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Generic Skills, Academic Achievement, and Means of Improving the Former

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Abstract

In Canada, in general – and in the Province of Ontario in particular – academics, employers, and government agencies are concerned with the low generic skill levels of university students and graduates. The assumption is that such deficiencies detract from academic and job success. Despite this concern, in Canada, research has not focused on potential links between *objectively* measured generic skills and grades recorded in administrative records. In view of this lacuna, the current research has two objectives. First, to assess the net effect of objectively measured generic skills on academic achievement as recorded in administrative records. Second, to determine the efficacy of an online course dedicated to the development of generic skills. Overall, I found that generic skills were better predictors of students' achievement than high school grades used in admission processes; the relationship between high school grades and generic skill levels was weak; students' generic skill levels did not improve over time; and an online course devoted to increasing students' generic skills was effective in boosting skills to an acceptable level. Accordingly, if they are concerned with academic achievement, universities in Ontario and in other jurisdictions in which students are admitted to university primarily based on their secondary school grades might make the development of generic skills a priority; however, unless such skills are demanded across the curriculum, they will atrophy.

Keywords: generic skills, academic achievement, skill improvement

1. Introduction

In Canada, the province of Ontario's Ministry of Education makes it clear that it is important for students in primary and secondary schools to develop various skills and work habits "*in preparation for postsecondary education* [my emphasis] and the world of work" (Ministry of Education, 2010, p. 12). These skills and work habits include: responsibility (e.g., takes responsibility for and manages own behaviour); organisation (e.g. devises and follows a plan and process for completing work and tasks); independent work (e.g. follows instructions with minimal supervision); collaboration (e.g. accepts various roles and equitable share of work in a group); initiative (e.g., looks for and acts on new ideas and opportunities for learning); and self-

regulation (e.g. sets own individual goals and monitors progress towards achieving them) (Ministry of Education, 2010, p. 11). These skills are consistent with the assessments of university instructors and employers of factors contributing to success (Tsui, 2002; Arum & Roska, 2011).

In Ontario, the extent to which students in primary and secondary schools have achieved the Ministry's objectives is decided by students' teachers. There is no external verification of their assessments. As a result, there is considerable variation in the abilities of students who graduate with similar grades from different high schools (Authour et al., 2019; Côté et al., 2020).

In view of these considerations, it is not surprising that in Canada in general, and in Ontario in particular, there is a belief among university faculty members (Côté & Allahar, 2007, p. 42; 2011; Dion & Maldonado, 2013; Hutchins, 2017), employers (Mancuso, 2014), Statistics Canada (Munro, 2014; Statistics Canada, 2016), and journalists (Bradshaw, 2011; Brown, 2016) that students entering into, and graduating from, universities lack the skills essential to academic success and future employment. The situation does not improve over an academic career. Moreover, among young adults already low skill levels have declined over the past decade (Mahboui, 2017). Comparable concerns have been raised in other countries (Shtaltovna, 2021).

With colleagues at the University of Toronto, the University of Waterloo (Waterloo, Ontario), and Western University (London, Ontario), in 2018-2019, I conducted an analysis of the degree to which over 2,500 students in faculties comparable to Liberal Arts & Professional Studies at York University in Toronto, at all levels of study, believed they had the generic skills associated with academic and job success, and with democratic citizenship (Authour et al., 2019). The skills measured were those supposedly developed via primary and secondary school curricula in Ontario.

Despite the provincial objective of developing these skills prior to postsecondary education, only 44% of university students had adequate skill levels. There were no variations by university or year of study. The importance of generic skills was established by the finding that they had a sizeable positive impact on both grades and thoughts of degree completion. At a general level, these findings are consistent with those of other Canadian studies (Statistics Canada, 2016; Finnie et al., 2018; Weingarten & Hicks, 2018).

It is important to note that the pilot study for the multi-university survey was conducted among 100 Introductory Sociology students at York University. Consistent with the results of focus groups carried out among enrolees in Introductory Sociology (Brock et al., 2017), the pilot study (Authour, 2017) found that, skill-wise, 62% of students could be placed in a 'functional' category. The remainder, 38%, were classified as 'at risk'. As was later found in the larger four-university study, the numbers in the categories did not vary by high school grades, level of study, or major (not all students in Introductory Sociology were majors).

Based on information obtained from the sociology pilot and four-university studies, in 2018, I designed an online course, Skills for Success in Sociology (Sociology 1000), intended to provide students with the generic skills associated with academic achievement. The course was first offered in 2019-2020.

The skills on which I focused for the course were those identified by participants in the multi-university study as problematic. However, these skills were not dealt with as abstractions.

Instead, they were embodied in specific activities, like synthesising different points of view, essential to university success. The students themselves may have been unaware that in so doing, for example, they were utilising, and developing, the skills of analysis and synthesis.

