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Report on **Best practice, including problem solving and innovation training**

Dr. Cristina Pita
and
Prof. Graham Pierce

WP leader: Partner 85 (University of Aberdeen)
Partner participation in the WP: The main contributors to this WP were partners 24 (University of Thessaly), 65 (Universitat de Barcelona), 71 (Ege Üniversitesi), 76 (AQUALEX Multimedia Consortium Ltd) and Universidade Aberta

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1. INTRODUCTION

The present report firstly provides a summary of the relevant findings from the WP4 surveys (results in Deliverable 4.6) about methods for teaching generic skills and the effectiveness of different teaching methods. Following this, the report discusses the best practices in generic skills training.

2. SUMMARY OF FINDINGS FROM SURVEY

Interviewees were asked several questions regarding the teaching of generic skills. In particular they were asked if the skills were taught in a compulsory or optional way, how the skills were taught (e.g. *ad-hoc*, integrated into knowledge-based modules, as separate modules, as work experience, or other). They were also asked to rate the efficiency of different teaching methods. The main findings from the survey indicate that:

1. Most generic skills tend to be taught in compulsory courses,
2. Generic skills are mostly taught integrated in knowledge-based module(s), as separate module(s) and as work experience,
3. Students and teachers tend to favour traditional teaching methods over innovative teaching.

These findings will be described in more detail below. It is also apparent that much learning of generic skills (e.g. workplace and life skills identified as important by Confederation of British Industry's – CBI) takes place during university degrees but is not generally recognised as such by students – nor identified as such by most university teachers. This reflects in part the different views of what represents important generic skills in the university sector and in industry. Indeed, the questionnaire used here was designed by academics and we inadvertently left out of our list a number of work and life skills regarded as important by the industry, several which are undoubtedly learned during university life even if not identified on the curriculum.

2.1 Ways to teach generic skills

In terms of the teaching of generic skills, results from the survey (see Tables 1 and 2) indicate that:

- Generic skills are mostly taught integrated in knowledge-based module(s), as separate module(s) and/or as work experience dependent on the category of generic skills.
- As would be expected, to a large extent students and university teachers perceived generic skills to be taught in the same way. However, in relation to practical skills, students replied that these were taught as module(s) and integrated into knowledge-based module(s) whereas university teachers more often said such skills were taught as work experience.
- Students did not identify any category of skills to be taught ad-hoc, while teachers identified that some skills that fall into the “science in society” category where taught ad-hoc.

In addition to revealing a likely difference in perception of what constitutes practical skills, survey results also emphasize that students do not always realise when they are learning generic skills. In addition, we would argue that many skills are taught and learned ad-hoc. Given the value of learning such generic skills, as emphasised by views expressed by employers, training providers could usefully review their courses practices and make a point of highlighting generic skills teaching. By specifically identifying generic skills that are taught but which were not previously highlighted in course descriptions, teaching and learning of such skills may be enhanced.

2.2 Compulsory versus optional courses

Results from the survey (see Tables 1 and 2) indicate that:

- Most generic tend to be taught within compulsory courses, with the exception of career and life skills (e.g. CVs, job applications, research funding), science in society (e.g. policy awareness) and communication skills (e.g., poster presentation, media communication) which are mostly delivered within optional courses.
- Students and graduates often replied that they had not been taught generic skills within optional courses.

These results again emphasise the importance of perceptions. Students tended to perceive that they had been taught generic skills only when these were delivered within compulsory courses whereas in reality generic skills are probable learned from the whole range of courses taken and indeed also from experience of normal working practices within universities. In this respect, it is also important to highlight that universities may inadvertently teach inappropriate or unrealistic views of some life and workplace skills, in particular in relation to the general informality of the working environment

(e.g. flexibility of deadlines, relaxed standards of general conduct in the workplace, lack of respect for superiors) and a sense of entitlement (e.g. to a high level of individual support and generous dispensation for learning-related disabilities) which will not serve them well in the outside world.

