

A Longitudinal Comparative Study of the Academic Achievement of Education and Other Undergraduate Students

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A study of the academic achievement of education students as compared to that of other undergraduates over a ten-year period (1973–1984), and based on more than 20,000 grades, showed that: (1) education students enrolled in junior courses in faculties other than Education generally did not perform as well as other comparable undergraduates; (2) in senior courses the situation reversed: education students generally outperformed their counterparts from other faculties; (3) students who entered education after having earned a degree were as academically able as their cohorts who did not enter education; (4) females in both elementary and secondary programs were generally more academically able than their male counterparts; and (5) these trends have remained stable over a ten-year period.

Une étude du rendement scolaire des étudiants en sciences de l'éducation comparé à celui d'autres étudiants de premier cycle sur une période de dix ans (1973–1984), étude basée sur plus de 20 000 notes, a révélé que: (1) les étudiants en sciences de l'éducation, inscrits dans des cours de premier cycle dans d'autres facultés, obtiennent en général des résultats plus faibles que de ceux d'autres étudiants de premier cycle comparables; (2) dans les cours des cycles supérieurs, la situation est inversée: les étudiants en sciences de l'éducation ont, en général, un meilleur rendement scolaire que leurs homologues inscrits dans d'autres facultés; (3) les étudiants qui se sont inscrits en sciences de l'éducation après avoir obtenu un diplôme ailleurs étaient, du point de vue du rendement scolaire, aussi aptes que les cohortes inscrites dans d'autres facultés; (4) les femmes inscrites dans les programmes d'enseignement au primaire et au secondaire ont, en général, un meilleur rendement scolaire que leurs homologues masculins; (5) ces tendances sont demeurées stables au cours de la période de dix ans.

It is a generally held belief that teachers and students preparing to become teachers are of only mediocre academic ability. This opinion is frequently expressed in the popular press (e.g., *Quest*, 1984; *Time*, 1980) and in the scholarly press (Clark, 1984). Teachers, students and university faculty also sometimes express such views, as does the general public (Elam, 1989).

Evidence on this point is rare. Current information about the people entering education in the United States is very limited and narrow (e.g., Feiman-Nemser & Floden, 1986; Lortie, 1973, 1975; Schalock, 1979). In

Canada, these data are virtually non-existent (O'Neill, 1988). The 1978 yearbook of the Canadian Society for the Study of Education, *The Education of Teachers in Canada* (MacIver, 1978) contained no systematic information about education students. In order to begin to rectify this situation, I here offer a comparative study of the academic achievement of education and other students at one major Canadian university (the University of Calgary).

American (and other) research findings can be instructive on this point. American research (Vance & Schlechty, 1982; Weaver, 1984) suggests that the academic ability of American education students declined in the 1970s and 1980s. Schlechty and Vance (1981) and Vance and Schlechty (1982), employing samples from North Carolina and a representative American sample involving more than 22,000 subjects, concluded that teaching attracts more people with low academic ability than high academic ability. Their measure of academic ability was performance on the Scholastic Aptitude Test (SAT).

In contrast, older studies of the academic ability of teachers by Learned and Wood (cited in Weaver, 1984) in 1928, 1930, and 1932 showed that men preparing to be teachers had significantly better test scores than the college average and that their performance compared favourably with that of students in other professions (for example, medicine and theology). The women in the sample (who were twice as numerous as the men) did not fare so well: they scored below the mean and as a consequence reduced the education sample mean score.

Later, Thorndike and Hagen (1959), having studied the Aviation Cadet candidates who entered teaching after serving in World War II, found that these teachers clustered in the middle range of occupational groups with regard to both verbal and quantitative aptitude. Wolfe's (1954) study had uncovered similar findings: education majors tended to cluster a few points below the mean for all college graduates, scoring at about the 44th percentile on the Army General Classification Test. For this period, from World War II to 1970, many other researchers have confirmed these general findings (e.g., Burnett & MacMinn, 1966; Mitzel & Dubnick, 1961; Povalko, 1970). Another general finding from this research is that the most academically able teachers are typically the least committed to teaching and the most likely to leave the profession. Thus, a disproportionate number of the least academically able people are retained in teaching. These general trends have also been reported in Britain (Crocker, 1974; Lomax, 1972) and the Soviet Union (Lordkipanidze, 1965).

