11-PA008

Analysis of Engineering Education Trend by Bibliometric Approach: A Case Study

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The aim of this study was to investigate the research characteristics present in the JEE from 2000 to 2009, and provide research patterns for engineering educators or those with an interest in engineering education research. A modified, four-step content analysis, which contains sampling (content selection), conceptualization (question specification), operationalisation (variable identification), and coding verification (reliability check), analyze published works in JEE since 2000.

11-PA039

An alternative approach to learning styles indexes in engineering curricula

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Learning in a structured educational setting may be thought of as a two-step process involving the reception and processing of information. A learning-style model classifies students according to where they fit on a number of scales pertaining to the ways they receive and process information. An objective of engineering education should be to help students build their skills in both their preferred and less preferred modes of learning. Learning style models that categorize these modes provide good frameworks for designing instruction with the desired breadth. The goal is to make sure that the learning needs of students in each model category are met at least part of the time. Two well known learning styles scales have been developed and applied to engineering students throughout the world. Kolb's Learning Style Model classifies students as having a preference for (i) concrete experience or abstract conceptualization (how they take information in), and (ii) active experimentation or reflective observation (how they internalize information). Learners are then classified in four types. Felder's Index of Learning Styles proposes five categories with two dimensions each, (sensing/intuitive, visual/verbal, inductive/deductive, active/reflective, sequential/global). Both learning style models have been used effectively in engineering education. This paper presents a case study of an alternative learning style model named CHAEA, developed for general education, when applied to engineering students. The scale is based on the Kolb Theory. It analyzes Active (experimentation), Reflective (observation), Theorists (theories, models and system's thinking) and Pragmatists (theories and techniques into practice) dimensions of learning. A comparative study of CHAEA with respect to the Kolb and Felder scales has been developed using the Pearson correlations and SPSS software package. The study was performed over a sample of electrical engineering students at the University of Burgos in 2010. Positive and negative correlations amongst models were analyzed for future research in the field

11-PA046

Assessment of pioneer experiences implementing EHEA structured degrees at the School of Design Engineering ETSID in Valencia (Spain)

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During 2009-2010, as a prelude to the establishment of European Higher Education Area (EHEA) adapted new degrees, the School of Design Engineering (ETSID) launched a pioneer project in the first year of the BEng degrees in Mechanical Engineering and Electronic Engineering. This paper analyses the academic performance of these two groups on the basis of various indicators, such as performance and success rates, comparing their grades with other groups of students of the same year and degree. Academic outcomes in both groups have been found to be clearly positive. On the other hand, the teaching and assessment approaches employed in these innovative groups have favoured both, the suitable development of the learning outcomes, and the students' participation in the programmed activities.

11-PA056

Creative Engineering Education in Collaboration with Medical Course Students

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The Kanazawa Institute of Technology (KIT) incorporates Project-Based Learning (PBL) into creative courses that are based on problem solving. This is a report of a 2009 PBL collaboration project between KIT and the Kanazawa Medical University (KMU). The PBL approaches were different, but the system used by KMU students participating in KIT classes as well as that used by KIT students participating in KMU classes provided beneficial stimulation for both classes.

11-PA065

Does a link exist between examination performance and lecture attendance for first year engineering students ?

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The objective of this study is to examine if a link exists between lecture attendance and examination performance of Level 7, Year 1, Electrical Engineering students at Dublin Institute of Technology in the Electrical Systems subject. Lecture attendance was monitored and analysed over four academic years (2007-8, 2008-9, 2009-10 and 2010-11). The average lecture attendance for students in the three academic years from 2007-10 was 55%, increasing noticeably in the 2009-10 academic year. A statistically significant weakly positive correlation between lecture attendance and examination performance was established. Each 10% increase in student attendance at lectures improved both Module 1 examination and terminal examination performance by approximately 3% on average, a finding similar to that reported in other studies.

11-PA094

Group Peer Review of Engineering Lecturing

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Peer observation is a voluntary system of professional support that can help lecturers gain valuable insights about their lecturing performance in a confidential, trusting and formative climate. It involves inviting a colleague into a lecture or tutorial and asking them to give their insights about the delivery of material, the student experience, and other important teaching related factors such as clarity, pace and learning outcomes; and they are invited to offer ideas and suggestions.

