Learner Perceptions of Construction Industry Knowledge and Skills Requirements

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Abstract: - The lifelong learning concept has been at the centre of many national education reforms in the past decade and higher education policy has been considerably shaped by it. At a policy level, a simple, elegant vision of integration and mutual dependence between learners, industry and higher education institutions is prescribed. When investigated in more detail, however, the individuality of learners, the pace at which skill level requirements are changing in industry and the accommodation of previous, legacy education systems among other challenges add complexity. This paper describes a study of learner perceptions of construction industry skills requirements in Estonia. The findings suggest considerable diversity in learner perceptions of industrial requirements.

Key-Words: - Lifelong learning, engineering education, learner models, construction industry, Estonia

1 Introduction

Lifelong learning may be defined as: "*All learning activities undertaken throughout life, with the aim of improving knowledge, skills and competences within a personal, civic, social (social cohesion) and/or employment-related perspective either formally, non-formally and informally.*" [1] The underlying concept is not new having been effectively established early last century by authors including Lindeman (1926) [2] and Yeaxlee in his 1929 publication entitled "Lifelong Education" [3].

In terms of national and supranational policy, recent developments in lifelong learning follow an earlier wave of initiatives marked by the UNESCO report "Learning to be: the world of education today and tomorrow" [4] which received only a modest reaction at national government level [5]. The current wave of policy development commenced with a European Commission white paper "Growth, Competitiveness, Employment" [6] and includes a UNESCO follow-up to the earlier Faure report entitled "Learning: The Treasure Within" [7], the European Commission's "Memorandum of Lifelong Learning" [8] and further policy documents from the Organization for Economic Co-operation and Development (OECD) and the Group of Eight (G8). These have inspired a "veritable inflation" of national policies with lifelong learning at their centre [5].

The new policies are framed as a response to the challenges faced by modern societies from structural unemployment, globalization, the envisaged knowledge economy and rapid technological change. They promise to revolutionize all education as lifelong learning becomes the "guiding principle for [the] provision [of] and participation" in education and training [8]. According to Field (2004): "*It amounts to a full-blooded, head-on challenge to the front-end model that underlies all the assumptions underpinning our existing education system.*" [9]

A dominant discourse has been the relationship between education and work [10]. The European Commission's "Memorandum on Lifelong Learning", suggests that the transition to a knowledge-based economy would require higher overall levels of education and qualification and changes to the ways in which education and training are provided so that people can participate in learning throughout their lives [8]. The implications for higher education institutions (HEIs) include pressure to admit a higher proportion of the population from a variety of different (and non-traditional) educational backgrounds as well as to restructure

their courses to make them part-time and modular and thus more readily available to the full-time employed [10].

One interpretation of this emerging higher education system envisages a 'lifelong university' where the HEI continuously interacts with its students over the course of their (adult) lives [11]. The lifelong university would provide graduates with further education and training in response to their changing requirements and also draw on their graduates' relationships with industry to enrich the learning experiences of other students. So that, for example, alumni might actively participate in the teaching, advising and mentoring of other students.

However, lifelong learning is not being seen as simply and necessarily positive. There is evidence that the increased demand for learning in recent years has been largely socially inspired and independent of an economic demand for skills. Labour forces seem disproportionately highly educated when compared to the skills demands of the currently available work so that underemployment is a growing problem [9] [12] [13] [14]. Similarly, the "*flexibilisation*" of the labour market makes individual life planning riskier and threatens to replace unemployment with generalised, risky underemployment [5] [15].

Since 2005, Estonia has thoroughly reorganized its higher education system in line with the resulting European Union policy initiatives. Reforms have been generally oriented towards economic imperatives with emphasis placed upon perceived benefits arising from a "knowledge-based" economy, alignment of education with labour market requirements and a flexible labour force engaged in "lifelong learning" [16].

The emerging higher education arrangement promises a high degree of integration between curricula, qualifications, professional standards and labour market requirements and appears relatively coherent and compact. There are, however, remaining challenges regarding the integration of previously existing education systems and professional qualifications frameworks. Additionally, the social and cultural roles of the Estonian higher education system particularly in the continuation of the independent national status of Estonia and in the maintenance and development of the Estonian language could come into conflict with its economic goals.

The Built Environment Lifelong Learning Challenging University Responses to Vocational Education (Bell Curve) project was inspired by the reported mismatch between graduates' competencies and labour market skills requirements which has been identified as one of the main factors behind graduate unemployment and employer dissatisfaction in the construction industry [17]. It brings together researchers from the University of Salford, Tallinn University of Technology (in Estonia) and Vilnius Gediminas Technical University (in Lithuania) to investigate this mismatch and to develop solutions to it within the framework of the lifelong university concept.

This paper reports findings from a survey of students' perceptions of the skills requirements of the construction industry both currently and in the future and their perceptions of how HEIs are responding to these skills requirements. The survey is one of a series of Bell Curve project surveys underway investigating the reported skills mismatch.