By the 1970s, the situation in the United States had become alarming. Fewer than half of 1976 teacher education graduates had SAT scores as high as the average high school senior's score four years earlier (Weaver, 1983, 1984). This trend has since continued (Mitchell, 1978; Schlechty & Vance,

1981; Vance & Schlechty, 1982; Weaver, 1984). Weaver (1984, p. 110) concluded that "the field has attracted individuals of limited academic talent" during the 1970s and early 1980s.

What of the Canadian situation? How does the academic achievement of education students compare with that of comparable undergraduates? Do substantial differences in achievement exist between junior and senior education undergraduates? Do those who enter education after having earned an undergraduate degree differ substantially in their academic achievement from those who do not enter education? Are there notable sex differences in the achievement of education students? Has the situation changed in the past decade?

The present study considers the academic achievement of education students and other undergraduates at the University of Calgary over a ten-year period (1973–1984).

METHOD

The academic achievement of the following three groups of education students was of interest: (1) those working toward a B.Ed. as a first degree and enrolled in junior courses (Junior students), (2) those working towards a B.Ed. as a first degree and enrolled in senior courses (Senior students), and (3) those who had earned a B.A. or B.Sc. and were entering education for after-degree studies (After-Degree students). My study made use of more than 20,000 grades.

The longitudinal aspect of this study was complicated by the fact that the University of Calgary underwent several reorganizations between 1976 and 1981. For administrative reasons, all data for the Junior students for the period 1977–1980 had therefore to be dropped from analysis. The data were for two three-year periods, 1973–1976 and 1981–1984 (Tables 1 and 2). Senior students' faculty of enrollment was identifiable through the reorganizational period and data are hence provided for them from 1974 to 1983. The latter time frame was also used for After-Degree students (Table 3).

To compare the academic achievement of the Education students to other undergraduates, only courses taught *outside* the Faculty of Education were included as a data base. Ten junior courses (see Tables 1 and 2) with large enrollments from different faculties were selected for both time periods (1973–1976 and 1981–1984) for the Junior students; four senior courses (described below) taken by Education and other students formed the data base for Senior students. No other senior courses were taken by both Education students and others in sufficiently large numbers to allow for meaningful comparisons. Finally, for the After-Degree students, those entering Education in September of a given year from 1974 to 1983 were included in

TABLE 1
Mean Grades in Ten Junior Courses by Faculty of Enrollment for Three Academic Sessions (1973-1976)

Course	Faculty of Enrollment				
	Arts & Science	Education	Fine Arts	Management	Nursing
Art 241	2.39 (123) ¹	2.33 (218)	2.60 (234)		
English 231	2.06 (1951)	2.06 (816)	2.07 (197)	1.96 (169)	2.34 (126)
Geography 201	2.44 (1313)	2.11 (386)			1.72 (153)
Geography 213	2.25 (278)	2.10 (183)			1.83 (106)
History 231	2.73 (266)	2.55 (257)			
History 233	2.72 (367)	2.65 (335)			
Linguistics 201	2.64 (452)	2.52 (834)			
Linguistics 203	2.66 (192)	2.60 (627)			
Psychology 205	2.54 (2617)	2.29 (660)	2.10 (73)	2.32 (192)	2.98 (156)
Sociology 201	2.44 (2084)	2.17 (854)	2.08 (87)	2.26 (164)	2.67 (153)
Mean grade	2.42 (9643)	2.33 (5169)*			1.83 (372)

¹Total number of grades used to calculate the mean grade.

* $t=11.63$; $df=\infty$; $p<.01$

the sample. Their academic achievement was compared to a random sample of their cohorts (Table 3).

