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Engineering Skills Requirements: a Systematic Literature Review (2009-2016)

Una Beagon
Technological University Dublin, una.beagon@tudublin.ie

Brian Bowe
Technological University Dublin, Brian.Bowe@TUDublin.ie

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Proceedings

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Presenter: Una Beagon
Supervisor: Prof. Brian Bowe

3rd May 2019

Outline

1) Aims of research
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3) Results
4) Lessons learned

Aims of Research

Better prepare students for the workplace

Identify key skills requirements

Literature Review

Literature Review

Markes I., (2006), A review of literature on employability skill needs in engineering, European Journal of Engineering Education, 31(6), pp. 637-650

The extent of literature published by variant organisations merely confused the definition of any skills

Holmes, L. (2013). Realist and relational perspectives on graduate identity and employability: a response to Hinchliffe and Jolly. *British Educational Research Journal*, *39*(6), 1044-1059.

warns against presenting data analysis from such surveys in a statistical form, using means and standard deviations, when there can be considerable variation in the respondent's understanding of the question or meaning.

Slide 1: Methodological Approach

Methodological Approach — DUBLIN | CREATE

Search Terms (2009-2016)

"engineering" OR "engineer" AND "graduate attributes" OR "employability skills" OR "generic skills" OR "key skills" OR……..

Search
Search results
n=129

Screen
Screened for
"Engineering Skills" → n=23 excluded due to irrelevance

Screened for mention of specific skills requirements → n=9 excluded as specific skills were not mentioned

Appraise
Appraised as part of this study n=97

Slide 2: My approach

My approach — DUBLIN | CREATE
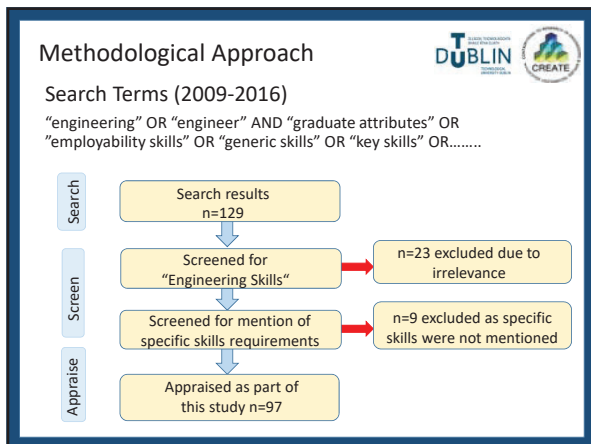
Limit interpretation ⟹ Simple count of no of mentions
Positive and negative both equal

"However such teaching methods……….do nothing to develop transferable skills such as team working, communication skills or the ability to think 'outside the box'" (Bourn & Neal 2008 p.20)

"These students do not value the course's use of presentations in the development of their communication skills" (Bather , 2011, p. 212)

Slide 3: My approach

My approach — DUBLIN | CREATE

Phase 1 - Open coding (66 categories)

Interpretation

Phase 2 - Refine, merge, relabel, distill (17 categories)

Slide 4: Overall Results – 17 categories

Overall Results – 17 categories — DUBLIN | CREATE

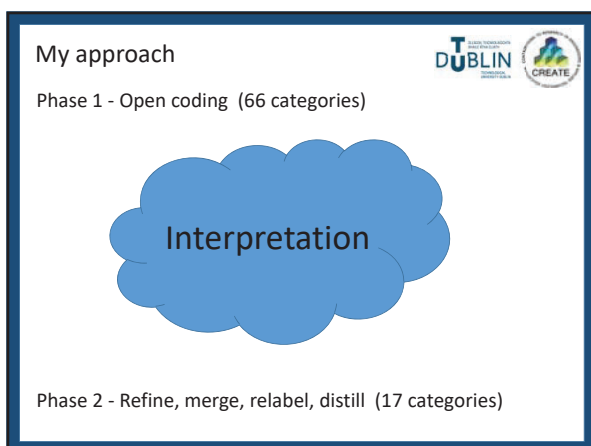| Category	No of sources which mention this skill	No of times this skill is referenced
Character and Interpersonal Skills	73	433
Teamwork / Groupwork / Collaboration	71	249
Communication	67	195
Technical skills	53	189
Problem solving	58	130
Business Acumen	46	111
Globalisation, Intercultural Skills	41	93
Self-Directed Learning/Independence	39	84
Project Management or Planning and Organisation	40	67
Leadership	33	54
Practical applications / Real life problems	21	37
Critical thinking	25	36
Research skills	24	31
Foreign Language skills	11	19
Risk Management	7	10
General Knowledge	8	10
Health and Safety	7	8

Results - Categories

Communication
Oral Communication or Presentation skills
Written Communication
Listening

Character and Interpersonal Skills
Ethics or Integrity
Creativity or Innovation
Social Responsibility
Sustainability or Environmental awareness
Adaptability
Change Management
Emotional Intelligence
Attitude to work
Self discipline
Self reflection and analysis
Enthusiasm Motivation Curiosity
Professionalism
Decision Making
Grit Determination Perserverance
Committment
Confidence
Taking responsibility Ownership Accountability
Self Awareness

Lessons Learned

- Keep a record of all steps in any research
- Interpretation is inevitable
- Descriptions are helpful
- Be wary of lists of skills!

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