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Newsletter SPEE
Nº 10
abril 2016

ESPAÇO DA DIREÇÃO

Mensagem da Direção

Alberto Cardoso
Presidente da SPEE

Esta edição da Newsletter da SPEE coincide com o final do mandato de dois anos da Direção e, por isso, esta mensagem é uma oportunidade para fazer um balanço da atividade desenvolvida.

Olhando para o que foi realizado e comparando com os planos traçados inicialmente, importa referir que nem tudo o que estava planeado foi concretizado, devido a dificuldades e constrangimentos de vária ordem, e que muito mais se poderia ter feito, apesar da determinação e coesão dos elementos da Direção.

Da atividade desenvolvida neste período, destaco as seguintes concretizações:

• Retoma da publicação da Newsletter da SPEE, duma forma mais regular, registando-se a publicação de três edições (a nº 8 em março de 2015, a nº 9 em julho de 2015 e a nº 10 em abril de 2016), em que se manteve a estrutura habitual mas onde ainda não foi possível reativar algumas das colunas;

• Realização de atividades e sessões especiais, associadas à SPEE e aos seus grupos de trabalho, em conferências internacionais tais como as edições TaT'14 e TaT'15 da SPEE Special Session "Talking about Teaching 20xx" (TaT'xx) na IGIP International Conference on Engineering Pedagogy;

• Realização de atividades como a sessão intitulada "A Atractividade dos Cursos de Engenharia em Portugal: Análise e Soluções", que decorreu em Coimbra a 30 de março de 2015;

• Colaboração com a comissão organizadora da 2ª edição da Conferência CISPEE que irá decorrer em Vila Real, de 19 a 21 de outubro de 2016, sob o tema "(Re)Pensar a Educação Superior de Engenharia";

• Disseminação de iniciativas em temáticas relacionadas com a Educação em Engenharia, especialmente as promovidas por sócios da SPEE;

• Colaboração em iniciativas que tiveram em vista a formação contínua e a sua certificação, nomeadamente na divulgação do Sistema de Acreditação da Formação Contínua para Engenheiros, da Ordem dos Engenheiros (OE+AcCEdE);

• Promoção da internacionalização da SPEE através da realização de iniciativas no âmbito dos protocolos já existentes e de contactos para o estabelecimento de novos protocolos com outras instituições internacionais;

• Realização de encontros e de contactos tendo em vista a dinamização dos Grupos de Trabalho da SPEE.

O aspeto que considero ter sido menos conseguido corresponde ao envolvimento dos sócios na atividade da SPEE, em especial através dos Grupos de Trabalho que foram pensados como estruturas fundamentais para a dinamização e intervenção da SPEE. Importa, pois, encontrar soluções que promovam a participação e intervenção dos sócios num contexto em que as diversas temáticas e os desafios da Educação em Engenharia têm um papel cada vez mais relevante na sociedade e na vida das instituições académicas.

Dada a relevância da CISPEE para a SPEE, quero deixar um apelo a todos os sócios individuais e institucionais para que participem e colaborem na disseminação da CISPEE2016 - 2ª Conferência Internacional da SPEE, cuja organização local é da Universidade de Trás-os-Montes e Alto Douro (UTAD), tendo como coordenadores do programa os colegas Maria Manuel Nascimento, da Escola de Ciências e Tecnologia da UTAD, e Gustavo Alves, do ISEP-IPP. A CISPEE2016 pretende reunir todos os interessados em partilhar experiências que podem contribuir para a melhoria do pensamento crítico e resolução de problemas, comunicação, colaboração e criatividade e inovação em educação em engenharia.

Ao concluir esta mensagem, quero expressar o meu agradecimento aos colegas de Direção, Jorge Barata e Jorge Bernardino, e a todos os que, direta ou indiretamente, apoiaram e colaboraram com a Direção, a que tive a honra de presidir, e formulo, desde já, votos de muito sucesso para a nova Direção e para os restantes órgãos sociais da SPEE que resultarão da eleição na Assembleia Geral do próximo dia 4 de abril.

EDITORIAL

Jorge M. M. Barata
UBI

Esta edição da Newsletter da Sociedade Portuguesa para a Educação em Engenharia é a décima e mantém a estrutura da edição anterior. Continua a não ser possível a reativação das colunas "Voz dos Sócios" e "Voz das Escolas", porque a participação dos Sócios tem sido muito difícil.