Table 1. Opinions of students about the teaching of generic skills (from Deliverable 4.6)

Students							
Generic skills	In which format were skills taught ¹					Was this compulsory or optional?	
	M	I	WE	AH	O	Compulsory	Optional
Numerical, computational, statistical skills	+					+	
IT skills	+	+			+		+
Scientific methods		+				+	
Practical/management skills		+	+			+	
Communication skills (scientific and general)		+				+	+
Career and life skills		+	+				+
Science in society		+					+
Practical skills	+	+				+	+

Notes: ¹ AH (=ad-hoc), I (=Integrated into knowledge-based module(s)), M (=Module(s)), O (=other), WE (=as work experience).

Table 2. Opinions of university teachers about teaching of generic skills (from Deliverable 4.6)

University teachers							
Generic skills	In which format were skills taught ¹					Was this compulsory or optional?	
	M	I	WE	AH	O	Compulsory	Optional
Numerical, computational, statistical skills	+					+	
IT skills		+	+				+
Scientific methods	+	+	+			+	
Practical/management skills		+				+	
Communication skills (scientific and general)		+				+	+
Career and life skills			+		+		+
Science in society		+		+	+		+
Practical skills			+				+

Notes: ¹ AH (=ad-hoc), I (=Integrated into knowledge-based module(s)), M (=Module(s)), O (=other), WE (=as work experience).

2.3 Teaching methods

In terms of teaching methods, results from the survey (see Figure 1) indicate that:

- Students and teachers tend to favour traditional teaching methods (e.g. practicals, work experience and tutorials) over “modern” or innovative teaching methods (e.g. role playing).
- Practical exercises, work experience and tutorials were regarded by all groups of students and teachers as the most efficient teaching methods.
- MSc students were more likely than BSc or PhD students to regard lectures as being an efficient teaching method.
- PhD students were more likely than BSc or MS students to regard self-learning and work experience as being efficient learning methods.

- Compared to MSc and PhD students, BSc students tended to score all teaching methods as having lower efficiencies.
- Role playing and games were regarded as the least efficient method to teach generic skills, by the teachers and students alike.

It is clear that perceptions of the effectiveness of different teaching methods relate to personal experience – and our innate conservatism. Those methods that are more familiar tend to be more highly rated and indeed this perception may itself reduce the effectiveness in practice of innovative teaching methods. Thus, use of innovative methods needs to be accompanied by a clear explanation, to students, of their value.

To some extent the differences in attitudes and perceptions between BSc, MSc and PhD students reflect the natural progression of teaching approaches that takes place over the three cycles of higher education, and the influence of growing maturity. However, results may also reflect ongoing societal changes and associated changes in the expectations of incoming students and their willingness to take responsibility for their own success in higher education.

Modern-day students are very focused on results. As long as degrees are examined by traditional methods (e.g., essay writing), which value knowledge over skills, students will tend to favour modes of teaching (e.g. lectures) which most directly provide the material required.

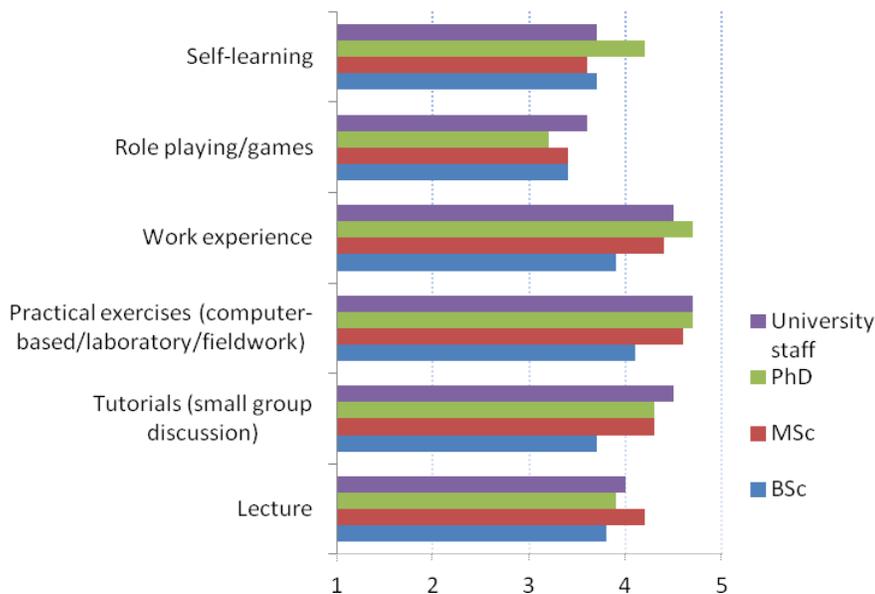


Figure I. Perceived efficiency of teaching methods (from Deliverable 4.6).

