Importance of Specific Skills Five and Ten Years After Graduation

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REPORT OVERVIEW

The Office of Educational Assessment surveyed all University of Washington alumni who received their bachelor degree five years and ten years earlier (see OEA Report 98-8 for the specific methodology). Included in the survey were seventeen abilities (Table 1) that respondents were asked to rate in terms of importance to their current primary activity.

The following variables were studied with regard to their effects on the ability ratings.

Years from Graduation

Average importance ratings by five-year and ten-year graduates were found to be very similar. Apparently these ratings stabilize within the first five years after graduation.

Advanced Degrees

Statistically significant differences were found for all but two items comparing alumni who had obtained advanced degrees and those who had not. On seven of the significant items, PhD/Professional degree recipients gave the highest rating and on seven Master's degree recipients gave the highest ratings. On one item, using modern technology, alumni with no advanced degrees gave the highest rating.

Primary Activity

Over 88% of the respondents classified their current primary activity as employment, 5% as in school, and 6% as unemployed. Differences in the average ratings of the groups were statistically significant for all items except *Using knowledge gained from outside of your major field*. For many, the pattern of these differences was for the highest average ratings to be given by those attending school, followed by those employed, showing that some learning outcomes are most important when one is actively pursuing new learning. However, there were some notable exceptions to the pattern; for example, using modern technology was as important for the employed as for those attending school.

Academic Majors

To analyze the effect of major on the relative importance of the abilities, alumni within six major areas were compared: business, engineering, social science, natural science, humanities, and arts. To simplify interpreting results, attention was restricted to the 65% of the respondents whose highest degree remained a bachelor's and whose primary activity is working. Predictable differences were found among these majors; for example, using science was rated more highly by engineering and natural science

majors, while appreciating the arts was rated more highly by arts majors. However, surprising consistency across majors is evident when the items are ranked by their averages within the six major areas, and in no area was the item: *Using the knowledge, ideas or perspectives gained from your major field* ranked above tenth. We conclude that these results underline the importance of education in general intellectual skills and that courses in the major may be best considered as a context for teaching these skills. Furthermore, these results argue strongly against the conceptualization of higher education as training for specific occupations.

METHOD AND PURPOSE

The Office of Educational Assessment surveyed alumni of the University of Washington who had received bachelor degrees five years and ten years previously. A description of the population, methods, and response rates and frequencies for this study are found in OEA Report 98-8.

In the survey, alumni were asked to respond to each of 17 abilities in terms of their own competence, the ability's importance to their current primary activity, the impact of UW on their development, and their satisfaction with UW's contribution to their development. This research focuses on the second question: *How important are each of these abilities to your current primary activity?* Specific issues addressed are:

- the relative importance of the outcomes across all respondents,
- differences in average responses between five-year and ten-year alumni,
- differences in average responses among levels of subsequent academic degrees attained,
- differences in average responses as a function of current primary activity, and
- differences in average responses among six areas of major.

RESULTS

The Items and Overall Means Ratings

Table 1 presents the full item text, the abbreviations that are used in subsequent tables, and mean ratings across all respondents.[1] Items in this table and in all subsequent tables are ordered by the magnitude of these means. The averages show considerable range from 4.34 for *Defining and solving problems* to 1.60 for *Using a foreign language*. The average rating of the importance of *Using the knowledge, ideas or perspectives gained from your major field* was gave it a ranking of only 11th among the 17 items.

Years from Graduation

Table 2 presents the average importance ratings for respondents who had graduated five years prior to the survey and respondents who had graduated ten years prior to the survey. The means suggest that the importance of the various abilities stabilizes within the first five years after graduation. Only two differences were statistically significant and neither of these accounted for appreciable variance (only one-fifth of one percent, as indexed by Eta-squared). Because of these similarities data from the two cohorts are combined for all subsequent analyses.

Advanced Degrees

We surveyed alumni who received a bachelor's degree from UW. The survey asked them to specify the highest degree they had attained since leaving UW. Response frequencies and percentages are found in Table 3. One can note that the majority of the alumni had received no advance degrees (73.5%), and there were more respondents who had received law degrees and medical degrees than PhD's.