A coluna de Susan Zvacek, "Talking about teaching" aborda o tema do planeamento, conteúdo e métodos de ensino de uma disciplina tendo em vista objetivos educacionais específicos. Usa como analogia o funcionamento de um tear. Tem de se escolher a urdidura, que se mantêm ao longo de todo o tecido e que é atravessada perpendicularmente pela trama através da cala com auxílio de uma navete. A escolha intencional e ordenada dos diversos fios de cor diferente dá origem a um tecido funcional e belo. É só aplicar ao projeto de uma disciplina…

A secção das atividades da SPEE desta edição é dedicada à 2ª CISPEE-Conferência Internacional da Sociedade Portuguesa para a Educação em Engenharia.

No final pode encontrar-se uma versão resumida do CISPEE2013 Best Paper Award, "Teaching and learning mathematical modelling and problem solving: a case study" da autoria de Dag Wedelin, Tabassum Jahan, Tom Adawi e Sven Andersson.

TALKING ABOUT TEACHING

The Warp and Weft of Course Planning

Susan Zvacek, Ph. D.
Assoc. Provost for the Advancement of Teaching & Learning
University of Denver

Most of us, if asked, would agree that we'd like our students to learn how to solve problems, apply theoretical understanding to real-world challenges, and evaluate dubious claims with a skeptic's lens. However, if we then examined our course syllabi with those goals in mind, it may be difficult to see when and how our courses facilitate such types of learning. And, if that isn't depressing enough, looking for evidence of how our day-to-day teaching behaviors support those lofty aspirations can be an exercise in frustration. Planning our course design, resources, and teaching to support all of the educational goals we have for our students is known as alignment.

The components of a course can be visualized as a series of threads in varying colors. These threads can end up tied in knots, broken off, and hopelessly tangled… or, if they are aligned effectively, can become the warp and weft of a functional, attractive fabric. To continue this analogy, let's assume that each learning outcome is a thread that continues throughout the duration of the course. Intersecting these on our loom are learning activities, feedback, resources, assessments, and evidence. My first task, when designing a course, is to select threads representing major outcomes – for example, the unit/module objectives related to problem solving could be one category, those supporting critical thinking another, etc. If one of my unit objectives is to predict the chance of a landslide on a given slope (problem solving), then each intersecting thread must support and be compatible with students demonstrating mastery of this competency. So, maybe I'll choose an online simulation as the learning activity, incorporate feedback from peers and myself, select a relevant textbook chapter with supporting information, and require students to calculate the landslide likelihood, resulting in a collection of worked examples. Any activities (or resources, assessments, etc.) that don't support – i.e., align with – the objectives can be eliminated.

For those not fascinated by the intricacies of textile manufacturing, here's another (more concise) way to look at alignment:

1. What should students be able to do? (Let's say, "Solve problems," for this example.)

2. What activities should they engage in that will result in problem solving ability?

3. What kind of feedback will help to improve their problem solving ability?

4. What resources do they need to support those learning activities?

5. How will you know if they've developed problem solving ability?

6. What artifact(s) will be generated to serve as evidence of problem solving ability?

Again, anything extra that doesn't point students toward the goal (problem solving) can be eliminated and any missing elements should be added. Conversely, if there are course elements that don't seem to have a "match" in your list of outcomes but you remain convinced of their importance, perhaps the outcomes themselves should be revisited.

In case this seems like a lot of work, be assured that the up-front labor can pay off in the long-term and the show benefits worth the effort. In addition, although the most important reason to align your course components is to see improved learning outcomes, you may also find that this process saves time when choosing textbooks or other resources, scoring students assignments, or answering student questions about course activities, for example.

Ultimately, an intentionally-designed fabric is more functional and beautiful than a random tangle of threads and so it goes for well-aligned courses. If your course threads resemble my chaotic sewing box, it may be time for a change. Identify the colors for your own course tapestry and weave a purposeful series of learning experiences to ensure that the most important goals aren't left dangling.

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TaT'15 – Talking About Teaching

The 4th edition of the "Talking about Teaching" SPEE Special Track took place within the 18th International Conference on Interactive Collaborative Learning (ICL2015), the 44th IGIP International Conference on Engineering Pedagogy (IGIP2015) and the World Engineering Education Forum (WEEF2015), on the 22nd September, in Florence, Italy.

