

ISSN: 2358-1271



Universidade Federal de Goiás



4

Goiânia | Volume nº 4 | Edition nº 2 | July-December 2017



UNIVERSIDADE FEDERAL DE GOIÁS (UFG)

Rector

Orlando Afonso Valle do Amaral



ESCOLA DE ENGENHARIA ELÉTRICA,
MECÂNICA E DE COMPUTAÇÃO (EMC)

Director

Marcelo Stehling de Castro



GRUPO PET – ENGENHARIAS (CONEXÕES
DE SABERES) (PETEEECs/UFG)

Tutor

Getúlio Antero de Deus Júnior



GRUPO DE EDUCAÇÃO APLICADA EM
ENGENHARIA E ENGENHARIA APLICADA
AO ENSINO (ENAEN/UFG)

Coordinator

Getúlio Antero de Deus Júnior

EDITOR-IN-CHIEF

Getúlio Antero de Deus Júnior, Universidade Federal de Goiás, Goiânia, Brazil

EDITOR

Rodrigo Pinto Lemos, Universidade Federal de Goiás, Goiânia, Brazil

INTERNATIONAL EDITORIAL COMMITTEE

Aly El-Osery, New Mexico Institute of Mining and Technology, Socorro, The United States of America

Christian Weiner, Darmstadt University of Applied Sciences, Darmstadt, German

Christof Sumereder, FH Joanneum University of Applied Sciences, Graz, Austria

Emmanuel Daniel, Institute Minés-Télécom Atlantique, Brest, France

Getúlio Antero de Deus Júnior, Universidade Federal de Goiás, Goiânia, Brazil

Jesús Mária López Lezama, Universidad de Antioquia, Medellín, Colombia

Leonardo Guerra de Rezende Guedes, Universidade Federal de Goiás, Goiânia, Brazil

Lina Paola Garcés Negrete, Universidade Federal de Goiás, Goiânia, Brazil

Lueny Morell, Lueny Morell & Associates and Director of InnovaHiED, Mayagüez, Puerto Rico

Luiz Carlos de Campos, Pontifícia Universidade Católica de São Paulo, São Paulo, Brazil

Marcelo Escobar de Oliveira, Instituto Federal de Goiás, Itumbiara, Brazil

Marcelo Stehling de Castro, Universidade Federal de Goiás, Goiânia, Brazil

Marco Antônio Assfalk de Oliveira, Universidade Federal de Goiás, Goiânia, Brazil
Marcos Lemos Afonso, Universidade Federal de Goiás, Goiânia, Brazil
Nival Nunes de Almeida, Universidade do Estado do Rio de Janeiro, Rio de Janeiro, Brazil
Natasha Van Hattum-Janssen, Saxion University of Applied Sciences, Enschede, Netherlands
Rodrigo Pinto Lemos, Universidade Federal de Goiás, Goiânia, Brazil
Rui Manuel Sá Pereira Lima, Universidade do Minho, Minho, Portugal