2 Problem Formulation

In a previous paper, the authors' proposed a model of the three-way comparison between an individual's competence, education provision and industry needs which lifelong learning implies [14]. The individual learner must assess industrial requirements (a prerequisite for the individual to secure their desired employment), relate these to their existing knowledge and skills and, in turn, assess the available education options in order to address any gaps between their existing knowledge and skills status and the requirements of industry. The context is one of mutual dependence where learners rely on industry for employment opportunities and education institutions to provide the necessary knowledge and skills to maintain their employability. Education institutions rely on learners as their customers and on industry to provide the marketplace in which their study programmes are valued. Industry, in turn, relies on learners as its operatives and on education institutions to produce suitably knowledgeable and skilled graduates as well as in the development and adaptation of the technology which industry depends upon. In this way, an education / employment system based on lifelong learning imposes obligations on learners and education institutions alike to consider and respond to the knowledge and skills requirements of industry.

The research problem may be framed as this: how do learners perceive the knowledge and skills requirements of industry and how common or diverse are these perceptions? In addition, what are learners' perceptions regarding how effectively education institutions are responding to these same requirements?

3 Survey Methodology

A questionnaire survey was developed to elicit the opinions of students of construction-related higher education study programmes as to which of a list of skills were currently most in demand; which would become more important in the future; and which would become less relevant in the future. Respondents were instructed to tick all the skills which, in their opinion, fell into the above categories. In addition, the students were asked to what extent they acquired generic skills as part of their study programme; how confident they were that completing their current programme of study would improve their career prospects; did they think universities respond effectively to industry skills needs; and, how realistic the picture of industry that they were given while studying was.

4 Survey Results

119 questionnaires were completed by respondents at different stages of construction-related study programmes. The majority of respondents (114) were students of the Tallinn University of Technology (the main provider of construction-related study programmes in Estonia). Of these, 111 were full time students with 1 part time student and 2 students who did not declare their mode of study. 5 respondents were enrolled in full time study programmes at the Tallinn College of Engineering.

113 respondents were enrolled in integrated (bachelors + masters) 5-year engineering studies courses, 3 respondents were enrolled in 2-year masters degree courses, 2 in 4-year courses and 1 was enrolled in a part time 7 year programme of study.

56 respondents were in year 1 or 2 of their study programmes, 29 respondents in year 3, and a further 29 respondents were in years 4 or higher of their study programmes. (5 respondents did not reveal their current status in this regard). 32 respondents were currently employed while 87 respondents were not.

Table 1 summarises the findings regarding respondents' perceptions of industry demand for technical, management and language skills. Table 2 shows the same for generic skills. Table 3 shows the respondents' perceptions of how effectively their HEIs respond to industry skills requirements.

	Currently Most in Demand	More important in the Future	Less Important in the Future
Technical skills			
Technical design skills	71%	70%	15%
Technical supervision skills	30%	32%	36%
Management skills			
Forecasting and planning	49%	58%	8%
Organising and coordinating	56%	53%	17%
Controlling	37%	33%	24%
Leadership	37%	25%	22%
Language skills			
Spanish	1%	6%	26%
English	85%	68%	6%
Mandarin	2%	39%	23%
Swedish	9%	20%	18%
German	18%	30%	8%
Finnish	46%	37%	18%
Russian	80%	55%	24%

Table 1: Perceptions of the relative importance of technical, management and language skills to industry

	Currently Most in Demand	More important in the Future	Less Important in the Future
Generic skills			
Teamwork / collaboration skills	71%	59%	3%
Problem solving	71%	51%	3%
Dealing with uncertainty and amiguity	27%	25%	13%
Networking skills	15%	34%	11%
Organising information	27%	29%	15%
Decision-making	42%	34%	5%
Interpersonal communication	40%	31%	9%
Managing one's time	48%	46%	4%
Awareness of ethical, cultural and ecological issues	6%	31%	19%
Presentation skills	16%	24%	24%
Study skills	26%	26%	11%

Table 2: Respondents' perceptions of the relative importance of generic skills to industry

Questions	Responses		
	Yes	Moderately	No
Do you think HEIs respond effectively to industry skill needs?	10%	61%	27%
How realistic is the picture of industry you are given while studying?	Realistic	Somewhat realistic	Unrealistic
	8%	68%	22%
How confident are you that completing your current programme of study will improve your chances of getting a suitable job?	Very confident	Mildly confident	Not confident
	26%	54%	20%
To what extent do you acquire the following generic skills as part of your study programme?	More than sufficient	Sufficient	Insufficient
Teamwork / collaboration skills	2%	53%	41%
Problem solving	4%	63%	30%
Dealing with uncertainty and amiguity	4%	50%	41%
Organising information	13%	66%	17%
Decision-making	3%	68%	26%
Interpersonal communication	8%	54%	35%
Networking skills	3%	29%	64%
Managing one's time	3%	68%	26%
Study skills	16%	74%	5%
Presentation skills	2%	47%	48%
Awareness of ethical, cultural and ecological issues	3%	41%	50%

Table 3: Respondents' perceptions of their higher education institution's response to industry skills needs

5 Data Analysis and Discussion of Findings

With reference to Tables 1 and 2, the responses show some commonality of perception (for example with regard to the current importance of English and Russian language skills). This is particularly noticeable with regard to the skills "technical design skills", "forecasting and planning", "English", "teamwork / collaboration", "problem solving" and "managing one's time" all of which were perceived by a large majority to be more important in the future.

