

A Model for Effective Mathematics Teaching With an Emphasis on the Development of Transversal Competencies in Technical and Economic Study Programs

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Abstract – The research results published so far have shown that success in mathematics positively affects the retention rate at technical and economic universities. Various studies have explored different forms, methods, and tools in mathematics teaching to improve student success, but an effective teaching model is yet to be identified. Based on previous experience and published results, a model of effective teaching was proposed with an emphasis on developing selected cross-sectional competencies to increase student retention. A recent study aimed to verify the effectiveness of this model in the pilot subject Mathematics I. The study included 211 first-year students of 7 bachelor's technical-economic study programs. Results showed significant improvement in the group of students who struggled with mathematics. The study confirmed that an appropriately chosen intervention in mathematics can increase the success rate of completing technical and economic study programs, and this approach can also be applied at other universities.

Keywords – Efficiency, teaching, mathematics, transversal competencies, technical and economic study programs.

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1. Introduction

Teaching mathematics in engineering studies has been reported worldwide as problematic due to the low student retention rate [1], [2]. High dropout rates, especially in the STEM disciplines (science, technology, engineering and mathematics) [3], have proved intractable despite offering supplemental instruction [4]. High failure rates in mathematics subjects and lower retention in disciplines with mathematics-intensive subjects have prompted tertiary institutions to set up some form of mathematics support to prevent these students from failing [2].

Success or failure in mathematics strongly influences the choice of study orientation and completion [5], [6]. Therefore, studies have been undertaken to identify how to increase student's success rate in mathematics and thus improve the success rate of completing engineering studies [7], [8], [9], [10], [11].

As Drijvers [12] points out, many university students are not sufficiently prepared to study mathematics at the university level. In addition, in recent years, there has been a negative trend (decline) in the preparedness of secondary school graduates in mathematics for university studies [13]. Only 10% of students complete their studies without intervention, while 40% obtain a bachelor's degree with additional help [14].

Among the traditional causes of insufficient mathematical preparation of students for engineering education are mainly inadequate preparation in secondary schools, a lack of dedicated hours to mathematical education and a weak connection between the requirements of engineering disciplines and the mathematical curriculum [15]. Bargagliotti *et al.* [16] also mention students' characteristics, lack of effort and motivation, or low study skills.

Technical Economic Study On Reduction

**Vladimir Robles-Bykbaev,Josefa
Mula,Gilberto Reynoso-Meza**



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Inventory of Current Energy Research and Development Oak Ridge National Laboratory, 1972 **pt. I and II** Oak Ridge National Laboratory, 1974 Indices Oak Ridge National Laboratory, 1972 *Economic Effects of Metallic Corrosion in the United States* United States. National Bureau of Standards, Lawrence Herman Bennett, 1978 *Scientific and Technical Aerospace Reports*, 1981-04 **The Endogenous Energy-Saving Technological Change in China's Industrial Sector** Xubo He, 2022-11-29 As improving energy efficiency and increasing energy R it established a mathematical model for the endogenous energy saving technological advancement of the industrial sector based on heterogeneous R it estimated the energy saving technological progress rate of 37 Chinese industrial sub sectors from 1980 to 2010 fourth it has empirically examined the relationship between the heterogeneous R D investment in China's industrial sector and its energy saving technological advancement rate **Selected Papers from 27th European Biomass Conference & Exhibition (EUBCE 2019)** David Baxter, Solange I. Mussatto, 2021-09-02 This book draws together a small selection of full length papers based on presentations given at the 27th European Biomass Conference and Exhibition held in Lisbon Portugal in 2019 The topics covered which reflect the breadth of the program of the EUBCE conference itself include biomass sources various aspects of technologies used for the conversion of biomass to bioproducts and bioenergy as well as different approaches to assessing environmental impacts which include case studies based on different technologies in use in a range of countries *Monthly Catalog of United States Government Publications* United States. Superintendent of Documents, 1977 February issue includes Appendix entitled Directory of United States Government periodicals and subscription publications September issue includes List of depository libraries June and December issues include semiannual index **Solar Energy and Nonfossil Fuel Research**, 1979 **An Analysis of Federal R & D Funding by Function** National Science Foundation (U.S.). Division of Science Resources Studies, Energy Abstracts for Policy Analysis, 1987 **Intelligent Technologies: Design and Applications for Society** Vladimir Robles-Bykbaev, Josefa Mula, Gilberto Reynoso-Meza, 2023-01-31 This book is oriented towards applications and perspectives on future developments connected to intelligent technologies Specifying topics connected to industry mobility telecommunications biomechanics among others The innovative character of the text allows relating technical experiences and advances that seek to improve the implication of new technologies at local national and regional levels demonstrating the advances towards the different fields of knowledge in the area of engineering The potential readers of this work would be master and doctorate students professors researchers in the field of new technologies and companies connected to the development of engineering The texts serve to illustrate new procedures new cases and new techniques for the optimization of systems that optimize social progress *Climate Change and Industry Structure in China* Chu Wei, 2020-02-25 In order to effectively address global warming many countries have significantly reduced the amount of carbon dioxide emissions that are put into the atmosphere From the perspective of