REVIEWERS

Américo Augusto Nogueira Vieira, Universidade Federal do Paraná, Curitiba
Amilton Costa Lamas, Pontifícia Universidade Católica de Campinas, Campinas
Anna Cristina Barbosa Dias de Carvalho, Faculdade de Tecnologia, Itaquera
Archimedes Azevedo Raia Junior, Universidade Federal de São Carlos, São Carlos
Cassio Dener Noronha Vinhal, Universidade Federal de Goiás, Goiânia
Denise Rauta Buiar, Universidade Tecnológica Federal do Paraná, Curitiba
Eliomar Araújo de Lima, Universidade de Brasília, Brasília
Emiliano Lôbo de Godoi, Universidade Federal de Goiás, Goiânia
Estéfano Vizconde Veraszto, Universidade Federal de São Carlos, Araras
Frederico Nicolau Cesarino, Universidade Luterana do Brasil, Manaus
Getúlio Antero de Deus Júnior, Universidade Federal de Goiás, Goiânia
Igor Kopcak, Universidade Federal de Goiás, Goiânia
Irlan von Linsingen, Universidade Federal de Santa Catarina, Florianópolis
Kléber Mendes Figueiredo, Universidade Federal de Goiás, Goiânia
Leonardo de Queiroz Moreira, Universidade Federal de Goiás, Goiânia
Leonardo Guerra de Rezende Guedes, Universidade Federal de Goiás, Goiânia
Luiz Carlos de Campos, Pontifícia Universidade Católica de São Paulo, São Paulo
Luiz Carvalho, Universidade Federal do Rio de Janeiro, Rio de Janeiro
Luiz Eugenio Veneziani Pasin, Universidade Federal de Itajubá, Itajubá
Mara Marly Gomes Barreto, Universidade Federal do ABC, Santo André
Marcelo Stehling de Castro, Universidade Federal de Goiás, Goiânia
Maria Assima Bittar Gonçalves, Universidade Federal de Goiás, Goiânia
Maria Cristina Kessler, Universidade do Vale do Rio dos Sinos, São Leopoldo
Marlize Garcia Fagundes Neto, Universidade Federal de Goiás, Goiânia
Mauricio Leonardo Aguilar Molina, Universidade Federal de Juiz de Fora, Juiz de Fora
Miguel Angel Chincaro Bernuy, Universidade Tecnológica Federal do Paraná, Cornélio Procópio
Reinaldo Gonçalves Nogueira, Universidade Federal de Goiás, Goiânia
Rodrigo Cutri, Instituto Mauá de Tecnologia, São Caetano do Sul
Rodrigo Pinto Lemos, Universidade Federal de Goiás, Goiânia
Sarajane Marques Peres, Universidade de São Paulo, São Paulo
Sergio Pires Pimentel, Universidade Federal de Goiás, Goiânia
Sigeo Kitatani Júnior, Universidade Federal de Goiás, Goiânia
Ubirajara Carnevale de Moraes, Universidade Presbiteriana Mackenzie, São Paulo
Warley Teixeira Guimarães, Faculdades Integradas São Pedro, Vila Velha

SISTEMA ELETRÔNICO DE EDITORAÇÃO DE REVISTAS (SEER)

Cássia Oliveira Santos, Biblioteca Central (BC/UFG)
Cláudia Oliveira de Moura Bueno, Biblioteca Central (BC/UFG)

SECRETARY

Huesdra Nogueira Campos (EMC/UFG)

STANDARDS FOR THE PREPARATION OF MANUSCRIPTS EDITOR

Getúlio Antero de Deus Júnior (EMC/UFG)

PAPERS EDITORS

Getúlio Antero de Deus Júnior (EMC/UFG)
Huesdra Nogueira Campos (EMC/UFG)
Bruno Lúcio Mendes Fontes (EMC/UFG)
Lucas Ribeiro Marquies (EMC/UFG)
Alexandre Godinho de Oliveira (EMC/UFG)
Isabela De Magalhães Barcelos Costa (EMC/UFG)
Isabela Lopes Magalhães (EMC/UFG)
Isabela Fontes de Araújo (EMC/UFG)
Lucas Wallace Nascimento Lima (EMC/UFG)

LANGUAGE REVIEWERS

Authors are responsible for reviewing their papers by an expert in English language.

GRAPHIC DESIGNER

Getúlio Antero de Deus Júnior (EMC/UFG)

WEBSITE DESIGNERS

Getúlio Antero de Deus Júnior (EMC/UFG)
Huesdra Nogueira Campos (EMC/UFG)

LATEX DESIGNERS

Bruno Lúcio Mendes Fontes (EMC/UFG)
Lucas Ribeiro Marquies (EMC/UFG)
Alexandre Godinho de Oliveira (EMC/UFG)
Isabela De Magalhães Barcelos Costa (EMC/UFG)
Isabela Lopes Magalhães (EMC/UFG)
Isabela Fontes de Araújo (EMC/UFG)
Lucas Wallace Nascimento Lima (EMC/UFG)

SPECIAL SUPPORT

Grupo PET - Engenharias (Conexões de Saberes) (PETEEECs/UFG)
Grupo de Educação Aplicada em Engenharia e Engenharia Aplicada em Educação (EnAEn/UFG)
Laboratório de Engenharia Multimeios (Engemulti/UFG)
Pró-Reitoria de Pós-Graduação (PRPG/UFG)

The Grupo de Educação Aplicada em Engenharia e Engenharia Aplicada em Educação (EnAEn/UFG) of the Escola de Engenharia Elétrica, Mecânica e de Computação (EMC) of the Universidade Federal de Goiás (UFG) promotes The International Journal on Alive Engineering Education (IJAEdu). The journal publishes issues every six months and receives papers in continuous flow, so there will be no deadlines for submitting them. IJAEdu provides to professionals and academia an electronic space for the dissemination of technical and scientific works related to Engineering Education in Brazil and other countries.

