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Comparison of Employers' and Student's Ratings of Importance of Expected Technical Skills

András Farkas

Faculty of Economics, Budapest Tech
Tavaszmező u. 17, H-1084 Budapest, Hungary
e-mail: farkas.andras@kgk.bmf.hu

Abstract. Based on literature review and surveys conducted by the Faculty of Economics of Budapest Tech the importance ratings of the technical skills of American and Hungarian business students expected on entering employment are developed. The importance ratings of these technical skills are assessed by American and Hungarian employers also. The study compares the magnitudes of the importance of the single attributes and their priority rankings. Based on a comprehensive statistical analysis the major findings are also given.

1 Introduction

The purpose of this study is to compare perceptions of business students to those of employers regarding the value of specific skills necessary for employment. We evaluate qualities beneficial for securing entry-level employment in the practice. We will identify items which relate more to a quantitative attribute. Therefore, we define these items as *technical skills* including their associated theory and methodology. These quantitative attributes tend to deal more with technology- or discipline-based knowledge, so we refer to these student competencies as technical abilities and skills. They include knowledge in computer use, programming languages, database management, optimization techniques, managerial accounting and finance and methods used in operations management.

The benefit gained from this study can assist students in assessing their level of understanding of the skills valued by employers. The investigations will reflect to the technical skills that students should concentrate on acquiring in order to prepare themselves for the job market. The results of the study provide students with guidance in preparing resumes and in identifying skills and characteristics to emphasize during interviews. This study also provides a foundation and methodology that is broadly applicable to other areas of interest and educational programs. Many skills can be achieved through curricula experiences. Our goal is to help the Faculty of Economics of Budapest Tech for curricula developments

and course redesign and thus, to teach their students on employer expectations, i.e. highly skilled students for positions after graduation.

For successful community-based education, it is important for the academic community to foster relationships and develop open lines of communication with both students and the business community [5]. Communication must flow between not only the academic community and students, and the academic community and the business community, but also between the business world and the students. Moreover, if the academics are aware of the needs and desires of the outside world and this information is not transmitted to the students, resistance and frustration may emerge. In order to more effectively match employer needs with student attributes, it is first necessary to remove any misconception among students about what employers are seeking.

In Section 2 a literature review of the problem is given, in Section 3 the research hypothesis is formulated, in Section 4 the methods supporting this research are discussed and in Section 5 the results are shown and the major findings are presented.

2 Literature Review

In the literature, research has mainly focused on identifying gaps between academia and different fields of the business environment about perceptions of the importance of various skills necessary for employment (see e.g. [11]). This research indicates that the academic community is beginning to understand what businesses want from their graduates, and are attempting to design curricula to meet the needs of the business community. Kane's study [8] has reported that Fortune 500 recruiters focus on the candidate's people skills because they assumed that graduates possess the appropriate technical skills. In Martell and Carroll's study [10], Fortune 500 managers stated that although the technical skill requirements needed for a position differ across functional areas, general skills and personal characteristics were the same across functional areas.

Numerous studies address the issue of whether business schools are adequately preparing students to succeed in today's highly technical and global marketplace (see e.g. in [7]). Studies propose steering away from theoretical teaching to a more application-oriented approach [11]. Some research indicates that programs should concentrate on management development instead of quantitative skills [9]. Other studies, however, suggest that programs lack focus on various technical skills, such as management information systems [12]. In Hungary, employers' opinion is rather negative, or at least ambiguous against the industrial engineering programs [2, p. 111].

The link between the students and the business community is the weakest of the three links. Most undergraduate students have little interaction with the business community prior to graduation. They may gain some exposure during work-related experiences such as internships. Hafer and Hoth [6] matched employers' and students' perceptions in the areas of accounting, marketing and management. In this study, we compare industrial engineering and business students' perceptions to employer preferences to identify the inconsistencies between the two parties. We will be concerned with not only the local Hungarian investigations but we will extend them to the American situation in some extent.