industrial structure this volume examines the emission reduction potentials and abatement costs in China By making an empirical analysis of the emission reduction the author proposes some practical strategies The book comprehensively summarizes related theories and research of contaminant disposal modeling and estimates the shadow price of interprovincial CO2 emissions the emission reduction potential of different regions and the marginal emission reduction cost based on the parametric model It finally puts forward the strategy to adjust the industrial structure in China The book hence provides solid evidence for policy makers to help mitigate CO2 emissions through industrial restructuring strategy

Energy Research Abstracts ,1992-07 **Radioactive Waste Management** ,1988 *Romania* ,1960 Potential for Industrial Energy-Efficiency Improvement in the Long Term J. de Beer,2013-06-29 This book does not give a prediction of what the efficiency will be of the energy use of industrial processes in the future However it does give an exploration of limits to the efficiency of current processes and an indication of what might be achieved if new technologies can be developed At the Department of Science Technology and Society of Utrecht University research had been done to the opportunities for improvement of the energy efficiency in the short term since the 1980 s This had resulted in a comprehensive database on energy efficient measures This database and a possible application are described in Chapter 3 of this book The use of the database induced new research themes around efficiency improvement e g concerning barriers for implementation of measures It was around 1993 that I did a preliminary study to the potential for efficiency improvement in the long term Historical analysis had shown us that the short term potential stayed constant over the years It seemed to be replenished by the introduction of new technologies This lead to the question whether there are limits to the efficiency taking into account both thermodynamic considerations and ideas on the development and dissemination of new technologies **NASA SP-7500** United States. National Aeronautics and Space Administration,1972 Technological Economics Shoubo Xu,2020-10-26 This book creatively puts forward the subject nature object system theory method and application of technical economics and brings together the research achievements of 50 years especially the latest research results It is of great significance for the development of China s technical and economic disciplines and the cultivation of special talents for technical and economic development It is of great significance for the solution of major technical and economic problems in economic and social development and has a landmark significance in the history of world technical economics The book can be used as teaching material for both the liberal arts science and engineering students within higher education institutions and as a leading cadre training source for engineers Furthermore it can facilitate readers engaged in policy making program planning macro control evaluation of investment decision feasibility studies project with aspects such as government consulting companies banks and financial personnel needs Also this book can aid readers with engineering design product development business management as well as with the needs of engineering and technical personnel and enterprise management personnel *Green finance & carbon neutrality: strategies and policies for a sustainable future* Wei

Zhang,Tian Tang,Satar Bakhsh,Xuemeng Liu,2025-09-01 The accelerating global climate crisis demands innovative and sustainable financial strategies to mitigate its impacts and facilitate the transition to a carbon neutral economy Green finance and carbon neutrality are instrumental in this endeavor Green finance entails financial investments directed towards sustainable development projects and initiatives that promote environmental benefits Its growth is critical in supporting the transition to a low carbon economy Simultaneously the concept of carbon neutrality which refers to achieving net zero carbon dioxide emissions by balancing or eliminating emissions entirely has become a central goal for many governments and organizations worldwide The urgent global challenge that this Research Topic aims to address is how to effectively integrate green finance strategies into our path towards achieving carbon neutrality Despite the increasing importance of both these areas there remains a significant knowledge gap on how they can synergistically drive a shift towards a low carbon sustainable economy Moreover the absence of standardized regulations and lack of broad understanding of these concepts have contributed to slower adoption and implementation rates than what is urgently required The goal of this Research Topic is to consolidate recent advancements present innovative strategies and highlight successful case studies in the nexus of green finance and carbon neutrality This includes exploring novel financial instruments and models that encourage sustainable investments comprehending the socio economic impacts of moving towards a carbon neutral economy and showcasing policy mechanisms that have effectively integrated green finance and carbon neutrality By amalgamating these insights we aim to guide policymakers inform business practices stimulate further academic exploration and ultimately accelerate the global journey towards a sustainable carbon neutral future The scope of this Research Topic encompasses a broad range of themes at the intersection of green finance and carbon neutrality We are particularly interested in empirical Original Research articles in depth Reviews of current literature Policy and Practice Reviews and case studies demonstrating the successful application of green finance strategies in achieving carbon neutrality Potential topics include but are not limited to following areas Development of innovative green financial instruments Analysis of policy frameworks and regulations promoting carbon neutrality Examination of the role of ESG Environmental Social Governance factors in investment decisions Studies on the socio economic impacts of transitioning to a carbon neutral economy Manuscripts that provide novel insights propose unique models or offer critical perspectives on existing approaches are highly encouraged By collating these diverse viewpoints we aim to further enrich the dialogue on sustainable development and carbon neutrality

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