Thesis development can be used to illustrate this point. An example of a thesis is: “In this essay I will argue that Liberal Justin Trudeau won the federal election because the Conservatives failed to develop a credible plan to combat climate change.” Clearly, this task requires analytical as well as communication skills. The latter are needed to express the former. In formulating a thesis of their own, a student would therefore be required to develop the capacity to analyse and synthesise certain materials and communicate the results of their endeavour in a clear and precise way. The important thing to notice is that instead of the student being aware that they were developing analytic and communications skills per se, they were involved in activities that developed them.

To assess the extent to which the skills developed in this way were important to students’ academic success, and to detail the degree to which generic skills can be developed via an online course, I conducted pre- and post-tests in Skills for Success in Sociology (Sociology 1000 B). In these tests students were presented with situations in which they would be required to utilise certain skills cultivated or reinforced through course materials, to answer a question or to solve a problem. Differences between pre- and post-tests would be a measure of how much students had learned in the course. For comparative purposes, the same tests were given in two sections of Introductory Sociology (1010 B and 1010 C).

2. Course Design

2.1 Skills for Success in Sociology

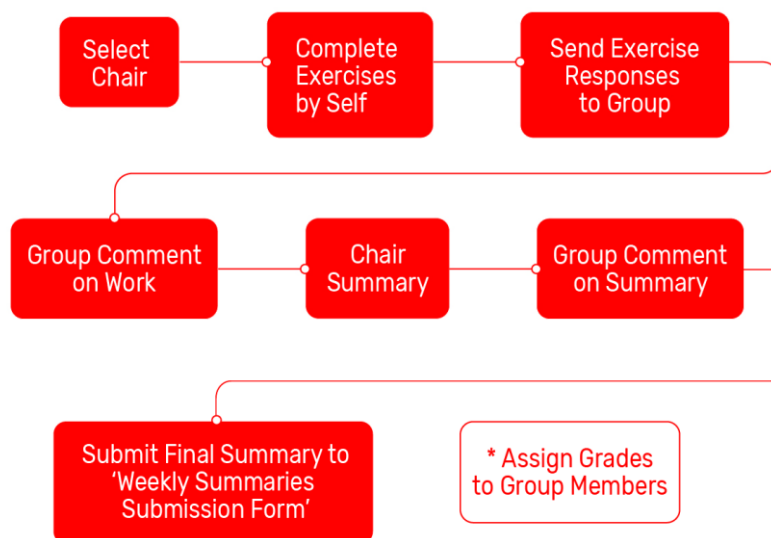
Skills for success in sociology was developed for online delivery in a way consistent with the principles of collaborative and experiential learning.

As in Figure 1, students are placed in learning groups. Each group includes approximately five students. In the learning groups, students serve as mentors to one another.

From the students’ perspective, the absolute course size is irrelevant. Their course experience is comparable to that of a small seminar embedded in a large course. Each group is led by a weekly rotating chair.

On a weekly basis, group members are individually responsible for addressing a case study, scenario, or series of questions related to information presented via an online course ‘workbook’ or texts. In many instances, students are required to analyse their life experiences in terms of what they are learning in the course.

FIGURE 1. SKILLS FOR SUCCESS IN SOCIOLOGY COURSE DYNAMICS



Source: own editing

Once they have addressed the case studies etc. students forward their responses to other members of their learning group for comment and discussion. At the end of the discussion a rotating chair synthesises the results. After feedback from the group, the chair then posts, via a report, a synthesis of the group's deliberations to the rest of the class. Based on weekly reports, members of any group are free to initiate discussion with members of other groups.