3 Research Hypothesis

It seems to be clear that differences still exist between the skills needed by the business community and the skills acquired by business students. Minimizing the gap between the ability of graduating students and the skills deemed important by employers is one goal of our faculty at the BMF. In order to accomplish this goal, we must clearly identify those technical skills valued by employers. In addition, we must understand students' perceptions of the technical skills what they think to be marketable. The following research hypothesis (H_A) is addressed in this paper:

There will be differences between employers and students in their perceptions of the importance of technical skills both in Hungary and in the United States.

The formal statement of our hypothesis testing problem is given in the following form:

$$H_0: \quad \mu_{\text{Hstu}} = \mu_{\text{Hemp}} = \mu_{\text{Ustu}} = \mu_{\text{Uemp}}$$
$$H_A: \quad \text{At least one } \mu_i \text{ differs from the others,}$$

where μ_i denotes the mean importance score of the *i*th population.

4 Methods

The study relies on literature research and descriptive empirical research by using quantitative methods for the observable phenomena. The tools discussed involve collecting survey information and summarizing data. The term survey means the process of looking at the problem in its entirety. For our goals, the survey is a study that uses questionnaires and interviews to discover descriptive characteristics of the problem. To give more insight into the characteristics of our data sets descriptive statistical measures and some graphical displays are applied. Levels of measurement are ordinal and interval.

There are a great number of studies that have produced lists of graduate attributes desired by employers. To make our findings enable for international comparisons we have considered the analysis that was carried out for similar undergraduate degree programs delivered in the United States [4] (BA in business administration and BSc in industrial engineering, major in operations management). The individual items were explored by Levenburg [9]. The items for the technical skills are listed below:

A = Word processing (Word, etc.)

B = Spreadsheets (Excel, etc.)

C = Databases

D = Operating systems design

E = Project management

F = Computer software and programming languages

G = Inventory management

H = Logistics (transportation, distribution, warehousing, suppliers)

I = Quality management

J = Resource planning & control

K = Web designing, IT, Internet operations

L = Telecommunication

M = Quantitative analysis (statistics, optimization, etc.)

N = Managerial accounting (budgeting, break-even, cost controlling)

O = Finance (balance sheet, cost-benefit, cash-flow, investments)

P = Marketing & market research (sales, behaviour, etc.)

Q = Entrepreneurship

The study [4] sophisticated in attempting to prioritize these attributes in terms of their importance for both the students (178 usable questionnaires) and their employers (36 usable surveys from midwestern companies of the USA (Chicago area). Respondents were asked to indicate how important it is for prospective employees to have the given technical skill. They were instructed to indicate the importance level of each skill on a 7-point Likert scale. The use of such Likert-scales is common in applied research. They simply gauge the degree to which there is agreement or disagreement with statements to reflect clear positions on an issue and represent a desirable goal, a transition from ordinal scales to interval scales [13]. The survey instrument was then pilot-tested to assess the instrument's face validity. The relative priority rankings and the mean scores on the importance of the single items (technical skills) evaluated by American students (US_Stu) and employers (US_Emp) will be given.

At the Faculty of Economics (KGK) of Budapest Tech we considered both of our two undergraduate degree programs (full-time and part-time programs: BA in business management and BSc in industrial engineering). Students were asked to rate from 1 to 7 on a seven point ascending Likert-scale these 17 technical skills according to their importance. Instructions to the use of the scale in the questionnaires were as follows:

1	Not at all important
2	Scarcely important
3	Slightly important
4	Moderately important
5	Usually important
6	Significantly important
7	Extremely important

Altogether, 242 student questionnaire forms were usable. The relative rankings on the importance of the single items and the mean scores of the technical skills evaluated by the Hungarian students (HU_Stu) and employers (HU_Emp) will be given. A more comprehensive description of the KGK students' survey can be found in [3]. The potential employers of our graduates who have rated the items from their perspective in the same questionnaire forms in Hungary are represented 12 different companies, service firms and entrepreneurships.