JUNIOR STUDENTS

The results from the analyses of Junior students are summarized in Tables 1 and 2. At the University of Calgary, students receive letter grades for each course. The letter grades have the following numerical values: A=4.0; A-=3.7; B+=3.3; B=3.0; B-=2.7; C+=2.0; C-=1.7; D+=1.3; D=1.0; and F=0. The mean grades used throughout this study are based on these numerical values.

Table 1 summarizes the mean grades in each of the ten junior courses for three academic sessions (1973–1974; 1974–1975; 1975–1976) by the faculty in which students were enrolled. Students enrolled in Fine Arts, Management, Nursing and Physical Education did not take all the courses while Education and Arts and Science students were represented in all ten courses. Means across all ten courses for all three academic sessions for Education students and Arts and Science students were computed. The mean GPA for Arts and Science students was 2.42 (based on 9,643 grades) while for Education students it was 2.33 (based on 5,169 grades). A two-tailed *t*-test for independent samples was used to analyze these data to test for significant differences in means. The Arts and Science mean GPA was significantly higher than for education students ($t=11.63$; $df=\infty$; $p<.01$). This lower score is particularly noteworthy as ten courses and thousands of grades over a three-year period were used. There can be little doubt that the Arts and Science students performed significantly better than the Education students.

For further analyses, three courses (English 231, Psychology 205, and Sociology 201) taken by students in all faculties represented in Table 1 were selected as a data base. The mean grades for students in each faculty were computed across these courses for all three academic sessions. A rank order was assigned to each faculty based on the mean grades. Education students were in the middle range of achievement, behind Nursing students (rank=1), Arts and Science students (rank=2), and Management students (rank=3), but ahead of Fine Arts students (rank=5) and Physical Education students (rank=6).

Table 2 is a summary of the parallel analysis as represented in Table 1 but for the academic sessions 1981–1982, 1982–1983 and 1983–1984. There are several differences between Tables 1 and 2. Among other differences, the faculties of enrollment are different because of the reorganization of the University described above. Only students specifically registered in one of the designated faculties in Table 2 were included in the analyses.

As before, means for Education students and for Social Science students across all ten courses and all three academic sessions were computed. The

TABLE 2
Mean Grades in Ten Junior Courses by Faculty of Enrollment for Three Academic Sessions (1981-1984)

Course	Faculty of Enrollment				
	Education	Engineering	Nursing	Phys. Ed.	Social Science
Anthropology 201	2.67 (25) ¹	2.84 (65)		2.51 (42)	3.01 (81)
English 231	2.55 (45)	2.51 (40)	2.71 (135)	2.00 (165)	2.70 (63)
Geography 201	2.50 (53)	3.00 (177)		2.01 (65)	3.01 (83)
Geography 203	3.02 (24)	2.63 (25)			2.84 (12)
History 231	2.78 (66)			2.29 (90)	2.86 (108)
History 233	2.78 (79)			2.23 (92)	2.94 (10)
Linguistics 201	2.75 (142)				3.22 (25)
Linguistics 203	2.88 (178)			2.54 (11)	3.40 (30)
Psychology 205	2.68 (57)	3.15 (276)	3.05 (122)	2.17 (507)	3.28 (20)
Sociology 201	2.62 (61)	2.91 (108)	3.09 (123)	2.25 (535)	3.21 (226)
Mean grade	2.75 (730)				3.00 (95)
					2.95 (500) *

¹Total number of grades used to calculate the mean grade.

*t=6.90; df=∞; p<.01

mean grade of Education students of 2.75 (based on 730 grades) was lower than the mean grade of Social Science students of 2.95 (based on 500 grades). Again, using a two-tailed *t*-test for independent samples, these means were found to be significantly different ($t=6.90$; $df=\infty$; $p<.01$).

Again, for further analyses, means for all faculties represented in Table 2 were computed across the same three junior courses as in the previous analysis and these were rank-ordered. Education students did not fare very well, ranking behind Engineering, Science, Social Science, and Nursing students; they were, however, ahead of Physical Education students. The academic performance of Physical Education students remained stable, and they ranked last in both time periods represented in Tables 1 and 2.