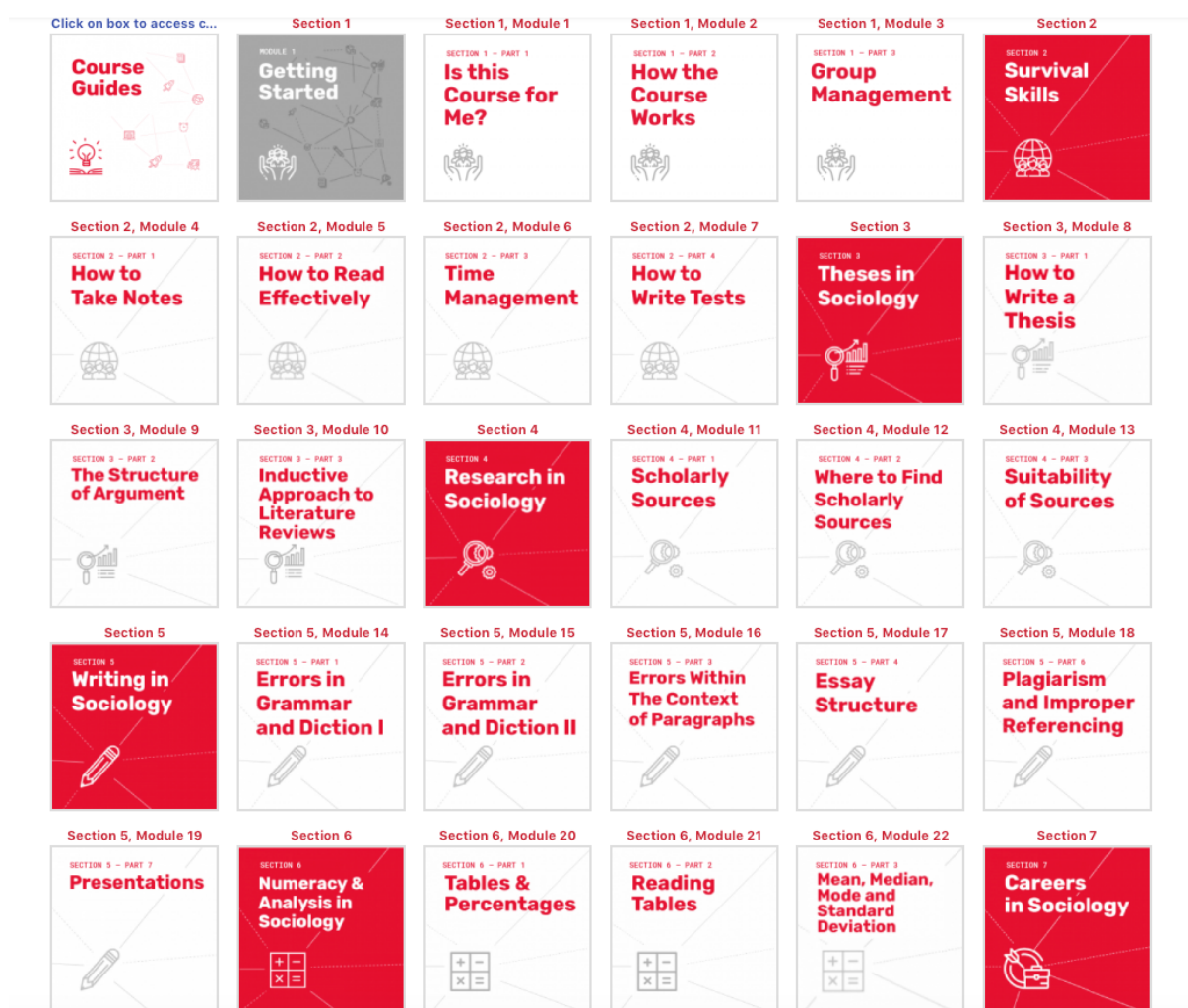
The instructor provides immediate feedback for these weekly submissions (within one or two days) and gives a group grade. At the end of the year the total grades earned by groups are assigned by its members to individuals in terms of the contribution that they made to the weekly learning tasks. In addition to weekly group work, students submit individual assignments and complete a final test.

More course details can be found at:

https://www.youtube.com/watch?v=RnNtcNRpjE&ab_channel=PaulGrayson.

Overall, as in Figure 2, the foregoing dynamic is embodied in 23 modules. Using different means, each module is designed to develop, or enhance, students' skills. For example, the module on careers in sociology does not just outline options available to students upon graduation. Instead, these options must be discovered by students through an analysis of relevant quantitative data supplied by Statistics Canada. In essence, students learn about career options and develop their quantitative analysis skills at the same time. In the module on time management class members must develop time management plans suitable to real and hypothetical circumstances. As a result, they enhance their organising skills. The requirements of the weekly reports produced by each group involve the development, and use, of leadership, analytical, synthetic, and communication skills. In essence, the subject matters of each module, and the weekly reports, are vehicles for skills development.

FIGURE 2. AREAS OF SKILL DEVELOPMENT



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2.2 Introductory Sociology

Both sections of Introductory Sociology were delivered in-class. Each involved lectures and tutorials. One section included short lectures and considerable in-class group work. In these sections, the focus was on sociology per se. Still, encouragement was given to students to refine particularly their writing skills.

3. Research Objectives

Based on data collected on students in Skills for Success in Sociology (1000 B) and in two sections of Introductory Sociology (1000 B and 1010 C) this article has two objectives:

- To assess the net effect of objectively measured generic skills on grades derived from administrative records for Sociology 1000 B and 1010 C.
- To determine the degree to which the skills that contribute to academic success in these two course sections can be developed in a full web course (Sociology 1000 B).

Overall, I will show that, at the beginning of the year, students in these three course sections had relatively low levels of generic skills; however, by the end of the year, particularly those whose skills scores were in the top quartile, had higher levels of academic achievement than others. In addition, students' skill levels were raised substantially in the course dedicated to skills development. As a result, if they are to increase students' level of academic achievement, universities might focus on generic skill development.