As concerns the necessary assumptions of the simple random sampling processes applied in the US and in Hungary, we remark that none of the randomness and the representativeness assumption is perfectly satisfied. Especially the employer sample sizes may be regarded to be too small. Therefore, caution must be exercised when drawing "strong" conclusions about the findings in the following.

Univariate Analysis of Variance (ANOVA) is used to test the differences between students and employers views on the one factor of interest (importance). To determine whether employers and students valued technical skills with no significant differences (see the null hypothesis, H_0) we compared the sample overall grand mean scores using two-tailed paired *t*-tests, by applying a multiple comparison procedure based on the method of contrasts called Least Square Differences (LSD).

5 Results and Discussion

We assessed the internal consistency of the sets of questions within the main factor of importance using the commonly used reliability measure termed Cronbach's α [1]. This is based on the average inter-item correlation. The values

of Cronbach's alpha ranged from 0.862 to 0.908 in the US surveys [4] and from 0.768 to 0.839 in the Hungarian ones [3], indicating quite strong internal consistency among items within the factor (since they are rather close to 1, i.e. to perfect reliability). The lower values refer to the employers' sets of questions.

In Table 1, the overall weighted arithmetic mean scores (Mean) and the importance rankings given by the rank numbers (R) based on the magnitudes of the mean scores as well as the overall weighted grand mean scores (Grand mean) are presented. The weighted standard deviations are ranging from 1.110 to 1.926 for the US and from 1.046 to 2.355 for the Hungarian samples. The upper values indicate the much larger differences of the employers in their assessments. These rather large differences in employers' opinion would certainly be diminished by increasing the sample sizes (by pursuing the information gathering process especially in Hungary in order to gain more reliable outputs). These latter results are well reflected in the ranges also, as for the American students the range of the overall weighted mean scores of the items is: R=6.33–5.07=1.26, whereas that of the employers it yields: R=5.72–3.21=2.51. For the Hungarian students the range of the overall weighted mean scores of the items is: R=5.87–3.26=2.61, while that of the employers it yields: R=5.88–2.96=2.92.

Table 1
Mean scores and Rankings

Technical skills	US_ Stu		US_Emp		HU_ Stu		HU_Emp	
	Mean	R	Mean	R	Mean	R	Mean	R
A word processing	6.07	3	5.72	1	5.68	3	5.38	4
B spreadsheet	6.33	1	5.64	2	5.70	2	5.88	1
C database	6.06	4	4.94	6	4.86	13	4.72	9
D operating systems	6.21	2	4.74	7	4.83	14	3.87	12
E project management	5.67	7	4.53	9	4.99	11	4.88	8
F comp. software	5.57	9	4.32	10	3.26	17	3.06	16
G inventory man.	5.25	14	4.04	11	4.64	16	4.22	11
H logistics	5.07	17	3.95	12	5.02	10	3.81	13
I quality management	5.14	15	3.67	13	5.09	7	4.28	10
J resource planning	5.36	13	3.54	14	5.02	10	4.96	7
K web, IT	5.53	10	3.50	15	4.98	12	2.96	17
L telecommunication	5.58	8	3.29	16	5.07	8	3.48	15
M quantitative anal.	5.10	16	3.21	17	4.67	15	3.74	14
N man. accounting	5.48	12	5.05	5	5.32	6	5.18	6
O finance	5.96	5	5.46	4	5.50	5	5.34	5
P marketing	5.71	6	5.58	3	5.64	4	5.58	3
Q entrepreneurship	5.50	11	4.67	8	5.87	1	5.76	2
Grand mean	5.62		4.46		5.07		4.54	

To address the research hypothesis we used a one-way analysis of variance procedure to compare the sample overall grand mean scores. For the importance of the technical skills the ANOVA table is given in Table 2. Levene's test for the homogeneity of variance is significant (The Levene statistic is 6.757; p=0.000).