3. RECOMMENDATIONS FOR BEST PRACTICES IN GENERIC SKILLS TEACHING

Based on the findings from the survey, we offer the following recommendations for best practices in generic skills teaching:

- Curriculum design needs to account for the skills level of incoming students, while at the same time resisting external pressures to boost “achievement” by reducing the difficulty level of the courses offered.
- Generic skills are taught in a wide array of ways, as separate modules, integrated in knowledge-based modules and through work experience. Different generic skills could be best taught in different ways. For instance, certain skills (e.g. statistics) are better taught as stand-alone modules while teaching of others may benefit from the context provided by being integrated into subject-based units.
- There is the need to acknowledge the full range of life and workplace skills required by employers. Some of these skills are already being delivered in an ad-hoc way as part of university degrees but the success of such training could potentially be enhanced if (a) these skills were generally recognized as such in course descriptions and the curriculum programme, and (b) some more formal training of such skills were introduced.
- Since students learn the value of generic skills gradually, as they gain more experience, it might be useful to accelerate this process by getting past graduates to talk to new students about their experiences in the workplace.
- Compulsory teaching of generic skills may be necessary to ensure that such skills are taken seriously by students.
- Students and teachers tend to favour traditional teaching methods over innovative teaching and, indeed, some generic skills are arguably best taught using traditional teaching methods (e.g. practical exercises such as laboratory and field work). Existing good practice should thus be valued.
- However, there is the need to increase the use of innovative teaching methods. For instance, the use of interactive teaching approaches (e.g. role playing, games) was not widely thought to be a good way to teach generic skills, by either teachers or students. This may be the result of a lack of experience of such methods by both groups. However, potentially useful innovative teaching methodologies need to be used on a more regular basis. Resistance could very likely be overcome if the potential benefits were clearly explained prior to delivery of the training.
- Different teaching methods could be adopted for students undertaking different degrees since they perceive the efficiency of teaching methods differently. For instance, self-learning and work experience are methods more popular with PhD students, while, lectures are more popular with

MSc students. However, it may ultimately be more effective to try to influence perceptions rather than change teaching methods.

- Tutorials (small group discussion) are widely used in generic skills teaching. However, teachers view this methodology more favourably than do the students. This may be because students find the engagement and lack of structure of tutorials difficult and, again, this could perhaps be overcome if the benefits of the tutorial system were clearly explained.
- Other innovative teaching methods which could be used and were not included into the questionnaire include use of pre-recorded material (e.g. films, images, podcasts), student-led activities (e.g. in the form of book clubs, journal clubs) and role playing.
- A good level of generic skills might give graduates an “edge” when it comes to finding a job. However, generic skills are often not accredited and students may therefore underestimate their value, even considering them to be “a waste of time”. Uptake and achievement in generic skills training could be enhanced by providing assessment of skills learned and accreditation of skills teaching.
- It is important to be aware of the difficulties associated with assessing generic skills (academics are good at testing knowledge but less experienced at testing generic skills) but also to attempt to overcome these difficulties.
- Future surveys should involve consultation with end-users before questionnaires are “rolled out”.
- Universities need to do both consult industry more widely and regularly concerning expectations for generic skills and do a better job of promoting, to industry, the initiatives they already have in place to provide generic skills training. Universities, and consequently university students, are generally too focused on academic achievement and fail to recognize that employers might attach equal or even higher weight to acquisition of generic skills. Universities could help students by clearly identifying the generic skills to be taught as part of their degrees and providing assistance for students to describe these skills on their CVs.

Knowing the situation is the first phase in solving the problems and this report contributes to increase the knowledge about best practices in generic skills teaching.