The means across the three junior courses for Education students in the first time period resulted in a *z*-score of -0.18 , which is the 43th percentile. For the second time period the *z*-score was zero, which is the 50th percentile. These results were very similar to Wolfe's (1954) post-World War II findings in the United States.

SENIOR STUDENTS

The senior courses taken by sufficiently large numbers of Education students and others to result in meaningful comparisons were Drama 360, English 398, Pure Math 340 and Pure Math 320 for 10 academic sessions (1974–1983). Education students and non-Education students were included in this analysis. In these courses, there are insufficient numbers of students registered in any given faculty (except Education) to make meaningful comparisons; therefore, students were classified as either Education or non-Education.

The mean grade (across all courses and academic sessions) for Education students was 2.71 (based on 2,556 grades) while for non-Education students it was 2.59 (based on 1,040 grades). As before, a two-tailed *t*-test for independent samples was used to test for significance: Education students' mean grade was higher than the non-Education students' ($t=6.67$; $df=\infty$; $p<.01$). This apparent reversal of the relative achievement in junior courses requires some scrutiny.

In Drama 360, 24% of non-Education students were in Fine Arts while 63% were in University College (General Studies), for a total of 87%. In English 398, 74% of the non-Education students were in University College (General Studies); in Pure Math 340, non-Education students comprised 47% while 41% were Science students for a total of 88%. Finally, in Pure Math 320, Science students represented 62% and General Studies students represented 28% (total=90%) of non-Education students. These figures suggest that the relatively superior performance of Education students is not due to the overrepresentation of weak students (for example, Physical Education) in

TABLE 3
*Means, Standard Deviations, and F Ratios for GPA for the Final
 Year of Students Convocating (B.A. or B.Sc.) for Ten Academic
 Sessions (1974–1983)*

Year of Convocation	Direction after convocation						F
	Enter Education			Not enter Education			
	GPA			GPA			
	N	Mean	SD	N	Mean	SD	
1974	34	3.00	0.72	45	3.12	0.60	0.98
1975	52	3.00	0.50	46	3.07	0.63	0.31
1976	54	2.83	0.48	47	3.08	0.50	6.51 *
1977	43	3.01	0.54	45	2.99	0.55	0.04
1978	18	2.73	0.43	42	2.91	0.55	1.48
1979	23	2.88	0.58	46	2.91	0.56	0.03
1980	27	2.85	0.69	40	3.10	0.47	3.02
1981	17	2.97	0.46	43	2.89	0.52	0.26
1982	24	3.06	0.42	40	3.06	0.51	0.00
1983	24	2.80	0.37	47	3.00	0.50	2.17

* $p < .05$

the non-Education group. More likely, Education students who take these courses may be a self-selected group who are among the most academically able students. That is, they may not be representative of education students as a whole as reflected in junior course enrollment. Perhaps less able Senior Education students chose education options they perceived to be easier. Alternatively, it may be that by senior year Education students become more studious and dedicated. There is no evidence, however, to support this notion. A third possibility is that the least academically able education students either fail or withdraw by senior years. This last explanation, however, is not very compelling since the combined withdrawal and failure rate of education students at the University of Calgary is only approximately 10%. Within the context of the present study, however, this matter cannot be settled. In any case, for whatever reason, it is worth noting that where comparative data exist, Senior Education students outperform their counterparts from other faculties.

