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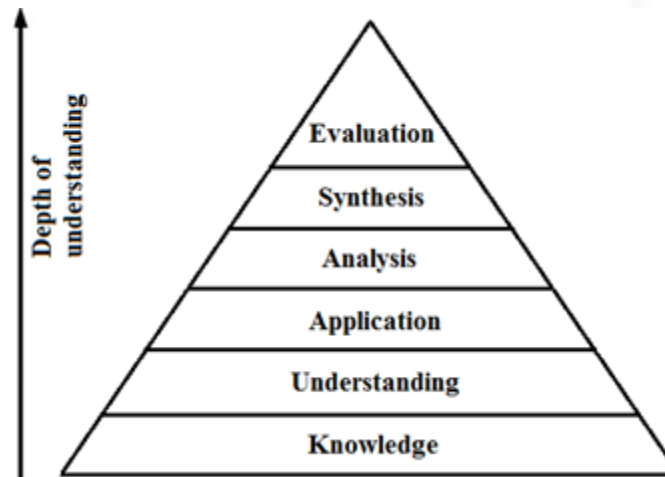


ELECTRICAL POWER ENGINEERING EDUCATION: HOW TO BRIDGE THE GAP BETWEEN INDUSTRY AND UNIVERSITIES

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Question 1 – What level of specialization of engineering curricula should be sought for? Is basic, fundamentals knowledge more formative and potentially more effective for industry than up-to-date information ?

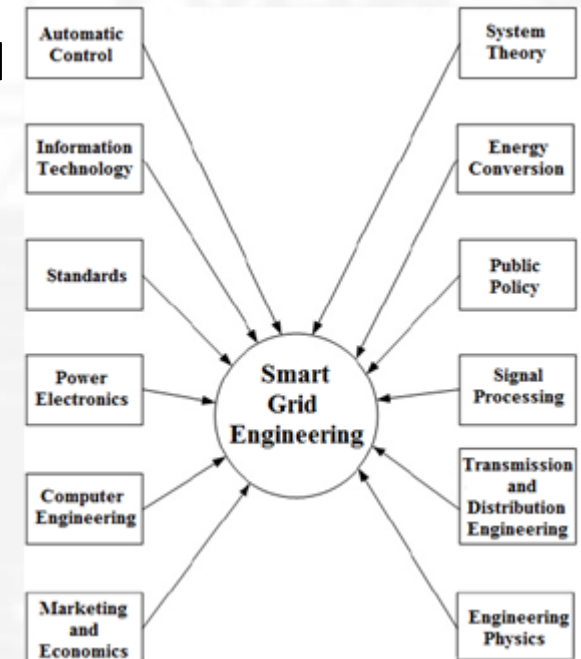


- The university education for the emerging workforce should be closely coordinated with industry whenever feasible to make sure the hands-on-learning process is based on the most advance instructional delivery tools used in the industry.



Question 2 – What are the differences between Industry needs and expectations and Academia ones ?

- The academia may view the fundamental knowledge more important and lasting, but that may be deceiving with all the fundamental advancements and technology discoveries
- Industry may need a well rounded engineer with the basic knowledge in many areas, which may not be taught at Universities
- The industry may be more interested in practical skills to solve everyday problems, but that may not be possible due to the need to understand the fundamentals as well



Question 3 – What are the reasons behind the gap between Academia and Industry, if any ?

- The main gap may be in the age groups at industry and academia

Job Category	Percentage of Potential Attrition and Retirements (%)	Estimated Number of Replacements	Estimated Retirements Only
Technicians	49.0	27,000	20,500
Non-nuclear Plant Operators	47.6	12,000	9,000
All Engineers	44.7	14,500	10,000
Pipe Fitters / Pipe Layers	45.0	8,500	6,500
Line Workers	40.2	29,500	19,000

- Universities and industry need to recognize the need to tailor the academic delivery of knowledge in more flexible forms of instruction and course/degree accreditation
- This can easily be bridged through universities offering extensive short courses for continuing education and smaller teaching units for modular course/degree cortication



Question 4 – What is the current status of cooperation between Academia and Industry and in particular the interaction between industry and undergraduate/doctoral programs ?

- Many universities in the USA are very active in offering short courses and seminars, as well as specialized on-site training
- More companies are recognizing the need to educate their staff in the fundamentals that are best taught by academics
- The technology of course/lecture delivery has advanced to the point that education may be personalized to any class option
- Remote delivery, instructor combinations, verification option and virtual hands-on experiences can fit many needs seamlessly



Question 5 – Is at present the number of PhDs produced every year for the higher education establishment too much to be absorbed by Industry?

- No, at least in the USA, where the industry encompasses utilities, vendors, consultants and service providers
- The key is to train Ph.D.s to have the skills needed by the mentioned industries and an ability to learn and adapt
- The education should mimic the industry problem solving, which in turn will help Ph.D.s to be placed in the jobs easier
- Additional relief comes from the hiring in Academia where at least 5% of the Ph.D. graduates may be hired



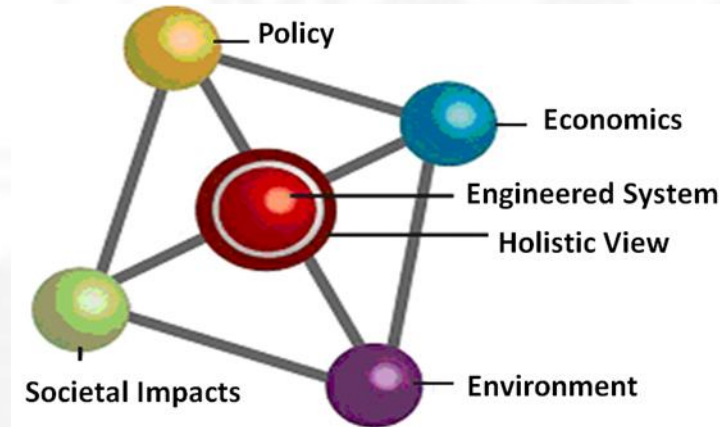
Question 6 – Should industry be involved in the management of Educational Establishments?

- Industry should NOT be involved in the management but should have very focused input to the educational process
- A common practice in the USA is to have advisory boards at different levels (departments, colleges, etc.) made up of industry
- Industry can have big impact by offering financial support for elaborate hands-on labs
- Industry can also shape the academic involvement in the delivery and curriculum by requesting certain type of courses



Item 7 – The biggest industry game changers affecting Industry

- The knowledge in industry is lagging behind the developments in the grid and problems that need solutions, and the situation will not get better unless a massive educational remake is undertaken
- Industry and academia need to understand each other better, and the best approach to achieving that is through joint projects, particularly the ones focused on hands-on experiences
- The industry needs better problem solving skills and universities need to be sensitive to that so that the fundamental knowledge is delivered using tools and methods facilitating such goals



Conclusions

- The WGB5.40 report “Education, Qualification and Continuing Professional Development of Engineers in Protection and Control” recognizes that the educational goals and objectives for Control & Protection engineers have fundamentally changed
- It has also been recognized that more elaborate formal education with hands-on experiences may be the only way to deal with the demand for better problem-solving skills
- The way to proceed is to develop partnerships between industry and academia that will facilitate collaborative curriculum and instruction delivery plans based on real-life problems