Note that the research objectives of, and the methodology applied in, this study received ethics approval from York University.

4. Sources of Information

For this article, information on students' skill levels as measured in Skills for Success in Sociology and two sections of Introduction to Sociology derived from a 60-question test designed to measure proficiency with: time and group management, written communication, numeracy, research ability, critical analysis, and numeracy. The questions were based on insights derived from the four-university study mentioned earlier. A sample question is shown in Figure 3.

It is important to note that test questions were not abstract. Instead, in keeping with previously mentioned considerations, they focused on the performance of tasks required in students' academic lives. For example, a student may have been given a passage similar to what they might encounter in their course readings. They were then asked to identify the thesis embodied in the text. This question, along with others, was a component of the operationalisation of critical analysis identified above. A similar strategy was followed in measuring each of the other important concepts. The underlying assumption of this approach was simple. Once skill gaps had been identified, a course could be developed that would focus on students' skill deficiencies. Approaches such as this are often employed in occupational training.

As discussed elsewhere (Côté et al., 2020), test questions differed from those used, for example, by the Higher Education Quality Council of Ontario (HEQCO). For studies conducted by the latter it was impossible to gain full access to the exact questions; however, from the little information made public, in contrast to those used in the current study, many HEQCO questions focused on skills with a dubious connection to the demands of university life.

During the first week of classes in 2019-2020, *as a course requirement*, students in 1000 B were expected to complete the test. The questions included in the test did not require specific knowledge of course content. As part of course requirements, it was necessary for students to complete the same test at the end of the course.

In 2019-2020, approximately 700 students were enrolled in Introductory Sociology. Almost three hundred of these were taught in Sociology 1010 B and C. As, except for time considerations, students likely enrolled in these courses randomly, for this article, they can be regarded as typical of those in all sections of Introductory Sociology.

While the pre-test was mandatory in Sociology 1000 B, in October and early November of 2019, the test was made available to students in Sociology 1000 B and C; however, it was not a course requirement. As a result, the response rate was approximately 50%. In April 2020, students in these two course sections were also provided with the option of completing the same test a second time. Responses on this occasion were slightly lower. In Sociology 1000 B, and

in 1010 B and C, differences between the pre- and post-tests were viewed as a measure of the development of generic skills over the 2019-2020 academic year.

The pandemic struck in the final month of these courses; however, any effect would have been constant across all three course sections.

FIGURE 3. SAMPLE TEST QUESTION

Before answering this question, note the following definitions:

Passive Reading – reading without analysis or reflection
Active Reading – reading for understanding and retention
Critical Reading – reading to assess author's argument(s)

As Jonas was reading, he realized that the text was primarily based on opinion. This is an example of what kind of reading style?

Select one:

- ☐ a. Passive Reading
- ☐ b. Critical Reading
- ☐ c. Active Reading
- ☐ d. None of the above

Source: own editing

Although in 1000 B and C participation in the two tests was voluntary, those who completed received a bonus mark. As in 1000 B the pre- and post-tests were required, and non-participation resulted in a loss of grades, participation was not an issue.

In preparation for the current analysis, in Sociology 1010 B and C, students who did not complete both the pre- and post-tests were removed from the data file. In addition, the scores of students who took a frivolous approach to the tests were removed. Such students may have, for example, only opened and closed the test. The resulting score would have been zero. After removing from the file those students who did not complete both tests, or those who were frivolous in their approach, the number of students available for analysis was 96. Of this number, 14 were enrolled in 1000 B, 34 in 1000 B, and 48 in 1010 C. Because of these measures, those included in the analysis are not necessarily representative of students in 1010 B and C.

In view of the number of respondents, the response rate for 1010 B and 1010 C, the exclusion of students who did not respond to both the pre- and post-tests, and the removal of frivolous responses, the sample cannot be regarded as representative of all students in various sections of

1010. That being said, given the consistency between the results of this and prior studies, it is unlikely that the general patterns identified in the sample were random.

