

Chapter 5

Are there differences between economics students and law students in terms of study success?

An exploratory study of the impact of prior knowledge on study success - ex post facto research 1

Introduction

Our initial interest in the role of prior knowledge has grown from some striking experiences with the course 'Economics and Money' (E & M), as mentioned earlier. When general consideration is given to the achievements of the economics and law students who are expected to study this course, the implicit assumption is often made that economics students possess a greater level of prior knowledge. This implicit assumption invokes problems in relation to the 'multi-functionality' of the E & M course. Multi-functionality implies that students studying differing disciplines can make functional use of the same course without encountering special problems (such as delay in completing the course, drop-out, subject-specific problems, etc.). This multi-functionality relies largely on basic assumptions about the role of prior knowledge in studying this course. Prior knowledge is not expected to play a major role if a course is truly multi-functional.

But law students are claimed to have less domain-specific or prior knowledge than economics students, and this causes specific study problems and poorer examination results.

Using an ex post facto research design, we looked for empirical support for these assumptions about differences in study success and prior knowledge, and for the multi-functionality of the E & M course. In other words, the main objective of this research is to check whether economic and law students complete the E & M course with clear differences in efficiency. It will be clear that, based on our earlier overview of research and literature in chapter 2, we take the assumption that prior knowledge is the best predictor for study success for granted in our ex post facto studies. Further research will be needed to investigate the reasons for differences in success and determine whether the causes also help to reveal how the situation can be remedied. Important variables which we used in this first ex post facto research were the number of passes (and fails) and the number of examination attempts.

Course developers should be well aware of the prior knowledge-problem when developing new learning materials in modular higher education (see chapter 1). These materials have to be used by a very heterogeneous student population in terms of previous experiences with the specific knowledge domains.

In the actual research, the value of the variable 'student type' will be tested as an 'indicator' of prior knowledge (independent variable); i.e. economics student (ES) or law student (LS). Student type is according to course developers the variable that can account for a major amount of explained variance in study results (dependent variable). This implicit hypothesis implies that student characteristics (e.g. good

knowledge of languages, good in sports, etc.) direct the study choice of students. As a consequence, study choice (student type) could be a potential indicator of prior knowledge.

In this chapter, the problem of assessing prior knowledge and the link with 'type of student' will form the background to the statement of our research hypotheses. Following that, the results will be discussed. This brings us to some concluding remarks introducing an alternative approach to the study of the specific role of prior knowledge.

2 Research design

2.1 Ex post facto research

There were two principal reasons for adopting an 'ex post facto' design for the research:

1 The target student population of the Open University is very difficult to involve in experimental or quasi-experimental designs. The students learn at a distance and at their own speed. As a consequence, putting together a representative set of students in a specific geographical location, at the same time, studying the same course and at the same level is hardly possible.

2 Since we focus on indicators of prior knowledge and their link with achievement, ex post facto analysis is a satisfactory and useful approach. Ex post facto research is used here in a broad sense: "The researcher arrives after the fact that the treatments have been imposed on the subjects" (Shavelson, 1981).

2.2 Research population

The E & M course has been available since March 1985. Up to May 1988, when the research data were collected, 5,654 students had enlisted for this course, 2,541 of whom completed it. Of this entire population, 3,713 students take or had taken two or more courses along a specific diploma line.

The background characteristics of the research population are stable: approximately 79% are male and 21% are female; 41% are 30 years of age or younger, 40% between 31 and 40, 19% older; approximately 24% have a lower secondary school background, 31% have a HAVO/VWO (high school) diploma, 35% have HBO (tertiary education) background and 10% attained a WO (university education) diploma. About 25% of the students passed the examination within six months and another 41% passed between the seventh and the twelfth month after enlisting for the course.

The research population, involved in the actual analysis, are economics and law students who have passed examinations for at least two courses within their diploma-line (i.e. our definition of 'student'): 1,893 law students (LS) and 389 economics students (ES).