To assess the effects of higher degrees on the importance ratings, we combined respondents who had obtained medical, law, doctorate, and other degrees and compared that group with bachelor degree and with master's degree recipients. Statistical significance was assessed using One-Way Analyses of Variance. The results are in Table 4.

Nearly all items show significant differences. The only exceptions are *Using management or leadership capabilities* and *Using knowledge gained from outside of your major field*. Lack of differences for these two items is predictable since obtaining advanced degrees is unlikely to affect the use of either. The largest difference was for *Using the knowledge, ideas or perspectives gained from your major field* (3.7% of the variance), followed closely by *Critically analyzing written information* (3.2% of the variance). However, for the former, master's degree recipients found it more important, on average, than Professional/PhD. recipients. This result is not totally surprising since more than two-thirds of the latter received law and medical degrees, and both of these fields draw students from a variety of majors. In fact, among the fifteen items that showed significant differences, only seven were ordered from bachelor's to master's to Professional/PhD, and these tended to be the highest ranked items across all respondents. For seven significant items, master's degree recipients gave the highest ratings. Only *Working effectively with modern technology, especially computers* was ordered such that alumni with no advanced degree

gave the highest ratings, which is reflective of the importance of computing technology in the current workplace.

Primary Activity

Respondents classified their current primary activity as employment, attending school, or being unemployed. A strong majority placed themselves in the first category (over 88%), with 5% in school and 6% unemployed. The average importance ratings of each group are found in Table 5.

Differences among these ratings were statistically significant for all items except *Using knowledge gained from outside of your major field*. For nine of the sixteen significant items, the pattern of these differences was for the highest average ratings to be given by those attending school, followed by those employed, with the unemployed group giving the lowest average ratings. This pattern is what one might expect; learning outcomes tend to be most useful when one is actively pursuing new learning, and the employment setting tends to be more demanding than when one is neither employed or attending school. However, there were some notable exceptions to the pattern. For example, using modern technology was as important for the employed as those attending school. Management skills and working in groups was less important to students than to workers, on average, which undoubtedly reflects greater need for the two skills in the work place. Items on the arts and the environment were rated more highly by the unemployed than any other group, perhaps reflecting greater amounts of time to devote to these topics.

Academic Majors

It seems likely that the importance ratings given the various abilities would by affected by the major of the respondent. In addressing this issue, we have chosen to restrict our attention to alumni who have not attained a degree beyond their bachelor's since leaving UW and who primarily working when completing the survey. We make this restriction so that comparisons among majors can be more easily interpreted. This restriction is particularly important given the many significant differences among subsequent highest degree levels and current primary activity. The target of this investigation will be typically individuals who went from UW in to the labor force and have, for the most part, remained there for the five or ten years from graduation. Of the total number of respondents, 64% fall into this category.

To perform this analysis, alumni whose first major was in one of six commonly chosen areas were chosen. The areas and the departments chosen to define each are as follows:

Business (N=293)
- Accounting
- Business Administration

Engineering (N=184)
- Chemical
- Civil
- Electrical
- Mechanical

Social Science (N=289)
- Anthropology
- Political Science
- Psychology
- Sociology

Natural Science (N=109)
- Biology
- Chemistry
- Mathematics
- Physics
- Zoology

Humanities (N=171)
- English
- Speech Communications

Arts (N=78)
- Art
- Dance
- Drama
- Music

The average rating for each ability within each major area is found in Table 6. Also found in Table 6 are the results of *one-way analyses of variance* to determine the statistical significance of differences among means and eta^2 values which indicate the percent of total variance accounted for by the difference among averages.

There are two notable aspects of these data. First, all items show significant differences except:

Working and/or learning independently,
Working cooperatively in a group,
Using management or leadership capabilities, and
Using a foreign language.

The largest difference by far is for *Understanding and appreciating scientific principles and methods*, which accounts for 25.4% of the variance in that item. As would be predicted, engineering and physical science majors gave this item the highest ratings; the other four areas, especially humanities majors, gave it a rather low ratings. The next largest difference was found for *Understanding and appreciating quantitative principles and methods*, and again predictably the highest ratings were from engineering and science majors. *Understanding and appreciating the arts* was rated quite low by all groups except, of course, arts majors. *Using the knowledge, ideas or perspectives gained from your major field* was rated most highly by the two professional programs, business and engineering, and rated the lowest by social science majors. *Understanding and appreciating diverse philosophies and cultures* was rated highest by humanities and social science majors and lowest by engineering and physical science majors.