AFTER-DEGREE STUDENTS

Do students who enter Education after having earned a degree differ in achievement from their cohorts who do not enter Education? To address this question, the mean grades of students who had earned a B.A. or B.Sc. from the University of Calgary and then entered Education were compared to the scores of those who did not enter Education. This was done for a ten-year

TABLE 4
Mean Grades of Fourth Year Education Students

<i>Academic session (Winter)</i>	<i>Elementary</i>			<i>Secondary</i>		
	<i>Male</i>	<i>Female</i>	<i>Total</i>	<i>Male</i>	<i>Female</i>	<i>Total</i>
1974	2.67 (41) ¹	2.96 (337)	2.93 (378)	2.69 (94)	3.00 (143)	2.88 (137)
1975	2.54 (42)	2.88 (295)	2.83 (337)	2.73 (76)	2.98 (105)	2.87 (181)
1976	2.53 (28)	2.95 (274)	2.91 (302)	2.67 (81)	2.93 (92)	2.81 (173)
1977	2.56 (37)	2.90 (280)	2.86 (317)	2.79 (104)	2.88 (116)	2.84 (220)
1978	2.55 (20)	2.96 (320)	2.94 (340)	2.67 (66)	2.92 (86)	2.81 (152)
1979	2.97 (17)	2.96 (302)	2.96 (319)	2.76 (59)	3.03 (108)	2.94 (167)
1980	2.48 (18)	3.03 (257)	3.00 (275)	2.75 (36)	2.97 (88)	2.91 (124)
1981	2.93 (15)	3.04 (197)	3.04 (212)	2.76 (22)	3.03 (54)	2.95 (76)
1982	2.32 (12)	3.03 (141)	2.97 (153)	2.72 (32)	3.05 (44)	2.91 (76)
1983	2.68 (11)	2.98 (175)	2.96 (186)	3.14 (25)	3.01 (57)	3.05 (82)
<i>Mean grade</i>	2.60(241)	2.96(2758)*		2.78 (595)	2.97 (893)**	

¹Numbers in parentheses are numbers of students.

* $t=18.94$; $df=\infty$; $p<.01$

** $t=11.18$; $df=\infty$; $p<.01$

period (1974–1983) by identifying the year of convocation of the degree holders who entered Education in September of each year. If they had convoked the previous June, they were included in the sample. From the four to five hundred students convocating (B.A. or B.Sc.) that same June, a comparable number (to those who entered Education) were randomly selected to form the non-Education sample. The mean grades of both groups were then compared by analysis of variance to test for possible differences (Table 3).

A significant difference emerges for only one year, 1976. These results suggest that generally the means (computed for the final year) of those who enter Education do not significantly differ from their peers who do not enter Education. This group of students entering Education perform as well academically as their peers not entering Education.

SEX DIFFERENCES

The American research suggests that notable sex differences frequently occur in Education students' academic achievement. To test for this possibility in the present study, the mean grades (in the fourth and usually final year) of male and female undergraduates in Education were computed separately for a ten-year period (1974–1983); those preparing to be elementary school teachers and secondary school teachers were analyzed separately. These data appear in Table 4. The difference in mean grades for male and

female students were tested for significance by a two-tailed *t*-test for independent samples. For the elementary program, females outperformed the males ($t=18.94$; $df=\infty$; $p<.01$). Females also outperformed males in the secondary program ($t=11.18$; $df=\infty$; $p<.01$).

These data show that females in both elementary and secondary programs perform better than their male counterparts almost without exception. Clearly, the females in the past decade or so who have entered Education have performed better academically than did their male colleagues.

DISCUSSION

The major findings of the present study may be summarized as follows: (1) Education students enrolled in junior courses taught outside the Faculty of Education generally did not perform as well as other comparable undergraduates in these courses; (2) in senior courses the situation reversed: Senior Education students generally outperformed their counterparts from other faculties; (3) students who entered Education after having earned a degree performed as well academically as their peers who did not enter Education; (4) women in both secondary and elementary programmes achieved higher grades than their male counterparts; and (5) these trends have remained stable over a ten-year period (1973–1984).

Data for Junior and After-Degree students show that in respect of academic achievement, Education students come from two different populations. Although the Junior students did not perform as well as their counterparts in other faculties, After-Degree students did. These findings were stable for the ten-year period, 1973–1984. This implies that students who earn a degree outside the Faculty of Education before taking teacher training, perform better academically than students who enroll directly in the Faculty of Education as junior students. Thus, post-degree Education students may come from a population with a higher mean academic ability in comparison to the population from which junior level students are drawn.