2.3 Research procedure

Since students can study at their own pace, they do not necessarily take examinations at the same time. The Open University organizes three examination periods per course per year. Since the E & M course has been available since March 1985 the first fixed examination date was June 1985 (8506). Accordingly, nine periods can be distinguished:

- period 1: to 8506.
- period 2: 8507 to 8510
- period 3: 8511 to 8602
- period 4: 8603 to 8606
- period 5: 8607 to 8610
- period 6: 8611 to 8702
- period 7: 8703 to 8706
- period 8: 8707 to 8710
- period 9: 8711 to 8804

For the analysis, data¹ relating to 9 groups of students have been analyzed (from June 1985 to April 1988). More details can be found in Dochy and Bouwens (1990d). These data comprise the following information:

- What kind of courses does and did the student study? (in order to define the student type)
- Did the student pass the E & M examination?
- If so, when did the student pass the E & M examination?
- How many attempts were necessary?
- Did the student drop-out² of the course?

2.4 Research hypotheses

Taking into account the theoretical considerations set out above (and in chapter 2) and the research procedure adopted, the following hypotheses (H_0) were tested:

- 1 Equal proportions of economics students and law students pass the E & M examinations.
- 2 There are no differences in the numbers of attempts needed by each group to pass the E & M examination.

¹ These data are not gathered by the researchers themselves. They are extracted from a database containing personal information about all students of the Open university. In order to guarantee privacy of study results, raw data were not put at the disposal of the researchers. Only summary data were obtained: percentages, group scores, etc. This implies that statistical analysis remains limited.

² A student is considered as a drop-out when he does not take an examination for the specific course. The concept 'drop-out' is not synonymous with academic failure. Not all students intend to take examinations.

- 3 The number of drop-outs is equal when comparing the population of economics and law students.

3 Research results and discussion

3.1 Equal proportions of economics students and law students pass the E & M examinations

The following table gives an overview of the percentage of economics and law students passing. The table reflects the results in relation to the 9 different evaluation dates.

Table 1: Percentage of law and economics students passing the examination

Period	passed	
	LS	ES
1	34.9	43.8
2	27.4	45.5
3	23.6	47.8
4	30.5	64.7
5	39.6	58.3
6	34.9	60.9
7	42.2	52.2
8	26.5	57.6
9	3.3	00.0
Total	56.1	77.4

If we compare the proportions of the entire population of economics students who pass (or fail) against the proportions for law students, χ^2 analysis³ reveals that these proportions are significantly different ($\chi^2 = 16.645$, $p_{\chi^2} < .001$). If we repeat this analysis for the separate examination periods, the same significant results are found for period 2, 3, 4, 5, 6, 7 and 8. For period 1, no significant differences were found,

³ In this χ^2 analysis, the proportion of failure and success among economics students is considered as the expected frequencies; the proportion of failure and success among law students is considered as the frequencies observed.

but it has to be indicated that it was the very first time evaluation was set up for this course. Period 9 also reveals no significant differences, but the analysis is based on a too small number of students.

The results imply that the above hypothesis cannot be confirmed and that economics students are more likely to pass the E & M examination than law students.

3.2 There are no differences in the numbers of attempts needed by each group to pass the E & M examination

Table 2 gives an overview of the number of attempts, students need before passing the E & M examination.

Table 2: Number of attempts and percentage of passes by ES and LS

		Number of attempts				
		1	2	3	4	5
pass	ES	79.3	63.2	90.9		
	LS	52.8	61.6	64.0	47.7	25.0

Table 3 shows the proportion (percentage) of LS and ES passing in relation to the number of examination attempts.

Table 3: Percentage of passing LS and ES per number of attempts

		1	2	3	4	5
Total	ES	80.5	15.1	4.4		
	LS	59.7	29.1	8.9	1.9	0.4

If we explore these data, it is striking that the maximum number of attempts needed is different for economics and law students: ES (N=252) made a maximum of three attempts, whereas LS (N=1003) needed up to five attempts to pass the examination.

Two statistical analyses are using the data in tables 2 and 3:

a. A comparison of pass rates of law and economics students after the first attempt or a later attempt.

To check the hypothesis that the number of attempts needed was different for economics and law students, we slightly rearranged the data in table 2 to distinguish only the two principal categories: students passing on the first occasion

or students passing on a later occasion.