The Organizers, being responsible for the Portuguese Society for Engineering Education (SPEE) working groups (IT in Engineering Education and Lifelong Learning in Engineering Education) and actively involved in the International Society for Engineering Pedagogy (IGIP), promoted this Special Track in line with the mission of both Societies.

TEEM 2015, 3rd Technological Ecosystems for Enhancing Multiculturality Conference 2015

Following the successful results obtained in the previous editions of TEEM, namely in 2013 and 2014, in both scientific outcomes, human relationships and cooperation opportunities, a new edition was held in Porto. This edition maintained its multicultural nature combining different aspects of the technology applied to knowledge society development, with a special attention to educational and learning issues.

TEEM was divided in 14 thematic and highly cohesive tracks and took place at the ISEP campus from 7 to 9 October.

EDUCON2015 – IEEE Global Engineering Education Conference and Special Session "IT's and Engineering Pedagogy" (ITEP'15)

Under the theme of "Engineering Education towards Openness and Sustainability", the IEEE Global Engineering Education Conference was the sixth of a series of conferences that rotates among central locations in IEEE Region 8, Europe, Middle East and North Africa.

Carrying on the previous objectives of ITEP Special Tracks @ EDUCON Conferences, ITEP'15 @ EDUCON 2015 aimed to offer an open discussion and a reflection in the use of Information Technologies in Engineering Education and their appropriate Pedagogy. It also intended to foster the involvement in continuing education, bridging the gap between higher education and learning on the workplace by focusing the IT use in lifelong learning and training.

Selected papers could be reworked and submitted to special issues of the online journals http://online-journals.org/index.php/index.

REV 2016, 13th International Conference on Remote Engineering and Virtual Instrumentation

The REV conference is the annual conference of the International Association of Online Engineering (IAOE) and the Global Online Laboratory Consortium (GOLC). REV 2016 was the thirteenth in a series of annual events concerning the area of remote engineering and virtual instrumentation.

The general objective of this conference is to contribute and discuss fundamentals, applications and experiences in the field of remote engineering and virtual instrumentation. Another objective of the symposium is to discuss guidelines for education in University level for those topics including new technology applications, MOOCs, Open resources and STEM pre-University attraction.

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EDUCON 2016 – Smart Education in Smart Cities

11 -14 April 2016, Abu Dhabi, UAE
www.educon-conference.org/educon2016

The IEEE Global Engineering Education Conference (EDUCON) 2016 is the seventh in a series of conferences that rotate among central locations in IEEE Region 8 (Europe, Middle East and North Africa).
IEEE EDUCON 2016 will be organized by Khalifa University and EBTIC. The event will be held in Abu Dhabi, the capital of United Arab Emirates, April 11-13, 2016. Preconference workshops will be held on April 10, 2016.

2016 IACEE World Conference

17-20 May 2016, Porto, PORTUGAL
www.iacee.org/iacee_world_conference_2016

The 15th IACEE-International Association for Continuing Engineering Education World Conference on CEE has been scheduled for 17-20 May 2016 at Porto, Portugal, hosted by the University of Porto. Alfredo Soeiro, past IACEE President (2001-2004), is the General Chair of the Conference and welcomes your thoughts and ideas on the development of the conference program. He may be reached at avsoeiro@fe.up.pt.

IDEAS 2016 , 11th International Database Engineering & Applications Symposium

11-13 July 2016, Montreal, CANADA
www.concordia.ca

The annual IDEAS conference is a top international forum for data engineering researchers, practitioners, developers, and application users to explore revolutionary ideas and results, and to exchange techniques, tools, and experiences. IDEAS' 16 is being held in co-operation with ACM, SIGKDD and SIGMOD.

C3S2E 2016, Ninth International C* Conference on Computer Science and Software Engineering

20-22 July 2016, Porto, PORTUGAL
www.wikicfp.com

C3S2E16[*] is the ninth in a series of annual international conferences addressing the needs of the academic community in computing science and software engineering. The objective of C3S2E is to meet annually to exchange ideas on current issues and focus on new challenges from both the theoretical and application aspects of CSE.
C3S2E encourages the participation of practitioners from governmental and non-governmental agencies, industry, and academia not only from CSE but also from other disciplines with the potential of collaboration. The meeting offers participants a chance to broaden their insight into the multi-facets of CSE and emerging technologies while exploring R&D ideas in other disciplines as well, where CSE can make meaningful contributions.

