to focus on individual teachers' teaching practices and experiences and ignore data-based pedagogical method innovation. However, the results of this study suggest that the application of big data provides a new perspective and opportunity for teaching method innovation (Brown & Thomas, 2018). Through the analysis of student learning data, educators are able to better understand the learning needs and characteristics of their students so that they can design and implement more personalized and effective teaching methods.

This finding is of great significance to the development of teaching method innovation theory. First, it expands the ideas and ways of teaching method innovation so that it is no longer limited to the traditional accumulation of teaching experience, but focuses more on personalized teaching practice based on data. Second, it promotes the application and development of educational technology and information technology in the field of teaching and learning, providing a new direction and impetus for the development of educational information (Lee et al., 2021). Therefore, this study provides an important theoretical and practical foundation for the further exploration and improvement of the theory of teaching method innovation.

3. Scientific Theory of Educational Decision-making

Finally, the findings of this study also have important implications for the development of the scientific theory of educational decision-making. The scientific theory of educational decision-making mainly focuses on the psychology and behavior of individual decision-makers, while neglecting the application and analysis of data in the decision-making process. However, the findings of this study highlight the importance of big data in the educational decision-making process (Jones & Sutherland, 2020), which provides new perspectives and insights for the further improvement of educational decision-making science theories.

This finding provides new ideas and directions for the development of educational decision-making science theories. First, it promotes the integration of traditional decision-making psychology and behavioral economics with big data analysis methods, expanding the research scope and depth of educational decision-making science. Second, it emphasizes the importance of data in the decision-making process and provides educational decision-makers with more scientific and accurate decision-

making support and guidance. Therefore, this study provides useful lessons and insights for the further development and application of educational decision-making science theories.

In summary, the findings of this study have important implications for the development and improvement of related theories in the field of education. Through an in-depth discussion of the impact of the theory of educational policy making, the theory of teaching method innovation, and the theory of educational decision-making science, we can clearly see that the application of big data in the field of education has become one of the most important driving forces to promote the innovation of educational theory and practice. However, further in-depth research is needed to continuously expand and improve the relevant theories in order to cope with the new challenges and problems facing the field of education and to promote the sustainable development and progress of the field of education.

Implications for practice

The findings of this study not only have an important impact on the theoretical development of the field of education, but also have a far-reaching impact on the practice of education. The following are a few key aspects of the impact of this study on educational practice:

1. Educational policy development and adjustment

The findings of this study emphasize the critical role of big data in educational policymaking, providing policymakers with additional decision-making support and guidance. Specifically, policymakers can use big data analytics to gain a deeper understanding of the operation and trends of the education system, identify problems and challenges in a timely manner, and formulate more scientific and precise education policies. In addition, the application of big data can also help policymakers assess the effect of policy implementation, adjust the policy direction and measures in a timely manner, and maximize the realization of the goals and effects of education policy.

2. Optimization of teaching methods and curriculum design

The findings of this study reveal the important role of big data in supporting teaching methods and curriculum design, providing educators with more innovative ideas and methods. By analyzing students' learning data, educators can better understand students' learning needs and characteristics, and accurately design and implement personalized teaching methods and course content. This not only improves teaching effectiveness and student learning satisfaction, but also stimulates students' motivation and interest in learning and promotes their overall development and growth.

3. Education management and resource allocation optimization

The findings of this study also have an important impact on education management and resource allocation. Big data analysis technology can help education managers better manage education resources, rationally allocate teachers and teaching facilities, optimize education services and management processes, and improve the efficiency and level of education management. At the same time, the application of big data can also help educational institutions predict student demand and trends,

adjust resource allocation programs in a timely manner, and ensure the effective use and maximize the value of educational resources.

4. Teacher professional development and education training

Finally, the findings of this study also have a positive impact on teacher professional development and educational training. Big data analytics technology provides teachers with more teaching data and feedback information, helping them to better understand student learning and needs, and to improve teaching quality and effectiveness. In addition, teachers can improve their teaching ability and competitiveness through learning and mastering big data analytics to better adapt to the changes and developments in the field of education.

In summary, the findings of this study have had a positive impact on educational practice in many ways, providing an important theoretical and practical basis for promoting the continuous development and progress of the education field. However, the transformation of these theoretical results into practical outcomes requires the joint efforts of educational institutions, policy makers, educational administrators and educators to continuously innovate and explore in order to make greater contributions to the sustainable development of education.