These comparative results listed above are as one would expect in the main, and the reader can no doubt see other differences of interest. But clearly viewing the data in this way there is more validation of

expectations than surprises. However, there is a second way to view the data, and the results under this view seem more counter-intuitive. In Table 7, the rank ordering of items, from highest rated to lowest rated is presented for each group, side-by-side. Whereas Table 6 led one to see differences, this table leads one to see similarities.

One can see from these orderings that there is a great deal of similarity across areas. To illustrate, notice the similarity of the abilities that are ranked in the top six. The following items are in the top six in every area:

- *Defining and solving problems*
- *Locating information needed to help make decisions or solve problems*
- *Working and/or learning independently*
- *Working effectively with modern technology, especially computers*

Appearing in the top six for four areas is:

- *Speaking effectively*

and in the top six for three areas is:

- *Working cooperatively in a group*

Finally, appearing in the top six for two areas are:

- *Critically analyzing written information*
- *Writing effectively*

In other words, eight abilities make up the top six. These items are ***shaded*** in Table 7. Similarly, eight abilities make up the bottom six ranks, with *Using a foreign language* being on the bottom in all areas; these items are ***italicized***. In all cases, the remaining item, *Using management or leadership capabilities*, is found somewhere in the middle (between 7 and 11). No item that is found in the bottom six for one group is found in the top six for any other group.[2] Across all items, one's major is less a determinant of relative importance than one might think.

It is also worth noting that the highest rank for Using the knowledge, ideas or perspectives gained from your major field was tenth by business majors. It was ranked eleventh by humanities and arts majors, twelve by engineering majors, and thirteenth by social science and natural science majors. Granted, the higher ranked abilities are taught within the context of a major, where students are encouraged to look at a subject area in depth, but it is quite surprising how much the importance of the major fades after five and ten years, even for professional school programs. For the majority of students who do not go on for advance degrees, it appears that the content of the major is best considered a vehicle for teaching more general intellectual skills. What is of lasting importance are abilities such as Defining and solving problems and Locating information needed to help make decisions or solve problems. The lesser importance of "content" can also be seen in the relatively low rankings of Using knowledge gained from outside of your major field.

In interpreting these results, it is important to keep in mind that the question asked of alumni was to rate each item on its importance for their current primary activity, which was working. The skills that seem to be important in the workplace appear to transcend specific course content, both within and outside of the major. These results argue strongly against the conceptualization of higher education as training for specific occupations, even when the focus of these ratings was the job, not life more generally.

[1] *Essential = 5; Very important = 4, Important = 3; Somewhat important = 2; and Not important = 1*

[2] This result can also be seen from a mixed design *analysis of variance* with abilities as a within subjects variable and major as a between subjects variable. While both of the main effects and the interaction are statistically significant, the following partitioning of the variance components shows the strength of the abilities differences relative to the abilities by major interaction:

Effect	**Percent of Variance**
Abilities (A)	32.3%
Major (M)	00.0%
A x M	05.2%
Subjects (S) within Majors	14.0%
Subjects within Majors x Abilities	48.5%

TABLES

Table 1. Ability item text and overall means (*1=Not important; 5=Essential*)

Item	Abbreviation	Mean
Defining and solving problems	Problem solving	4.34
Locating information needed to help make decisions or solve problems	Using information	4.19
Working and/or learning independently	Working independently	4.15
Speaking effectively	Speaking	4.09
Working effectively with modern technology, especially computers	Using technology	4.00
Writing effectively	Writing	3.92
Working cooperatively in a group	Working in groups	3.90
Critically analyzing written information	Reading	3.90
Using management or leadership capabilities	Management	3.76
Using knowledge gained from outside of your major field	Non-major	3.51
Using the knowledge, ideas or perspectives gained from your major field	Major	3.39
Understanding and applying quantitative principles and methods	Quantitative skills	2.91
Understanding and appreciating diverse philosophies and cultures	Diversity	2.90
Understanding the interaction of society and the environment	Environment	2.75
Understanding and applying scientific principles and methods	Science	2.72
Understanding and appreciating the arts	Arts	1.83
Using a foreign language	Foreign language	1.60