DATA 2016, 5th International Conference on Data Management Technologies and Applications

24-26 July 2016, Lisbon, PORTUGAL
www.dataconference.org

The 5th International Conference on Data Management Technologies and Applications (DATA) aims to bring together researchers, engineers and practitioners interested on databases, data warehousing, data mining, data management, data security and other aspects of information systems and technology involving advanced applications of data.

ICSOFT 2016, 11th Joint Conference on Information Technologies

24-26 July 2016, Lisbon, PORTUGAL
www.icsoft.org

The purpose of ICSOFT is to bring together researchers, engineers and practitioners working in areas that are either related to new software paradigm trends or to mainstream software engineering and applications. ICSOFT is composed of two co-located conferences, each specialized in the aforementioned areas. Together, ICSOFT-PT and ICSOFT-EA aim at becoming a major meeting point for software engineers worldwide.

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CONTROLO 2016

14-16 September 2016, Guimarães, PORTUGAL
www.controlo2016.com

CONTROLO 2016 will be the 12th conference in the successful series of conferences on automatic control sponsored by APCA, the Portuguese association of automatic control and national IFAC organization member. This edition of the conference will be jointly organized by the School of Engineering, University of Minho, INESC-TEC and APCA and will be co-sponsored by IFAC. The proceedings of the conference will be published in the Springer Lecture Notes on Electrical Engineering, indexed by ISI Proceedings, EI-Compendex, SCOPUS, MetaPress, Springerlink.

CONTROLO 2016 will provide an excellent opportunity for presenting new results and to discuss the latest research and developments in the field of automatic control. While the topics of CONTROLO 2016 should be as wide as possible, we would like CONTROLO 2016 to become a privileged place to affirm the understated contribution of control and automation in general to human well-being. Whenever relevant, prospective authors are strongly encouraged to stress such contribution in their reported research and technology developments, so that a coherent overall picture can emerge from the conference and this gains a distinctive character.

ICL2016

19th International Conference on Interactive Collaborative Learning and 45th IGIP International Conference on Engineering Pedagogy

21-23 September 2016, Belfast, UK
www.icl-conference.org/icl2016

ICL2016 will be organized by IGIP and IAOE in cooperation with the University of Ulster and will be held from 21 to 23 September 2016, in Belfast, UK. It is an interdisciplinary conference that aims to focus on the exchange of relevant trends and research results as well as the presentation of practical experiences in Interactive Collaborative Learning and Engineering Pedagogy.

CISPEE 2016

19-21 October, Vila Real, PORTUGAL
cispee2016.utad.pt

Sob o tema (Re)Pensar a Educação Superior de Engenharia realiza-se em Vila Real de 19 a 21 de outubro de 2016 a 2ª CISPEE, Conferência Internacional da Sociedade Portuguesa para a Educação em Engenharia.
A organização local é da UTAD, tendo como coordenadores do programa os colegas Maria Manuel da Silva Nascimento da Escola de Ciências e Tecnologia e Gustavo Alves do ISEP.
A CISPEE 2016 pretende reunir professores e investigadores de diversas escolas de engenharia, instituições e da indústria de forma a partilhar boas práticas que podem contribuir para levantar questões relacionadas com a melhoria do pensamento crítico e resolução de problemas, comunicação, colaboração e criatividade e inovação em educação em engenharia.

WEEF & GEDC

6-10 November 2016, COEX, Seoul, SOUTH KOREA
www.weef-gedc2016.org

The 2016 World Engineering Education Forum was announced at the Closing Ceremony of the CSEDU 2015. It will be held together with The Global Engineering Deans Council. The Korean Society for Engineering Education (KSEE) and the Korea Engineering Deans Council (KEDC) will host the WEEF & GEDC in Coex, Seoul, South Korea in Nov. 6-10, 2016. The main theme will be Engineering Education for Smart Society.