Implications for future research

The findings of this study have important implications for future research in the field of education, providing new directions and ideas for future research. The following are a few key aspects of the impact of this study on future research:

1. Deeper inquiry into the application of big data in the field of education

Future research can further explore in depth the application of big data in the field of education, especially the specific applications in educational management, instructional design, student assessment and learning analysis. By combining practical cases, researchers can deeply explore the application effects and influence mechanisms of big data analytics in educational practices, providing more empirical support for innovation and development in the field of education (Wang et al., 2020).

2. Exploring the mechanisms and influencing factors of educational decision-making process

Future research can further explore the mechanisms and influencing factors of the educational decision-making process, especially the research on the mechanisms and decision-making effects of educational decision-making in the context of big data. Researchers can analyze in depth the mechanisms and paths of the influence of big data on the educational decision-making process from multiple dimensions such as the individual characteristics of decision-makers, organizational structure, and the policy environment, so as to provide theoretical support for the improvement of the science and efficiency of educational decision-making (Zhang et al., 2019).

3. Exploring new modes and paths of educational policy making

Future research can explore new modes and new ways of educational policy making, especially

the research on the mechanism of policy making and policy effects in the context of big data. Researchers can draw on the experiences and practices of other fields to explore the mode of educational policy making and policy evaluation mechanism based on big data analysis, which will provide new ideas to improve the science, transparency and sustainability of educational policies (Li et al., 2021).

4. Promoting interdisciplinary research in education

Future research can promote interdisciplinary research in education, especially cross-border cooperation with related disciplines such as computer science, data science, and management science. Researchers can build an interdisciplinary research team, integrate the strengths and resources of various disciplines, and jointly explore the application and impact mechanisms of big data in education, so as to provide more empirical and theoretical support for promoting interdisciplinary cross-fertilization in education.

In summary, the findings of this study provide important insights and directions for future research in the field of education, and provide important references and lessons for promoting theoretical innovation and practical transformation in the field of education. However, future research still needs to be deepened and expanded to further strengthen the theoretical constructs and empirical studies, so as to make a greater contribution to the promotion of sustainable development and progress in the field of education.

Conclusions

This study aims to provide insights into big data utilization, decision-making processes, and their combined impact on educational policy and teaching methods in the context of education, and has been analyzed in detail through advanced statistical techniques. The following main conclusions emerge from our study, further revealing the intricate interactions between these key factors in the field of education.

1. The impact of big data use on educational policy and teaching methods:

Our study found that the widespread use of big data has had a significant impact on educational policy and teaching methods. Through in-depth analysis of big data, we observed a profound evolution in educational strategies, providing valuable decision-making support for policymakers and educators. The use of big data has enabled us to gain a more accurate understanding of trends, patterns and potential problems in the field of education, thus providing a strong guide to the future development of educational policy and teaching methods.

2. The impact of decision-making processes on educational policy and teaching methodology:

Our findings further confirm the importance of decision-making processes in the field of education. Decision-making processes not only play a key role in the formation of educational policies, but also have a significant impact on the selection and implementation of teaching methods. We observe

that the decision-making strategies of educational policymakers directly influence the formulation and implementation of educational frameworks, while also shaping the quality and effectiveness of educational outcomes to a large extent. This finding is in line with past research and highlights the critical role of decision-making science in optimizing educational practices and improving outcomes.

3. The relationship between big data use and decision-making processes:

In addition, our study reveals a strong association between big data utilization and decision-making processes. Insights implementation plays an important role in this relationship, partially mediating the relationship between big data utilization and educational policy and teaching method. We found that decision-making variables not only directly influence the development and implementation of educational policies and teaching methods, but also have an indirect impact through insights implementation. This finding further enriches our understanding of the complex relationship between big data utilization and educational decision-making, and provides a more comprehensive guide for future educational policy and practice.

In summary, this study reveals the intricate interactions between big data utilization, decision-making processes, and their impacts on educational policy and teaching methods in the field of education through an in-depth study. These research results provide important theoretical and practical guidance for promoting educational innovation and optimizing educational practices, and are of great significance in promoting sustainable development and progress in the field of education.

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