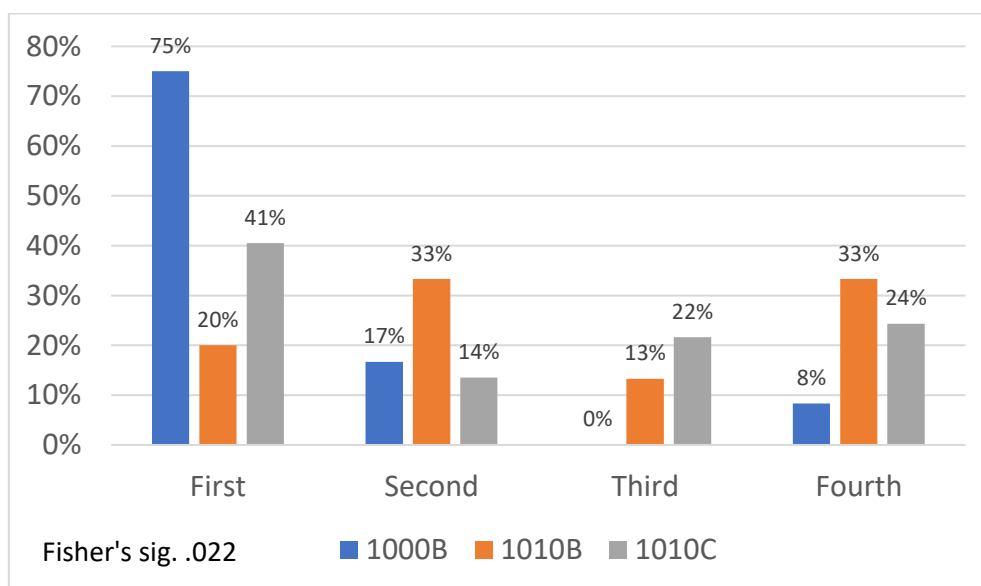
In addition to the diagnostic test, ‘objective’ information for this article was provided by Institutional Research at York. More specifically, administrative data were obtained for: high school grades, course grades for 1000 B and 1000 B and C; overall GPA for 2019-2020; cumulative GPA; number of credits completed in 2019-2020; cumulative completed credits; age; and sex. This information was merged with the results of the pre- and post-tests.

5. Course Profiles

There was a considerable difference between, on the one hand, students in 1000 B, and, on the other, those enrolled in 1010 B and C. These differences are important for two reasons. First, studies at York and elsewhere have demonstrated that the best predictor of future success is past success (Authour, 2004; 2008; 2011). More specifically, in any one course or in any one year, the best predictor of academic achievement is high school grades (despite their inflation) (Côté & Allahar, 2007, 2011) and previous GPA. Indeed, although far less now than in the past, high school grades have continued to have an independent effect on achievement even after four years of study at York, the University of Toronto, Waterloo, and Western (Authour et al., 2019), at least in studies that have not included measures of generic skills. Second, students’ abilities, manifested in different ways, are associated with phenomena such as attrition at the course or university level and with student satisfaction. As a result, it is reasonable to expect different course outcomes depending upon class profiles.

Overall, the high school grades of students in 1000 B, 1010 B, and 1010 C were 75%, 83%, and 82% respectively. These differences were statistically significant ($F \text{ sig.} = .03$). Perhaps even more important than differences in means is the within course distribution of grades. To determine this measure, I calculated the quartile distribution of high school grades across all courses. I then examined the quartile distribution by course. The results are seen in Figure 4. As seen in the figure, the largest percentage of students (75%) in 1000 B were in the lowest (first) quartile. By comparison, the corresponding figures for 1010 B and 1010 C were only 20% and 41% respectively. At the other end of the spectrum, only 8% of 1000 B enrollees were in the fourth quartile (highest). The corresponding figures for 1010 B and C were 33% and 24% respectively. In 1000 B, the students’ academic limitations expressed in the Figure were evident over the academic year.

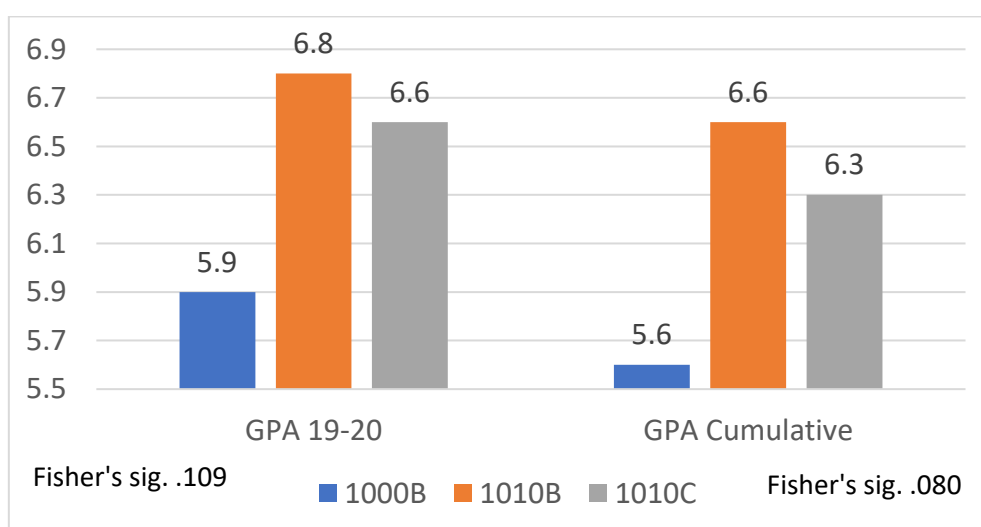
FIGURE 4. QUARTILE DISTRIBUTION OF HIGH SCHOOL GRADES BY COURSE



Source: own editing

Some manifestation of the limitations of students in 1000 B is found in Figure 5. It presents the overall student GPA for 2019-2020. Although not statistically significant, consistent with the foregoing, the achievement of students in 1000 B was considerably lower than in the other course sections. While the course average, on a nine-point scale, for students in 1000 B was 5.9, it was 6.8 and 6.6 for 1010 B and C respectively. Similarly, cumulative GPA (over all years of study at York) for 1000 B was only 5.6. For 1010 B and 1010 C it was 6.6 and 6.3 respectively.

