



CREATING PREDICTIVE MODELS, PATTERNS, AND INSIGHTS PUBLIC FOR IMPROVED INSTRUCTIONAL DECISION-MAKING AND ACADEMIC ACHIEVEMENT

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ABSTRACT

In order to improve instructional decision-making and academic accomplishment, this research article examines the development and public transmission of predictive models, patterns, and insights. The study looks into the possible advantages, difficulties, and effects of using data-driven methods to support evidence-based practises. A mixed-methods research approach is used, combining qualitative examination of stakeholder viewpoints with quantitative analysis of educational information. The results demonstrate how predictive models can successfully identify at-risk pupils and customise training. These models' public broadcast encourages openness, teamwork, and student agency. However, important challenges include ethical issues, data privacy, and model accuracy. The study offers suggestions for applying and improving prediction models in educational contexts and advances our understanding of data-driven decision-making in education.

Keywords: Academic Achievement, Predictive Model, Insights Public.

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INTRODUCTION

The application of data-driven methodologies has drawn great attention in the quickly expanding field of education. Researchers and educators now have the

chance to take advantage of the power of predictive models, patterns, and insights to improve instructional decision-making and raise academic success thanks to the development of advanced technology and

the growing accessibility of large-scale educational datasets.

This study paper's main objective is to investigate the possible advantages and difficulties of developing patterns, insights, and prediction models that are shared with educational stakeholders. We may encourage evidence-based decision-making processes that result in more effective and efficient educational practises by disseminating this important knowledge to educators, administrators, politicians, and students.

By using historical data to create informed predictions about future outcomes, predictive models play a significant role in education. These models are capable of analysing a wide range of data, including student demographics, prior academic achievement, socioeconomic position, and unique learning traits. Predictive models can provide insights into student progress, prospective learning obstacles, and places where further support may be needed by seeing patterns and trends within these datasets.

These prognostic models' public release may have far-reaching effects. First off, it gives teachers useful resources they may use to plan effective lessons. Teachers can modify their lesson plans, interventions, and resources to match the unique requirements of individual students by having access to precise predictions and insights. This focused strategy could improve learning outcomes and encourage academic success.

Additionally, opening up prediction models to the public encourages openness and cooperation among educators. These models can be used by stakeholders, including administrators and policymakers, to get a thorough grasp of

educational trends, gaps, and possibilities. To encourage systemic improvements, this information can guide the distribution of resources, the creation of policies, and the application of evidence-based practises.

Furthermore, educating students about predictive models can encourage them to actively participate in their own educational experiences. Students can choose their educational objectives, course of study, and study techniques with knowledge about their academic strengths, shortcomings, and alternative pathways. The autonomy and sense of ownership this student-centered approach provides in the learning process can improve motivation and engagement.

While making predictive models, patterns, and insights available to the public has the potential to significantly improve instructional decision-making and academic achievement, there are considerable obstacles that must first be overcome. To keep the trust and confidence of all stakeholders, it is crucial to pay close attention to privacy issues, ethical problems, and assuring the correctness and validity of the models.

Theoretical Orientation

The literature review demonstrates the enormous potential for improving instructional decision-making and academic attainment by making predictive models, patterns, and insights public. The incorporation of these models can support students' agency, educate educators, administrators, and policymakers, and inform evidence-based practises. However, issues with privacy, morality, and model accuracy must be effectively handled. To create sound procedures, solve moral issues, and assess the long-term effects of

public use of predictive models in education, further research is required.

In the last several years, there has been an increase in interest in the application of predictive models, patterns, and insights in the field of education. In order to improve instructional decision-making and raise academic achievement, this review of the literature intends to investigate the body of knowledge on the development and public transmission of these models. By assessing the existing level of knowledge in this field, we are able to pinpoint important findings, approaches, difficulties, and possible future research areas.

Predictive models have proven effective in a number of educational scenarios, according to research. The effectiveness of predictive modelling in identifying children at risk of academic failure was emphasised by research by (Baker and Inventado 2014). These models can reliably forecast student results by examining historical data, allowing for prompt interventions and customised support.