These interpretations, however, are complicated by the findings from the Senior students. For this comparison it was the Education students who consistently outperformed the non-Education students. As was noted above, there are at least two plausible explanations for this finding: (1) A self-selection factor is operating; only the most able Education students took the senior courses and so don't really represent Education students as a whole, and (2) by senior years, Education students become comparatively more studious and dedicated to achievement than their peers and so outperform them in common courses. If the first interpretation is correct, then the findings from the Senior students simply reflect a biased sample (*vis-à-vis* all Education students). On the other hand, if the second interpretation is

correct, then the undergraduate program in the Faculty of Education at the University of Calgary is impressively effective in improving student achievement. In other words, students who in junior years were comparatively poorer than their peers, become comparatively better than their peers by senior years. If this is true and such a reversal is due to the educational experience in the Faculty of Education, this is a remarkable feat indeed. Unfortunately, in the present study, the correct interpretation of these findings cannot be determined. The matter warrants further study and research.

Women enrolled in Education achieved higher grades than their male counterparts. This is probably partly due to the traditional differential recruiting into Education for men and women. Teaching tends to attract females more able than their male colleagues (Lortie, 1975). The rapid expansion of Education in the 1960s and 1970s saw an unprecedented influx of young women into the universities. Most of these women were middle class and academically well-prepared (Vickers, 1984), and they entered conventional female-oriented studies such as Education and Nursing (Aiken, 1983). So, although the male population in Education throughout the 1970s remained unchanged, many more academically able females also enrolled, hence the superior female performance across the ten-year period, 1973–1984. This is in marked contrast to the situation in the 1920s and 1930s when male Education students were academically superior to their female counterparts. It is clear, at least in the present study, that male and female Education students represent different parts of the academic ability distribution. In further research, it may be interesting to compare the academic achievement of female Education students to females in other faculties.

Women have recently enrolled in increasing numbers in traditionally male faculties such as Law and Medicine (*CAUT Bulletin*, 1986; Mechanic, 1983). At the University of Calgary, for example, typically 30% of the students in Medicine have been women but this percentage is increasing: in the 1989 first-year class, 31 of 73 students (43%) were women. Similarly, around 35% to 40% of students currently in Law schools across Canada are women, with the rate at the University of Windsor's Law faculty having exceeded 50% in the 1985 first-year class (*CAUT Bulletin*, 1986, p. 4). Accordingly, avenues other than traditional ones such as teaching are now becoming open to women who attend university. It is possible, therefore, that many of the brightest women who had previously chosen teaching as a career, may now select other alternatives such as Law and Medicine. This may further deplete the pool of academically able Education students.

By way of summary, my results show that some groups of Canadian Education students are of less-than-average university ability. My study suggests that the situation in Canada, fortunately, is not as alarming as it is in the United States. The data from Senior and After-Degree students indicate that

some groups of Canadian Education students are at least as academically able as their peers in other faculties, and some groups are academically superior. Nonetheless, there is some cause for concern. The data from the Junior students show that large numbers of Education students (at least in their junior years of study) do not perform as well as many of their peers from other faculties. Teacher educators should be concerned about this and at least study the matter further.

Finally, some cautions in generalizing from the present study should be underscored. While the present study spans a decade and encompasses a huge data base (more than 20,000 grades), it deals with only one major university in Canada. The extent to which the University of Calgary is representative of other Canadian universities remains a moot point. There are no obvious reasons, however, to suppose that the University of Calgary is particularly unrepresentative. Nevertheless, the extent to which the present findings can be generalized to other universities, is a matter for further research.

Quite clearly there is a need in Canada for more research of the present sort. There have been no other large scale studies of this sort published in Canada. The present findings, therefore, must be regarded with the circumspection that any as yet unreplicated findings warrant. Meanwhile, the present study can be a stimulus for discussion and further research on the very important question of the academic performance of Education students and teachers.

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