CATALOGUING DATA

INTERNATIONAL JOURNAL ON ALIVE ENGINEERING EDUCATION. Journal on the Escola de Engenharia Elétrica, Mecânica e de Computação, UFG, v. 4, n. 2, 2017 – Goiânia: IJAEEDU/EMC/UFG, 2017

v. 4, n. 2, July/Dec./2017.

Semester.

ISSN: 2358-1271

1. Universidade Federal de Goiás – Escola de Engenharia Elétrica, Mecânica e de Computação – Journals.

INDEXED IN:

IBICT/SEER (<http://seer.ibict.br/>)

CONTACT FOR EXCHANGE

SIBI/UFG, Biblioteca Central, Seção de Seleção, Aquisição e Intercâmbio
Campus Samambaia, Caixa Postal 411, CEP 74001-970, Goiânia-GO

CONTACT FOR SIGNATURE

No signatures. The journal can be accessed through the electronic address: <http://www.emc.ufg.br/ijaeedu>

CONTACT FOR CORRESPONDENCE

Escola de Engenharia Elétrica, Mecânica e de Computação (EMC/UFG), Avenida Universitária, n.º 1488, quadra 86, bloco A, 3º piso, Setor Leste Universitário, Goiânia-GO, CEP 74605-010.

Phones: (62) 3209-6079, (62) 3209-6070. Fax: (62) 3209-6292.

URL: <http://www.emc.ufg.br/ijaeedu>. E-mail: revviva.emc@ufg.br.

Preface

This is the first issue of this journal that is fully published in English in accordance with the policies announced in the last issue and presented in the International Conference on Alive Engineering Education, held in Rio de Janeiro in June 2017. From now on, this periodical constitutes an open forum to contributions coming from outside the Brazilian borders in order to enrich the debate on Engineering Education with experiences and practices from all around the world. In addition, our intention is as well to become a showcase that gives more visibility to the pedagogical efforts here presented and spreads ideas to influence good changes in the learning environment.

Internationalization is also the theme of the first paper in this issue, which discusses the impact of the Science without Borders program on the Minas Gerais State University. Besides the cultural and technical subjects, international mobility programs offer the students the opportunity to experience different pedagogical approaches and bring their perceptions to their home institutions. This paper questioned the incoming students about their exchange period and evaluated the corresponding qualitative effect on their formation and their institutions.

The fourth and fifth papers discuss the use of technology to help improving the learning process. The first one describes the role of cooperative learning on educational projects related to the development of skills for programming mobile devices. The authors evaluate the use of challenging projects to motivate the students and to promote the development of soft skills that will be useful to their professional career and meet the labor market expectations. The other paper describes an initiative of the students from CEFET-MG to recover the robotics laboratory by not only fixing the hardware of the available robot arm but also by integrating it to a simulated 3D Model they developed. The fully functional simulation allows even simultaneously controlling both the real robot arm and the model. This experience virtually incremented the amount of seats in the robotics lab and shows the importance of the students in the continuous improvement of our institutions.

Turning the attention to oppose dropout rates, three works add value to the debate. The second paper in this issue brings some suggestions on how to keep the attention of the students during highly technical classes. A set of technological tools was used with pedagogical purpose, like simulations, debates on technical-scientific papers and practical exercises with lab equipment to check the concepts just presented in the lectures. In the third paper in this number, a program to prevent the students from abandoning their courses is introduced together with a diagnosis of the causes of school dropout. Freshmen were integrated to senior students who shared experiences, gave motivational speeches and advices on time-management. During this process, a survey allowed identifying the main problems and assessing the results. It evidenced the increasing interest of freshmen after the introduction of the program.

The last work here presented unveils how a leveling course on basic sciences contributed to reduce the educational gap in conceptual and operational fields from the basic sciences cycle to the engineering formation cycle at the Engineering courses of UFPA, lowering the dropout rates. In order to explain the epistemological learning mechanism behind this process the authors appeal to cognitive learning theory, especially the Meaningful Learning Theory of David Ausubel that establishes a logical-mathematical connection between new knowledge and already acquired concepts.

Evasion repeatedly arises as an important concern among the Engineering schools all over the world. Especially when dealing with the so-called Generation Y or even Millennials new challenges are imposed to the learning process. Understanding their relation with technology and using it to arouse their interest maybe is the start to reach a better results in the learning process.