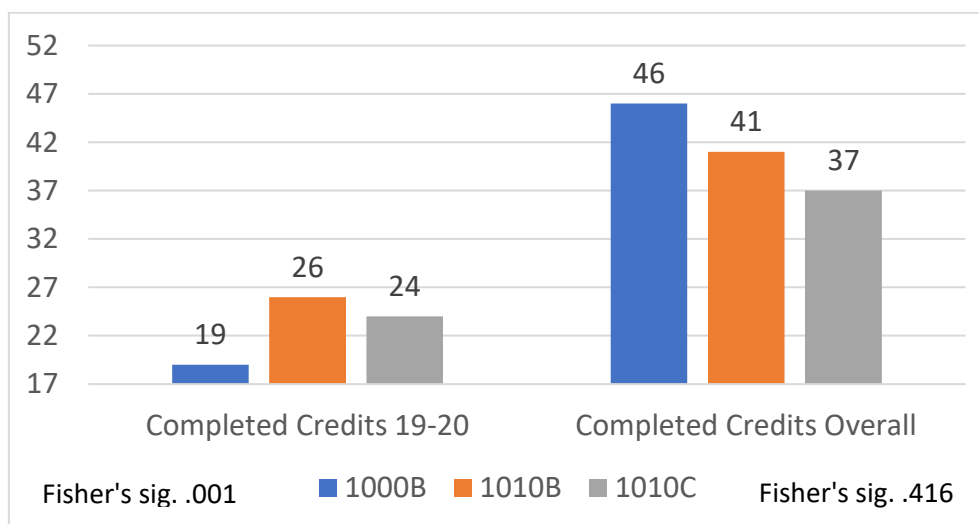
FIGURE 5. OVERALL GPA 19-20 BY COURSE



Source: own editing

A similar disadvantage is found in Figure 6. Here we see that in 2019-2010, 1000 B students completed only 19 credits. Those in 1010 B earned 26 credits and enrollees in 1010 C completed 24. These differences were statistically significant. When overall completed credits were examined, the reverse was true. The greatest number was achieved by those in 1000 B – 46. By comparison, the completions for 1010 B and C were 41 and 37 respectively; however, these differences were not statistically significant.

FIGURE 6. COMPLETED CREDITS BY COURSE



Source: own editing

The latter findings do not contradict the former. The greater number of completed credits for 1000 B could easily be the result of having been enrolled longer than students in the other course sections. The ages of students in each of the course sections were consistent with this possibility. From Figure 7 we see that the average age of those in 1000 B was 28. For 1010 B and C it was a much lower 20 and 19 respectively. These differences are statistically significant. Collectively, the figures suggest that students in 1000 B had lower levels of achievement, completed fewer credits in 2019-2020, and were significantly older than students in the other course sections. From one point of view this is a positive finding. Sociology 1000 was designed to meet the needs of students with low levels of generic skills.

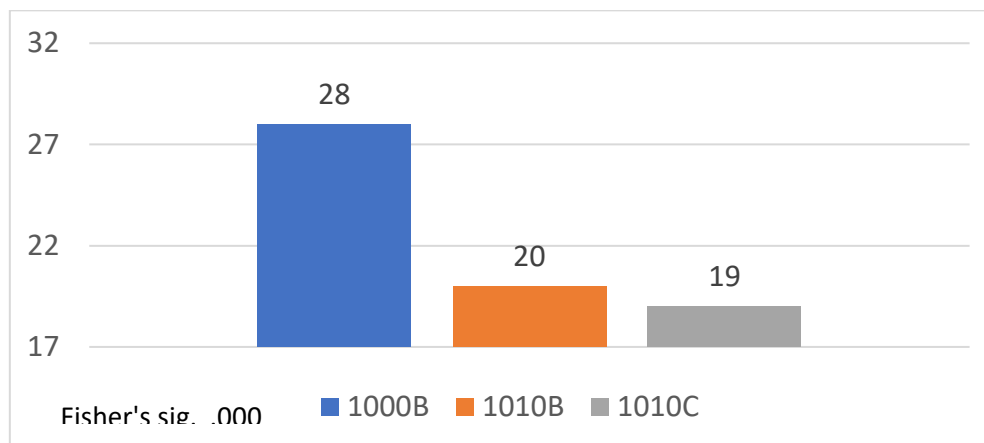
6. Pre- and Post-Tests

Despite the foregoing disadvantages of students in 1000 B, as shown in Figure 8, there were no statistically significant differences in the pre-test scores of students in all three course sections. The average score of students in 1000 B was 65%. For 1010 B and C it was 64% and 65% respectively. Whether or not these scores are consistent with the primary and secondary school generic skills goals of the Ministry of Education as articulated earlier is up for debate.