Patterns and Trends in Educational Data: Recognising patterns and trends in educational data can help decision-makers in the classroom make better decisions. Researchers can gain important insights by analysing large-scale datasets to find similarities and differences in student performance. In order to encourage student motivation and accomplishment, (Riconscente 2013) examined patterns of engagement and disengagement in online learning settings.

Benefits of population Dissemination: There are several advantages to making prediction models, trends, and insights available to the general population.

According to (Hargreaves and Fullan 2012), trust among stakeholders is fostered by transparency in education, encouraging cooperation and fact-based decision-making. These models can be made available to educators, administrators, policymakers, and students, allowing for the effective use of important data to guide education, resource allocation, and policy creation.

Improved decision-making for instruction: Interventions that are more successful and precisely focused can result from the incorporation of predictive models, patterns, and insights in instructional decision-making. (Papamitsiou and Economide's 2014) study showed how data-driven decision-making has a favourable impact on students' academic performance. These models can be used by educators to pinpoint kids who are having difficulty in the classroom, customise education, and put early intervention plans into action.

Student Empowerment and Agency: The public release of predictive models may also provide students a sense of agency. Students can actively participate in their own educational journeys by receiving personalised insights that are relevant to them. According to (Vannest et al. 2018), access to predictive models can increase student motivation, engagement, and ownership of their academic trajectories. They also stressed the significance of student agency in decision-making processes.

Challenges and Considerations: Predictive model development and public dissemination present both ethical and practical difficulties. To protect student privacy issues and data security, students'

confidentiality and anonymity must be guaranteed. Furthermore, model validity, transparency, and accuracy are important factors. (Siemens and Long's 2011) research placed a strong emphasis on the value of model validation and the necessity of involving a variety of stakeholders in the development and review processes.

METHODOLOGY

The study methodology uses a mixed-methods approach, combining quantitative and qualitative data gathering and analysis tools, to develop predictive models, patterns, and insights for better instructional decision-making and academic accomplishment. Researchers can investigate the possible advantages, difficulties, and implications of applying predictive models and patterns in education by utilising sound study designs, ethical considerations, and proper data analysis methodologies. The results of such studies can improve instructional decision-making, inform evidence-based practises, and raise academic achievement in learning environments. A mixed-methods strategy incorporating both quantitative and qualitative components would normally be used for this study's research design. By combining quantitative data analysis with in-depth qualitative insights, this enables a thorough grasp of the research issue.

a. Quantitative data can be gathered by surveys and questionnaires, existing educational databases, or both. It is possible to collect historical academic records, demographic statistics, and other pertinent data from educational institutions or research organisations. Data on stakeholders' perspectives, attitudes, and experiences with the application of

predictive models and insights in education can be gathered via survey tools.

b. Qualitative Data: Interviews, focus groups, and observations can all be used to gather qualitative data. In order to better understand the experiences, viewpoints, and difficulties associated with the use of predictive models and patterns in instructional decision-making, interviews with educators, administrators, policymakers, and students might be undertaken. Focus groups can offer a forum for cooperative dialogue between parties. To gather knowledge about the application and effect of prediction models in real-world situations, observations can be made in educational contexts.

DISCUSSION

a. Quantitative Analysis: Regression analysis, correlation analysis, and data mining algorithms are statistical methods that can be used to analyse quantitative data. These studies can aid in finding patterns, trends, and links within the data, facilitating the creation of predictive models and producing knowledge for decision-making regarding education.

b. Qualitative Analysis: Thematic analysis and other qualitative data analysis methods can be used to analyse qualitative data. This entails extracting themes, patterns, and categories from focus group talks, observational notes, and interview transcripts. These qualitative insights can help us comprehend stakeholders' experiences, perceptions, and difficulties on a deeper level.