Rodrigo Pinto Lemos, Editor

Presentation

The Grupo de Educação Aplicada em Engenharia e Engenharia Aplicada em Educação (EnAEn/UFG) of the Universidade Federal de Goiás (UFG) promotes The International Journal on Alive Engineering Education (IJAEdu). The journal publishes issues every six months and receives papers in continuous flow, so there will be no deadlines for submission of papers. Thus, a particular paper accepted in the field of Engineering Education will be published in an appropriate edition.

The IJAEdu provides to professionals and academia an electronic space for the dissemination of technical and scientific works related to Engineering Education in Brazil and other countries.

Contributions to The IJAEdu must address research and extension in the field of Engineering Education. The IJAEdu is aimed at undergraduate and graduate students, professors, researchers and professionals from different Courses of Engineering and related areas.

Before 2017, the IJAEdu was known as Revista Eletrônica Engenharia Viva (ISSN: 2358-1271). Under this name, the IJAEdu was submitted to Qualis that is a Brazilian official system with the purpose of classifying scientific production. It is maintained by the Coordenadoria de Aperfeiçoamento de Pessoal de Nível Superior (CAPES), a Government Agency linked to the Ministério da Educação (MEC). Qualis has the task to classify and evaluate the academic means used on the production of scientific publications of Undergraduate and Graduate Programs. The classification itself occurs by a system of grades, per field of evaluation, and depends on the level of circulation: local, national or international. The classification for a journal is A, B, or C. Thus, Qualis/CAPES indicators were obtained by Revista Eletrônica Engenharia Viva in 2016 is presented in the following Table.

Presentation Table. Qualis/CAPES indicators obtained by Revista Eletrônica Engenharia Viva in 2016.

Evaluation Area	Classification
Education	B4
Engineering I	B5
Engineering IV	B5

In 2017, the journal went through an internationalization process, being recognized as International Journal of Alive Engineering Education (IJAEdu). Since then, the IJAEdu has started publishing only papers in English.

The editors of the IJAEdu are working hardly for international recognition. In fact, our efforts focus on obtaining the Digital Object Identifier (DOI), using the plagiarism detection software (iThenticate) and indexing the journal on an international basis beginning in 2018, among other goals. Therefore, the editors of the journal welcome your confidence in the work being done.

The IJAEdu counts with the special support of Grupo PET - Engenharias (Conexões de Saberes) (PETEECS/UFG), Grupo de Educação Aplicada em Engenharia e Engenharia Aplicada em Educação (EnAEn/UFG), Laboratório de Engenharia Multimeios (Engemulti/UFG) and Pró-Reitoria de Pós-Graduação (PRPG/UFG).

Getúlio Antero de Deus Júnior

Editor-in-Chief

Contents

1. The Internationalization of Engineering Programs and its Contribution for Minas Gerais Universities: an evaluation of UEMG. <i>Filipe Mattos Gonçalves</i> <i>Aline da Luz Pascoal</i> <i>Júnia Soares Alexandrino</i> <i>Telma Ellen Drumond Ferreira</i>	15
2. How to Increase and Retain Interest in Power Quality Lectures <i>Carlos H Beuter</i> <i>Mario Oleskovicz</i> <i>Fernando B Bottura</i> <i>Jader F Breda</i>	23
3. The Establishment of A Program to Act Against Dropout and Retention Rates on Biochemical Engineering <i>Geraldo Gabriel Araujo Silva</i> <i>Michele da Rosa Andrade Zimmermann de Souza</i> <i>Ana Priscila Centeno da Rosa</i> <i>Elisangela Martha Radmann</i> <i>Thaisa Duarte Santos</i>	35
4. Cooperative Learning Environment in Teaching Mobile Application Development <i>Antonio Marcio Albuquerque Almeida</i> <i>Leonardo Pires De Sousa Silva</i> <i>Francisco Heitor Vasconcelos</i> <i>Romulo Nunes De Carvalho Almeida</i>	45
5. Robot As Virtual Learning Object <i>Vincius Ferreira da Silva Bianchi Grilo</i> <i>Paulo Pinheiro Junqueira</i> <i>Fabiano Pereira Bhering</i> <i>Lindolpho Oliveira de Araujo Junior</i>	57
6. David Ausubel's Theory and Learning Improvement: A Case Study of the Leveling Courses Program in Basic Sciences for Engineering <i>Pedro Santos Valente</i> <i>Jose Bencio da Cruz Costa</i> <i>Gilberto Martins Lynch</i> <i>Douglas da Silva Barros</i>	65