KMIS 2016, 8th International Conference on Knowledge Management and Information Sharing

9-11 November 2016, Porto, PORTUGAL
www.kmis.ic3k.org

KMIS is part of IC3K, the 8th International Joint Conference on Knowledge Discovery, Knowledge Engineering and Knowledge Management. The purpose of the IC3K is to bring together researchers, engineers and practitioners on the areas of Knowledge Discovery, Knowledge Engineering and Knowledge Management. IC3K is composed of three co-located conferences, each specialized in at least one of the aforementioned main knowledge areas.

ARTIGO

Dag Wedelin   **Tom Adawi**   **Tabassum Jahan**   **Sven Andersson**

Chalmers University of Technology, Sweden

Best Paper Award
na CISPEE2013

In order to deal with complex, real-world problems related to science and technology in their future profession, it is essential that engineering students develop the ability to translate real-world problems into mathematical problems – i.e. mathematical modelling – as well as the ability to systematically deal with non-trivial problems – i.e. problem solving. Engineering education has been criticized for neglecting to provide students with adequate opportunities to develop these fundamental skills.

In the paper we wrote for the CISPEE 2013 conference , we first briefly describe the design of a course in mathematical modelling and problem solving intended to provide second-year engineering students at Chalmers University of Technology with appropriate skills to deal with real-world problems. The course takes a broad view on modelling, and is based on a collection of about 30 reasonably realistic problems. The large number of problems enables a variation in applications and models, and repeated feedback on the entire problem-solving process. The problems are calibrated to be challenging, and while some general introduction is offered, students do not in advance know any given model or method. To balance this, the assessment is adapted so that, while students are expected to do their best, it is perfectly acceptable to fail. The problems are solved in pairs, and the continuous interaction between students and teachers is emphasized. During supervision, the teachers share their experience in problem solving, partly by asking general questions that help the students to continue on their own. Self-reflection is encouraged throughout the course, and in follow-up lectures, good solutions, reflections on modelling and problem solving strategies, and other types of feedback are offered. For a more detail description of the course, see [1].

To investigate how the students deal with mathematical modelling problems, we interviewed six students attending the course. The interviews were carried out early on in the course and were based on two problems that the students had solved during the course. Using basic strategies for qualitative data analysis and interpretation [2], we identified two central challenges experienced by the students as well as several strategies for overcoming them.

We found that, students did, as expected, experience difficulties related to modelling. However, the students were more concerned with aspects related to problem solving in general. We here identified two central challenges. The first challenge was that students were not aware of the importance of understanding the problem, and the second was that they did not sufficiently explore alternatives in a non-linear solution process. Instead, they tended to be answer-focused as well as locked into one perspective. Most students reported that they were used to solving well-known given problems with a given method, and when it came to problems where finding a method for solving the problem is a part of actually solving it, they lacked previous educational experience. Different types of beliefs (e.g. a complex problem must have a complex solution) also prevented students from exploring alternative strategies. It was only after failing to solve several problems that the students started to realize the complexity of the problem-solving process, and began to change appropriately by developing strategies similar to those seen in more experienced problem solvers.

[1] This article is based on the paper "Teaching and learning mathematical modeling and problem solving: a case study", presented at CISPEE 2013, ISEP, Oporto.

ARTIGO

Teaching and Learning Mathematical Modelling and Problem Solving (cont.)

Significant parts of the development of the students' problem solving abilities can be interpreted in terms of metacognition [3]. The failed attempts in solving the problems led the students to become aware of the importance of self-regulation – i.e. understanding the problem, planning, and monitoring continuously during the solution process. At the same time, the students also became aware of their own beliefs (about modelling, problem solving, mathematics and themselves as learners), how these influenced their abilities to solve the problems, and they report that they developed more productive beliefs during the course. These findings are consistent with research in mathematical problem solving, emphasizing the importance of metacognition in understanding how students perform when solving challenging problems [4].

At the end of the course, most students express and demonstrate a fundamental change in their modelling and problem-solving abilities, and often describe it as a new way of thinking. The nature of the problems together with the supervision sessions and the follow-up lectures were the three dimensions of the learning environment that the students believed contributed to this change. These are related to the three hallmarks of a cognitive apprenticeship environment: authentic problems, making expert thinking visible and making student thinking visible [5]. Based on our experience with the course and our current findings, we believe that a course in mathematical modelling and problem solving, or similar teaching, should be an essential element in the education of all engineers.

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