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Table 2. Differences between Five-Year and Ten-Year Alumni

Abbreviation	Five-Year (N=1696)	Ten-Year (N=1340)	t	Sig.	eta^2
Problem solving	4.34	4.33	0.17	ns	0.0%
Using information	4.22	4.16	1.86	ns	0.1%
Working independently	4.15	4.15	-0.04	ns	0.0%
Speaking	4.10	4.07	0.90	ns	0.0%
Using technology	4.02	3.97	1.42	ns	0.1%
Writing	3.95	3.89	1.24	ns	0.1%
Reading	3.93	3.85	2.19	p<.05	0.2%
Working in groups	3.91	3.90	0.36	ns	0.0%
Management	3.73	3.79	-1.39	ns	0.1%
Non-major	3.50	3.53	-0.86	ns	0.0%
Major	3.43	3.34	1.87	ns	0.1%
Quantitative skills	2.92	2.89	0.67	ns	0.0%
Diversity	2.93	2.86	1.45	ns	0.1%
Environment	2.81	2.69	2.60	p<.01	0.2%
Science	2.72	2.73	-0.17	ns	0.0%
Arts	1.82	1.84	-0.59	ns	0.0%
Foreign language	1.62	1.56	1.63	ns	0.1%

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Table 3. Highest Degree Earned

Degree	Frequency	Percent
Bachelor's	2282	73.5
Master's	554	17.8
Medical (MD, DO, DDS, DVM)	82	2.6
Law (LLB, JD)	113	3.6
PhD or EdD	39	1.3
Other	36	1.2
TOTAL	3106	100.0

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Table 4. Differences by Highest Degree Attained

Abbreviation	BA (N=2213)	MA (N=513)	Prof/PhD (N=258)	F	Sig.	eta^2
Problem solving	4.28	4.42	4.61	21.85	p<.001	1.4%
Using information	4.14	4.24	4.46	16.16	p<.001	1.1%
Working independently	4.12	4.21	4.24	3.53	p<.05	0.2%
Speaking	4.01	4.23	4.38	25.32	p<.001	1.7%
Using technology	4.03	3.98	3.78	6.05	p<.002	0.4%
Writing	3.83	4.15	4.22	28.65	p<.001	1.9%
Working in groups	3.89	4.09	3.63	16.70	p<.001	1.1%
Reading	3.79	4.04	4.45	49.35	p<.001	3.2%
Management	3.75	3.82	3.66	2.02	ns	0.1%
Non-major	3.49	3.60	3.51	2.40	ns	0.2%
Major	3.23	3.85	3.68	56.60	p<.001	3.7%
Quantitative skills	2.81	3.19	3.09	20.50	p<.001	1.4%
Diversity	2.80	3.28	2.86	29.28	p<.001	1.9%
Environment	2.69	3.04	2.70	17.13	p<.001	1.1%
Science	2.60	3.00	3.21	33.92	p<.001	2.2%
Arts	1.80	1.99	1.62	10.37	p<.001	0.7%
Foreign language	1.53	1.80	1.66	15.47	p<.001	1.0%

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Table 5. Primary Activity of Respondents