Table 2
ANOVA Table

Source of variability		Sum of Squares	df	Mean Square	F	Sig.
Between Groups	(Combined)	14.856	3	4.952	9.348	.000
	Contrast	7.164	1	7.164	13.524	.000
	Deviation	7.692	2	3.846	7.259	.001
Within Groups		33.905	64	.530		
Total		48.761	67			

From Table 2, it is clear, that there is a strong evidence (p=0.000, at a level of α=0.05) that the null hypothesis, H_0 should be rejected, and the research hypothesis, H_A is true. Therefore, we conclude that there are significant differences between employers and students in their perceptions of the importance of the technical skills both in Hungary and in the United States.

Table 3
Multiple Comparisons

LSD. Dependent Variable: importance

(I) factor	(J) factor	Mean (I-J) Difference	Std. Error	Sig.	95% Confidence Interval	
		Lower Bound	Upper Bound	Lower Bound	Upper Bound	Lower Bound
1	2	-.55612(*)	.24965	.029	-1.0549	-.0574
	3	.53176(*)	.24965	.037	.0330	1.0305
	4	.60512(*)	.24965	.018	.1064	1.1039
2	1	.55612(*)	.24965	.029	.0574	1.0549
	3	1.08788(*)	.24965	.000	.5891	1.5866
	4	1.16124(*)	.24965	.000	.6625	1.6600
3	1	-.53176(*)	.24965	.037	-1.0305	-.0330
	2	-1.08788(*)	.24965	.000	-1.5866	-.5891
	4	.07335	.24965	.770	-.4254	.5721
4	1	-.60512(*)	.24965	.018	-1.1039	-.1064
	2	-1.16124(*)	.24965	.000	-1.6600	-.6625
	3	-.07335	.24965	.770	-.5721	.4254

* The mean difference is significant at the .05 level.

At this point the question can be raised: which of the mean scores differs from the rest?

The answer turns out by utilizing the multiple comparison method LSD. As it is seen in Table 3, each of the pairwise differences of the overall weighted grand mean scores of the group of respondents is significant but, surprisingly, between the American and Hungarian employers.

For the aggregated student body of the Hungarian students we displayed the size of the overall weighted averages assessed for importance in Figure 1. Here, the 17 technical skills appear in an ascending order. This bar chart exhibits that KGK students ranked Entrepreneurship (Q), Spreadsheets (B), Word processing (A) and Marketing/Market Research (P) to be the most important while Computer Software/Programming Languages (F) as being the least important technical skills. These findings are not unexpected at all and quite similar to those of obtained for the American students. Just at the top of the list, one of these skills is remarkable, namely the Entrepreneurship (Q). This view of the students is probably due to the particular Hungarian economic environment as opposed to the American one.