Table 4: the proportion of economics and law students passing at the first or a later attempt

	ES	LS
1 attempt	80.5	59.8
2 or more	19.5	40.2

The results of an χ^2 analysis confirm that the proportion of students passing after 1 or more attempts is different for economics and law students ($\chi^2 = 27.290$, $p_{\chi^2} < .001$). This implies that the hypothesis is to be rejected, and that there are differences in the number of attempts need by law students and opposed to economics students⁴.

b. A comparison of the proportion of students passing after the first attempt.

Focusing on pass/fail rates after the first examination attempt is in our opinion of importance to find additional proof in relation to the hypothesis discussed in 4.1. If for example, students fail at their first attempt and try to pass the examination a second time, the role of prior knowledge might already be distorted by additional learning experiences while studying the course and taking the examination.

Table 5: Comparison between the percentages of passes/fails amongst law students taking the examination for the first time and percentages of economics students

	ES	LS
Pass	79.3	52.8
Fail	20.7	47.2

The results of an χ^2 analysis confirm that the proportion of students passing after one attempt is different for economics and law students ($\chi^2 = 42.780$, $p_{\chi^2} < .001$). This confirms the conclusions drawn in section 3.1.

3.3 The number of drop-outs is equal when comparing the population of economics and law students

⁴ An analogous analysis has been carried out in relation to the course "Balance Sheet, Profit and Loss Account and Administrative Procedures". The same significant differences in proportions between economics and law student have been found ($\chi^2 = 17.373$, $p_{\chi^2} < .001$).

Until now, we have been concerned with examination candidates. Our data showed however that a not inconsiderable number of students drop out. The students who register but do not take part in an exam are considered as drop-outs. The drop-out percentage is 47.8 % for ES and 60.5 % for LS. If a comparison is made with other distance teaching universities, this drop-out rate is seen to be common to this kind of tertiary education (Powell, 1990; CDE, 1989). Although drop-out is not synonymous with academic failure (not all students intend to take examinations and withdraw voluntarily from exams), different drop-out rates in different student types could reflect differences in the levels of prior knowledge. A key concept in this viewpoint is 'academic integration'. The concept academic integration is derived from Tinto's model of drop-out (1975).

In this model, academic integration also comprises individual characteristics in terms of individual competencies, abilities and previous academic experiences which might be related to the concept of prior knowledge. Differences in drop-out rates might therefore be related to differences in prior knowledge.

Table 6: percentage of ES and LS dropping out or completing their E & M study

	ES	LS
drop-out	35.2	47.0
complete	64.8	53.0

χ^2 analysis confirms that there is a difference the drop-out rates of the two populations, although the difference is only nearly significant ($\chi^2 = 6.1043$, $p_{\chi^2} < .025 > .01$). These significant differences can be related to differences in prior knowledge.

4 Conclusions

The analysis of examination behaviour of economics and law students presents a clear picture of 'indications' about differences in prior knowledge. We emphasize the word 'indications'. Economics students seem to be better qualified than law students to study the Economics & Money course. This consistent picture helps us to reject the three hypotheses stated above. Moreover, these findings challenge the multi-functional nature of the Economics & Money course. The variable 'student type' seems to indicate study success consequently.

These findings are consistent with earlier data about a comparable student population (Van Meurs, 1986; Joosten, 1987). If we apply the same statistical techniques to the data reported in their overview we get the following results:

- The pass rates for ES and LS are significantly different ($\chi^2 = 7.06$, $p_{\chi^2} < .01$).
- The drop-out rate for ES and LS is significantly different ($\chi^2 = 7.196$, $p_{\chi^2} < .01$).

Although the actual research findings help to support the assumptions about differences between law and economics students, more research is needed. First, more analyses are necessary to determine the value of single variables as indicators of prior knowledge. Further, following the approach adopted by Prosser (1987), it might be important to construct specific tests to analyze the actual prior knowledge of students in relation to the variable 'student type' as an indicator of prior knowledge. This will be the main focus of our analysis in a follow-up investigation into the impact of personal and contextual variables on success in an economics course.

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