Abbreviation	Employed (N=2681)	School (N=166)	Unemployed (N=185)	F	Sig.	eta^2
Problem solving	4.34	4.60	3.99	24.01	p<.001	1.6%
Using information	4.19	4.47	3.87	20.47	p<.001	1.3%
Working independently	4.15	4.35	3.89	11.57	p<.001	0.8%
Speaking	4.09	4.43	3.71	25.13	p<.001	1.6%
Using technology	4.04	4.04	3.33	38.26	p<.001	2.5%
Writing	3.94	4.54	3.16	71.16	p<.001	4.5%
Working in groups	3.94	3.72	3.52	16.56	p<.001	1.1%
Reading	3.90	4.58	3.26	67.49	p<.001	4.3%
Management	3.78	3.53	3.62	5.28	p<.005	0.3%
Non-major	3.51	3.62	3.49	0.94	ns	0.1%
Major	3.37	4.05	3.02	28.73	p<.001	1.9%
Quantitative skills	2.91	3.63	2.21	52.37	p<.001	3.4%
Diversity	2.86	3.25	3.14	10.29	p<.001	0.7%
Environment	2.70	3.13	3.16	18.65	p<.001	1.2%
Science	2.70	3.73	2.20	56.67	p<.001	3.6%
Arts	1.77	1.97	2.59	44.51	p<.001	2.9%
Foreign language	1.57	1.93	1.73	11.56	p<.001	0.8%

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Table 6. Mean Ratings within Area of Major
(Working Alumni with No Advanced Degrees Only)

Abbreviation	Busi	Engr	SocSci	NatSci	Hum	Arts	F	Sig.	eta^2
Problem solving	4.33	4.49	4.16	4.37	4.27	4.18	3.87	p<.005	1.8%
Using information	4.29	4.25	4.03	4.19	4.23	3.91	3.92	p<.005	1.8%
Working independently	4.15	4.04	4.17	4.24	4.13	4.04	0.93	ns	0.4%
Using technology	4.34	4.35	3.97	4.31	4.08	3.68	8.82	p<.001	3.9%
Speaking	4.10	3.87	4.12	3.75	4.19	3.99	4.77	p<.001	2.2%
Working in groups	3.90	4.14	3.86	3.82	3.87	3.79	2.20	ns	1.0%
Writing	4.02	3.86	3.87	3.67	4.06	3.36	6.13	p<.001	2.8%
Reading	3.96	3.93	3.71	3.87	3.83	3.22	6.70	p<.001	3.0%
Management	3.92	3.69	3.76	3.68	3.84	3.57	1.93	ns	0.9%
Non-major	3.39	3.39	3.64	3.44	3.66	3.36	3.28	p<.01	1.5%
Major	3.57	3.59	2.66	3.19	3.15	3.00	20.31	p<.001	8.6%
Quantitative skills	3.01	3.77	2.40	3.34	2.20	2.20	47.80	p<.001	18.2%
Diversity	2.54	2.26	2.91	2.33	3.09	2.81	12.32	p<.001	5.4%
Environment	2.35	2.57	2.81	2.26	2.78	2.53	6.48	p<.001	2.9%
Science	2.09	3.79	2.23	3.29	1.86	2.20	73.15	p<.001	25.4%
Arts	1.45	1.40	1.69	1.55	1.96	2.96	31.93	p<.001	13.0%
Foreign language	1.45	1.38	1.44	1.56	1.40	1.43	.59	ns	0.3%

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Table 7. Rank Ordering of Average Ratings within Areas of Major

Rank	Busi	Engr	SocSci	NatSci	Hum	Arts
1	Techno	ProbSolv	Independ	ProbSolv	ProbSolv	ProbSolv
2	ProbSolv	Techno	ProbSolv	Techno	Info	Independ
3	Info	Info	Speaking	Independ	Speaking	Speaking
4	Independ	Group	Info	Info	Independ	Info
5	Speaking	Independ	Techno	Reading	Techno	Group
6	Writing	Reading	Writing	Group	Writing	Techno
7	Reading	Speaking	Group	Speaking	Group	Mgmt
8	Mgmt	Writing	Mgmt	Mgmt	Mgmt	Writing
9	Group	Science	Reading	Writing	Reading	NonMajor
10	Major	Quant	NonMajor	NonMajor	NonMajor	Reading
11	NonMajor	Mgmt	Diverse	Quant	Major	Major
12	Quant	Major	Environ	Science	Diverse	Arts
13	Diverse	NonMajor	Major	Major	Environ	Diverse
14	Environ	Environ	Quant	Diverse	Quant	Environ
15	Science	Diverse	Science	Environ	Arts	Quant
16	Arts	Arts	Arts	ForLang	Science	Science
17	ForLang	ForLang	ForLang	Arts	ForLang	ForLang

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