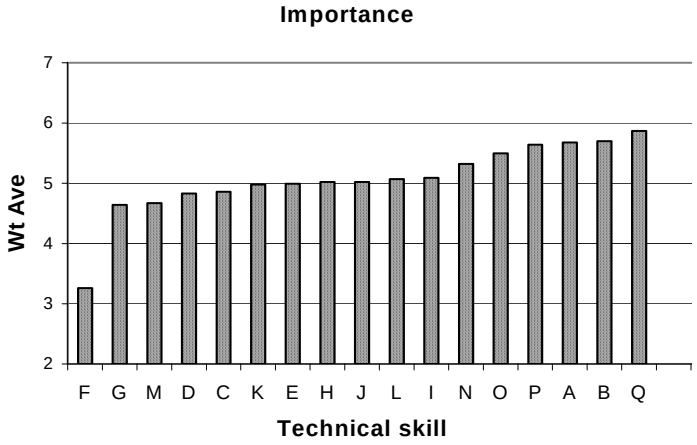

Figure 1
Priority ranking of the overall weighted mean scores of the KGK

Interestingly, in a pairwise manner, the Hungarian students and employers, and the American students and employers agree rather strongly in their importance priority. This statement is well supported by the numerical results when the Spearman's coefficients of rank correlation (interpreted on an ordinal scale) are computed. These statistical measures can be generated from the rank numbers of the student ratings given in Table 1, where it is seen that ρ=0.802 (between HU_Stu & HU_Emp) and ρ=0.711 (between US_Stu & US_Emp). Also, there is a high degree of agreement in the rankings between the two groups of employers: ρ=0.765 (between HU_Emp & US_Emp). Latter coefficient value reflects to the

fact that at present, there are very similar employer expectations against graduates in any part of the world. The other coefficients are relatively low-valued. Notice also that there is a tie in the ranking of the Hungarian students as it can be seen in Table 1.

Table 4
Rank Correlations

Spearman's rho (ρ)

		Rank of HU_Stu	Rank of US_Stu	Rank of HU_Emp	Rank of US_Emp
Rank of HU_Stu	Correlation Coefficient	1.000	.280	.802(**)	.544(*)
	Sig. (2-tailed)	.	.277	.000	.024
	N	17	17	17	17
Rank of US_Stu	Correlation Coefficient	.280	1.000	.400	.711(**)
	Sig. (2-tailed)	.277	.	.112	.001
	N	17	17	17	17
Rank of HU_Emp	Correlation Coefficient	.802(**)	.400	1.000	.765(**)
	Sig. (2-tailed)	.000	.112	.	.000
	N	17	17	17	17
Rank of US_Emp	Correlation Coefficient	.544(*)	.711(**)	.765(**)	1.000
	Sig. (2-tailed)	.024	.001	.000	.
	N	17	17	17	17

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

For the strength of the pairwise linear relationships between the magnitudes of the weighted mean scores the Pearson's product moment coefficients of correlation are calculated (interval scale). The numerical values of these coefficients are lower than those of the rank correlations and ranging from r=0.760 (between HU_Stu & HU_Emp) to r=0.281 (between US_Stu & HU_Stu). These facts reflect sharply to the different judgments of the importance of the technical skills by the two parties. The employers attach significantly less importance to the technical skills possessed by the graduates than the students would think about it.

It is worth noting that within the Hungarian group of students (KGK) the full-time business management students rated the technical skills (5.35) closest to the maximum grade (7) on the average by giving them the highest importance among the student groups (full-time and part-time business management and industrial engineering programs with majors in systems control and quality management).

Table 5
Product-moment Correlations

Pearson's (r)

		HU_Stu	US_Stu	HU_Emp	US_Emp
HU_Stu	Pearson Correlation	1	.281	.760(**)	.464
	Sig. (2-tailed)		.274	.000	.061
	N	17	17	17	17
US_Stu	Pearson Correlation	.281	1	.406	.742(**)
	Sig. (2-tailed)	.274		.106	.001
	N	17	17	17	17
HU_Emp	Pearson Correlation	.760(**)	.406	1	.736(**)
	Sig. (2-tailed)	.000	.106		.001
	N	17	17	17	17
US_Emp	Pearson Correlation	.464	.742(**)	.736(**)	1
	Sig. (2-tailed)	.061	.001	.001	
	N	17	17	17	17

** Correlation is significant at the 0.01 level (2-tailed).

Conclusion

The importance of the technical skills of graduates from both student and employer perspectives was assessed by two representative samples of students and employers, one from Hungary (Budapest Tech) and one from the business schools of mid-western United States. Based on the results of this study it is apparent that business school professors are in danger of drifting apart from industrial reality because they like to teach elegant mathematical models and striking achievement where the truth is different. The challenge to these schools is either to pursue this practice or to make in their curricula a paradigm change in effect, as the struggle for the enrollment of entry level students is dramatically increasing among the schools. Latter strategy seems to be indispensable, if they want to survive in this competitive global environment.

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