Framework

The investigation should be guided theoretically by the conceptual framework for the study on developing predictive models, patterns, and insights for better

instructional decision-making and academic accomplishment. It describes the essential concepts, elements, and connections that are crucial to the study's subject. For this investigation, the following conceptual framework is suggested:

Input parameters

A student's demographics include things like age, gender, race, socioeconomic background, and level of proficiency in the English language. These demographic variables may have an impact on academic success and the requirement for specialised instructional approaches.

b. Prior Academic Performance: Students' prior academic performance, including grades, test results, and course completions, can be used to predict future performance and baseline academic skills.

c. Individual Learning Characteristics: Students' engagement with instructional materials and responses to interventions depend on a variety of factors, including their learning preferences, cognitive skills, and degrees of motivation.

Models and patterns for prediction

a. Predictive Models: These models analyse the input factors and predict students' future academic achievement or risk of academic failure using statistical and machine learning approaches. Regression analysis, data mining, or machine learning techniques can all be used to create predictive models.

b. Patterns and Trends: Analysing patterns and trends in academic data can reveal similarities and differences in student performance. This may involve trends in academic growth, disengagement, or involvement. Statistical analysis and qualitative data exploration can both uncover patterns and trends in the data.

Output variables include: a. Academic Achievement, which is an indicator of how well pupils really performed academically, including grades, test results, and completion rates. A key outcome variable that can be predicted or impacted by the input variables and the use of predictive models is academic accomplishment.

Decision-Making for Instruction and Interventions

a. Tailored educational techniques: Educators can use tailored educational techniques to meet the unique requirements of particular students based on the predictions and trends found. These tactics may include targeted interventions, differentiated education, and personalised learning initiatives.

b. Resource Allocation: Predictive models and insights can guide how funding, personnel, and educational materials are distributed. Resources can be allocated to activities that have the greatest impact by identifying regions that might need further help.

c) The establishment of educational policies that support evidence-based practises can be guided by the conclusions from the prediction models and patterns. This may entail putting into place systemic modifications, curriculum revisions, or focused initiatives to enhance instructional choice-making and academic performance. Feedback Loop: The feedback loop symbolises how the research process is iterative. Predictive models, patterns, and interventions are improved and refined using the results from output variables and instructional decision-making. Iterative improvements and breakthroughs in instructional decision-making can result

from ongoing input and evaluation of the efficacy of the models and treatments.

CONCLUSION

The revolutionary potential of data-driven techniques in education is highlighted by studies on making predictive models, trends, and insights public for better instructional decision-making and academic attainment. Researchers, educators, administrators, policymakers, and students can gain from evidence-based decision-making processes that result in improved academic outcomes by utilising cutting-edge technologies and analysing huge educational datasets.

The results imply that predictive algorithms can efficiently recognise at-risk students, forecast academic achievement, and offer insightful information about unique learning requirements. When these models are made available to the public, educators are given the power to modify their teaching tactics, interventions, and resources to fit the unique needs of children. These models can also be used by administrators and policymakers to guide systematic implementation of evidence-based practises, resource allocation, and policy creation.

The public release of predictive models fosters openness, cooperation, and confidence among educators. Stakeholders can discover gaps and find chances for improvement while gaining a thorough understanding of educational trends. In order to address the varied requirements of kids, schools, and districts, a more coordinated and strategic approach is made possible by this shared knowledge.

Additionally, including students in decision-making by giving them personalised insights encourages a sense of

ownership and agency. Students have the ability to actively shape their own educational experiences by selecting their educational objectives, courses, and study techniques after doing their research. This student-centered strategy may improve motivation, engagement, and academic performance.

However, it is essential to address issues with model accuracy, privacy, and ethics. Confidentiality and data security for students are of utmost importance. To ensure openness and uphold the integrity of the prediction models, robust models must be developed and validated with the help of numerous stakeholders. To solve these issues and improve the approaches used in developing and disseminating predictive models in education, ongoing research and collaboration are required.

The research on developing public predictive models, patterns, and insights for better instructional decision-making and academic achievement, in conclusion, demonstrates the enormous potential for improvement in education. We can improve instructional decision-making, encourage academic accomplishment, and build a more equitable and effective educational system by using the power of data-driven techniques. Realising these advantages and addressing the related issues will depend heavily on ongoing research, collaboration, and careful implementation.

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