The relationships among pre- and post-tests scores and other variables are found in Table 1. As expected, there was a low but statistically significant correlation of .26 between high school grades and GPA for 2019-2020. Notwithstanding this association, the correlations between high school grades and the pre-tests (.18) and post-tests (.03) were small and not statistically

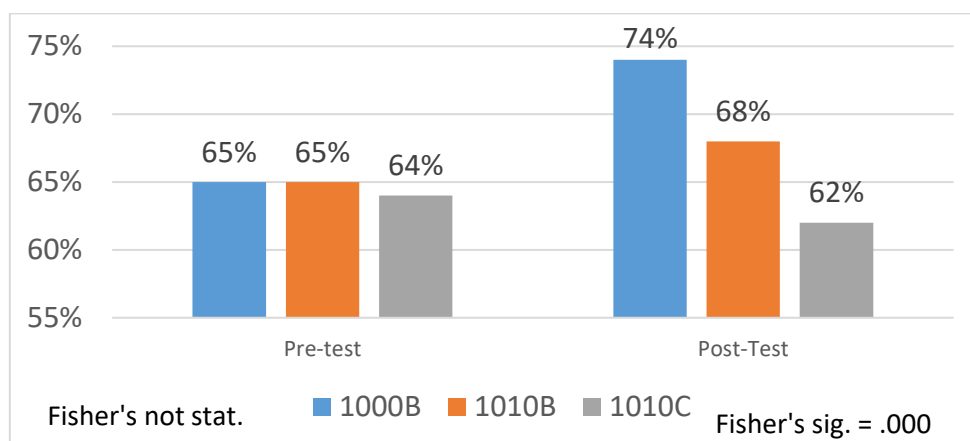
significant. Consistent with the four-university study referenced earlier, *this finding indicates that elevated grades in high school are not to be confused with the acquisition of generic skills.*

FIGURE 7. AGE BY COURSE



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FIGURE 8. PRE- AND POST-TESTS BY COURSE SECTION



Source: own editing

TABLE 1. CORRELATION MATRIX

	High School Grade	GPA 19-20	Pre-test	Post-test
High School Grade	1.00			
GPA 19-20	.26*	1.00		
Pre-test	0.18	.30**	1.00	
Post-test	0.03	.33**	.35**	1.00
* Correlation is significant at the 0.05 level (2-tailed)				
** Correlation is significant at the 0.01 level (2-tailed)				

Source: own editing

To return to Figure 8, despite there being no difference in the pre-test scores among the course sections, the opposite is true for the post-test. On this test, the scores of those in 1000 B (74%) were higher than those for 1010 B (68%) and 1010 C (62%) respectively. Overall, these differences were statistically significant. In addition, a paired samples test indicated that while differences between the pre- and post-test for 1000 B were statistically significant (t sig. .01), differences for the other two course sections were not. This finding is to be expected. While sections of 1010 may attempt to develop students' generic skills, their main mandate is to introduce students to sociology.

To identify the relationship between students' attributes and the results of the pre-and post-tests (not shown in graph or table form) test scores were regressed on high school grades, cumulative GPA, and the number of overall completed credits. For the pre-test, there was no statistically significant relationship among high school grades, cumulative GPA, and number of completed credits. The most important finding of this analysis was that more senior students (as measured by completed credits) did no better on the pre-test than new entrants to the university. Quite simply, their generic skills likely did not improve because of their time on campus.

The results of post-tests were regressed on high school grades, cumulative GPA, and number of completed credits. For this analysis, pre-test results were also included. In this procedure, only pre-test scores made a statistically significant contribution to the equation ($\beta = .28$; $t = .01$). *These findings indicate that the post-test skill levels of students with decent high secondary school grades were no better than those with low grades.*

7. Academic Achievement

All else being equal, to what extent is academic success a function of generic skills? In answering this question, only data for 1010 B and C were used. The reason for this focus is that, in 1000 B, the questions in the pre- and post-test test were part of the final course test. As a result, an analysis of the impact of test scores on final course grade in 1000 B would include a degree of redundancy. Unfortunately, because of the relatively few students in 1000 B, and the low ratio of participants to independent variables, it was not possible to conduct the same regression as for 1010 B and C for 1000 B alone.