The process in the University of Limerick is managed by the Centre for Teaching and Learning (CTL). The CTL's aims are to encourage and facilitate excellence in teaching and learning through helping to ensure that effective teaching is valued, supported and developed; that the learning and development experience is enhanced for both teachers and students; and encouraging scholarship, research and innovation in teaching and learning. The CTL supports the evidencing of teaching through a range of services, such as Student Evaluation of Teaching Process, Teaching Analysis, Portfolio Development; and Peer Observation.

The Mechanical, Aeronautical & Biomedical Engineering Department (MA&BE) of the University of Limerick (UL) delivers four engineering courses: Aeronautical, Biomedical & Mechanical Engineering and Computer Aided Engineering and Design. The courses are four years in duration, and each year the combined number of students is 100-120. The majority of students enter the courses directly from second-level education through the Irish Central Applications Office (CAO) system.

In Spring 2007 a pilot study of Peer Observation of Teaching was undertaken in UL, and was funded by the Higher Education Authority and the CTL as part of the UL President's Teaching Innovation Award. The model used was a peer review model (1), where interested faculty were invited to participate, which involved selecting a peer or colleague of their choice with whom they conducted reciprocal peer observation and acted as both observer and observed. Caroll and O'Loughlin (2) developed a peer observation framework including peer observation guidelines and supporting documentation. This was tested on five separate self-selected peer observation pairs, across a range of disciplines within UL. An integral part of the peer observation process and evaluation involved the provision of peer observation training and conducting of pre- and post-observation interviews. The conducted a series of in-depth interviews with the 10 participants (5 pairs), which explored participants' attitudes, insights and behaviours in relation to the peer observation process during the pre, during and post phases of the peer observation pilot. Two of the current authors participated in this pilot process. A number of key themes emerged from the pilot, these are barriers to participation, selection of peer, nature of the peer observation process and participation outcomes.

Caroll and O'Loughlin concluded by recommending the adoption of a peer observation framework based upon a voluntary system, involving peer self-selection and mutual trust and collaboration between participants. A three stage system is required for a successful framework involving an initial pre-observation meeting, the observed session and a post observation de-brief/discussion. They recommended that the session chosen to be observed should be an accurate reflection of a normal teaching and learning session.

The recommendations were taken on board and an institute wide three stage process, managed by the CTL, was initiated in Autumn 2007, of which the original pair again participated, this time with different modules. The documentation was finalised to list areas under which the observer could write notes during the observation, based on what was discussed in the pre-observation meeting. This was then feedback verbally during the post-observation meeting which happened as soon as possible following the observation. A written report was then finalised and sent to the observer and the CTL. The report lists the details of the observed class, listing the observer and observe, the date and time, the module code and title, the number in the class. It then has a section summarising the pre-observation meeting where any issues requiring particular focus or feedback can be listed. The main part of the document discusses the observation under the titles 'Beginning of the session', 'Style and approach', 'Student participation' and 'Close of lecture', the form is concluded with a section for 'Summary, Suggestions and Recommendations'.

In Spring 2009 two further colleagues were invited to participate, making the first peer observation group in UL. To complement the process a member of CTL staff also partook. The process was the same in terms of pre- and post-observation meetings, with all members of the group attending these and the observation. For one observe one member of the group could not attend at the last minute, so that observer and the CTL member attended another lecture. Following the post-observation meeting each participant wrote a reflection on the process and then a separate session was facilitated by the CTL member, focussing on the process rather than on the observation of teaching. From this it was decided to repeat the process in Autumn 2009.

This study found that a group review process was significantly more beneficial, due to a more balanced and accurate conclusion generated by the group feedback sessions. The study also found that a two-stage review process was necessary in order to assess any improvement in lecturing style and delivery of content. When compared to student feedback, it was found that peer review feedback provides a valuable in-depth critical review of lecturing style; it is harder to determine the value of peer feedback on delivery of content. Finally, it was found that it is possible to develop the skills necessary to provide honest feedback to one's peers with professional courtesy and respect.