However, there is also evidence of diversity of learner perceptions as illustrated when a similar number of respondents indicated that a particular skill will have more importance in the future to those indicating that the same skill will have less relevance in the future (as is the case with, for example, "technical supervision skills", "leadership", "Swedish" and "presentation skills").

As we might expect, the importance and relevance of any particular skill is not universal, it is dependent on the individual context in which the individual learner exists. (Swedish language skills may be of paramount importance to one learner while entirely irrelevant to another). The responses summarised in Tables 1 and 2 provide insight into the diversity of the learners surveyed.

With reference to the findings in Table 3, it is notable (and concerning) that high proportions of repondents considered that HEIs did not respond effectively to industry skills needs (27%), were of the opinion that the picture of industry given while studying was unrealistic (22%), and were not confident that completing their current programme of study would improve their chances of getting a suitable job (20%). In addition, a considerable share of respondents reported that their acquisition of generic skills was insufficient – particularly worryingly, 50% of respondents felt that the extent to which they acquired "awareness of ethical, cultural and ecological issues" was insufficient.

Further analysis of the data was carried out by disaggregating the responses according to the respondents' year of study (into 3 categories of years 1&2; year 3; years 4 & higher) and the respondents' employment status (into 2 categories of employed and not employed) and then applying Chi Square testing to determine whether responses from students within these categories significantly differed. Table 4 shows only those instances where a significant difference (at α=0.01) in responses from students in different categories was revealed.

Description of Responses	Respondent Categories			Chi Square test
Technical supervision skills will be more important in the future				
	Years 1&2	Year 3	Years 4 & more	
Number of 'Yes' responses	17	18	3	
Implied number of 'No' responses	39	11	26	p=0.0001
The language skill: 'Manadarin' will be more important in the future				
	Years 1&2	Year 3	Years 4 & more	
Number of 'Yes' responses	32	9	5	
Implied number of 'No' responses	24	20	24	p=0.0009
The language skill: 'Russian' will be more important in the future				
	Not employed		Employed	
Number of 'Yes' responses	42		24	
Implied number of 'No' responses	45		8	p=0.0093
The language skill: 'Russian' will be less relevant in the future				
	Not employed		Employed	
Number of 'Yes' responses	26		2	
Implied number of 'No' responses	61		30	p=0.0070
To what extent do you acquire the generic skill: "Study skills" as part of your study programme?				
	Not employed		Employed	
More than sufficient	10		9	
Sufficient	72		16	
Insufficient	3		3	p=0.0095

Table 4: Significant differences (α=0.01) between respondent categories

This revealed significant differences (p<0.01) in responses regarding the importance of technical supervision skills in the future where 62% year 3 respondents considered technical supervision skills to be more important in future compared to 30% of year 1 and 2 respondents and only 12% of respondents in years 4 and higher.

Mandarin language skills were considered to be more important in future by 57% of year 1 and 2 respondents while only 31% of year 3 respondents and 17% of respondents in years 4 and more concurred.

Russian language skills were valued significantly more highly by employed respondents than by those not employed. 75% of employed respondents considered Russian language skills would be more important in future compared to 48% of those not currently employed. While 30% of respondents who were not employed considered Russian language skills to be less relevant in the future, only 6% of employed respondents agreed.

In terms of HEI responses to industry skills requirements, the only instance in which the various categories of respondents differed significantly (α=0.01) was with regard to the extent to which "study skills" were

acquired as part of their study programmes. 28% of employed respondents answered "more than sufficient" compared to 11% of respondents who were not currently employed.

6 Conclusions

The higher education reforms, largely following the lifelong learning inspired policy at European Union level, which have recently been introduced in Estonia suggest the integration of education curricula, professional qualifications and employment in industry. This model's simplicity implies considerable standardisation, yet the lifelong learning agenda and 'flexibilisation' of the labour force are expected to replace the traditional, standardised 'front-end model' with an education system that responds to 'demands'. The findings of this research show that these demands are diverse, not standardised. The extent to which there can be a common understanding of industry requirements is questionable. This survey suggests there is limited commonality of perceptions among learners regarding certain skills but the overall picture is characterised by the diversity of learner perspectives. This challenges the model of simple integration portrayed at policy level.

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