11-PA146

Government-Funded Student Enterprise Program: A Special Program Collaborating with Regional Industry

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For a decade university education has been challenged if it has raised leading man power for future industry. In Korea, there have been some promising government-driven programs for sustainable university-industry coexistence. The Student Enterprise Program, among them, was established in July, 2010 by Ministry of Education, Science and Technology in order to activate and strengthen university educational infrastructure in aspect of industry-university collaboration. The aims of this program are to train student-engineers who are equivalent to industry employees, and for students to take the lead designing and developing a brand-new technology or goods with collaboration of industry under minimal academic supervision. A project team consists of three or more students (juniors and seniors), one supervisor (professor), and one or more industry professionals. A team is given $7500-$9000 for management, material purchases, and a prototype model. The SCH-SE (SoonChunHyang Student Enterprise) program compasses the industrial complexes nearby university including electronics, motor vehicles and parts, bio & medical instruments and cutting-edge cultural contents that can boost local feasts. This program supports local industry with consultation, high priced instruments, free use of university facilities and overall administration, which is so called a ‘family enterprise’. Students are encouraged to participate in on-or-off-campus exhibitions and the annual capstone design fair hosted by Ministry of Education, Science and Technology. A multi-sided evaluation containing final report, exhibition, and opportunities of employment is done in six months when the project ends. A few selected teams are given a scholarship. We have 25 projects which will be completed by February, 2011. The areas of the sponsored projects are chemistry/environmental science(1), medical(5), cultural contents(2), electrical engineering (8), telecommunication(7), and mechanics(2). A couple of sampled projects will be fully analyzed and be reported for discussion in the main conference.

11-PA147

An University-Industry Collaborative Mentoring Program for Improving Students' Practical Skill

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This paper introduces an outcome-based industry-university co-education model for engineering undergraduates and shows the results from the realized pilot programs based on the model. There have been different kinds of approaches to improve students' practical skills. However, they have been proved to have critical side-effects through many related programs. Especially, the invited industry expert's lectures normally gave little efficiency and the internship program usually made the curricular courses ineffective. To overcome these drawbacks, the proposed model was designed to have a cooperative framework which engages all the associated members including university students, faculties and industry experts. Based on the proposed model, five pilot programs were run and analyzed with a survey. By examining the results of the analysis, it is proved that the proposed model gives a better satisfaction for the attendees.

11-PA204

Active learning in Mathematics Lab classes for Engineering Students

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Polytechnic University of Valencia (UPV) is a Spanish university focused on science and technology. Founded in 1968 as the Higher Polytechnic School, UPV became a university in 1971, but some of its schools like the Design Engineering School (ETSID) are older than 100 years.

One of the ETSID delivered degrees is Aerospace Engineering where from its outset in 2005 the use of innovative teaching methods based on technology has been promoted.
On the other hand, UPV started to build up a platform known as PoliformaT, which includes several tools such as document distribution, live chat, assignment uploads and online testing among others. This platform was available for all, UPV instructors and students.
In our case this technological change was taken not as an obligation but as an opportunity to move on and try to improve and modernize the learning possibilities of our students. Thus we started its use within our lab Mathematics classes in the first year of the Aerospace Engineering degree during 2007/2008 in which we were using DERIVE as mathematical software.
The following academic year we extended the use of PoliformaT from the beginning to all laboratory classes as well as in the corresponding exams.

During 2010/2011 we have started the last version of MATHEMATICA available at that time, MATHEMATICA 7, as mathematical software and have fully implemented the use of the platform in laboratory classes as well as in the corresponding exams. Students' motivation and perception to the subject has changed with the use of these new technologies and they are performing and learning satisfactorily. As a consequence their outcome has improved compared to that in the past.
Results and opinions from the students have been obtained and are also presented.

11-PA261

Introduction of Outside Evaluation to Enhance Student Motivation in Engineering Education

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Kanazawa Technical College is 5-year educational institution. In the 5th year of study, students perform a capstone project that spans the entire year. However, student motivation of some projects is low. To solve the problem, an outside evaluation was taken to the capstone project. Fiscal year 2010, students performed the robot therapy that used a pet type robot and a remote-controlled robot in the senior citizen facilities. To make senior citizens pleased, students made various programs of the robots. It was found that the students thought more deeply, and motivation rose by the activity in the outside the school. In this paper, these projects performed for the student's motivation improvement in the capstone project are explained.

11-PA352

Initiatives to Prepare High School and College Students to Succeed in STEM at Howard University

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The purpose of the poster is to present initiatives in the Mechanical Engineering (M.E.) department at Howard University (HU) to prepare high school and college students to succeed in their academic pursuits in the disciplines of Science, Technology, Engineering and Mathematics (STEM). The initiatives summarized in this poster are the pre-college Howard University Minority Science & Engineering Improvement Program (MSEIP) and the historically evolved Senior Capstone Design course. The various initiatives show a multi-team centered approach involving multi departments, industries and countries, with favorable success with students who are planning on, or pursuing STEM related fields. Through collected data, and evaluation of formative and summative survey results, it can be concluded that the initiatives are proving to achieve successful results.