The results of the analysis for only 1010 B and C are shown in Figure 9. From the figure, two conclusions are evident. First, in Sociology 1010 B and C, neither high school grades nor pre-test scores had a statistically significant effect on course grades. By contrast, the effect of post-test scores ($\beta = .31$) was statistically significant. Moreover, the effect was greater than the effects of high school grades and pre-test scores combined (.24). The overall statistical significance of the model was .01.

The implications of the foregoing can be illustrated by the following hypothetical example. Student A had a high school grade of 75%. Her scores on the pre- and post-tests were 50% and 55% respectively. From the regression, her predicted course grade was 72%.

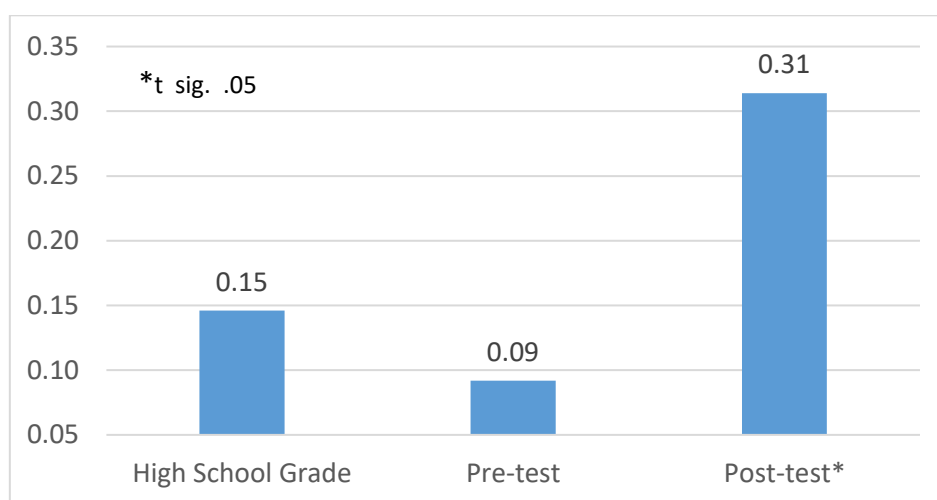
Student B also had a high school grade of 75%. In addition, she achieved 50% on the pre-test. At the end of the course, however, her post-test increased to 85%. As a result, her predicted course grade was 81%. In other words, the increase in skills resulted in a 9% gain when compared to student A.

Despite the foregoing, a word of caution is appropriate. The standard error of the estimate was 6.9%. Therefore, results should be treated carefully. (As will be seen later, dividing post-test scores into quartiles results in a clearer picture of the relationship between generic skills and academic achievement).

Judging from Figure 10, a similar effect for 1010 B and C was evident for overall grades for 2019-2020. Once again, neither high school grades nor pre-test scores had a statistically significant effect. By contrast, the effect of the post-test (beta = .24) was almost equal to the combined effect of the other two variables (.26). In addition, it was statistically significant. The overall significance for the model was .02.

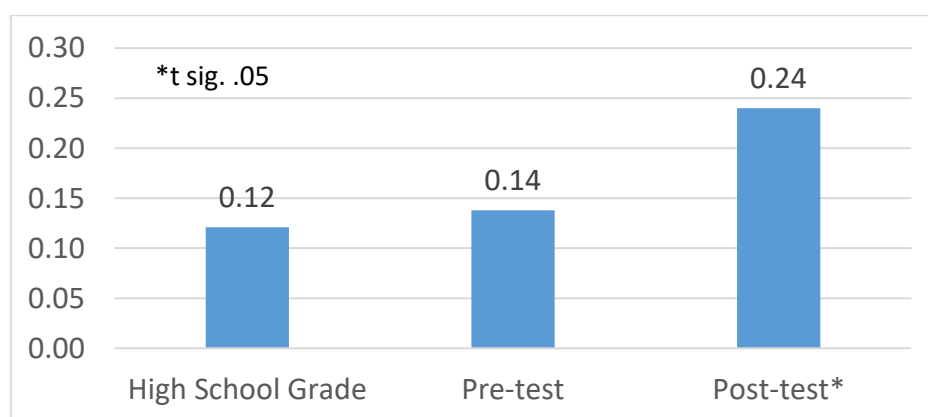
The implication of the foregoing is simple. Despite prior academic qualifications, students' generic skills, as measured in the post-test, are better predictors of course grades in 1010 B and C than either high school grades or the results of pre-tests.

FIGURE 9. BETAS FOR REGRESSION OF COUSE GRADE FOR 1010 A AND B



Source: own editing

FIGURE 10. BETAS FOR REGRESSION OF OVERALL GPA FOR 1010 B AND C 2019-2020



Source: own editing

The same is true for students' overall grades in 1010 B and C for the 2019-2020 period. Subject to qualifications to be raised later, the foregoing analysis suggests that if a way is found to deal with students' skill deficits, those with low entering averages might not be at an academic disadvantage over the long run.

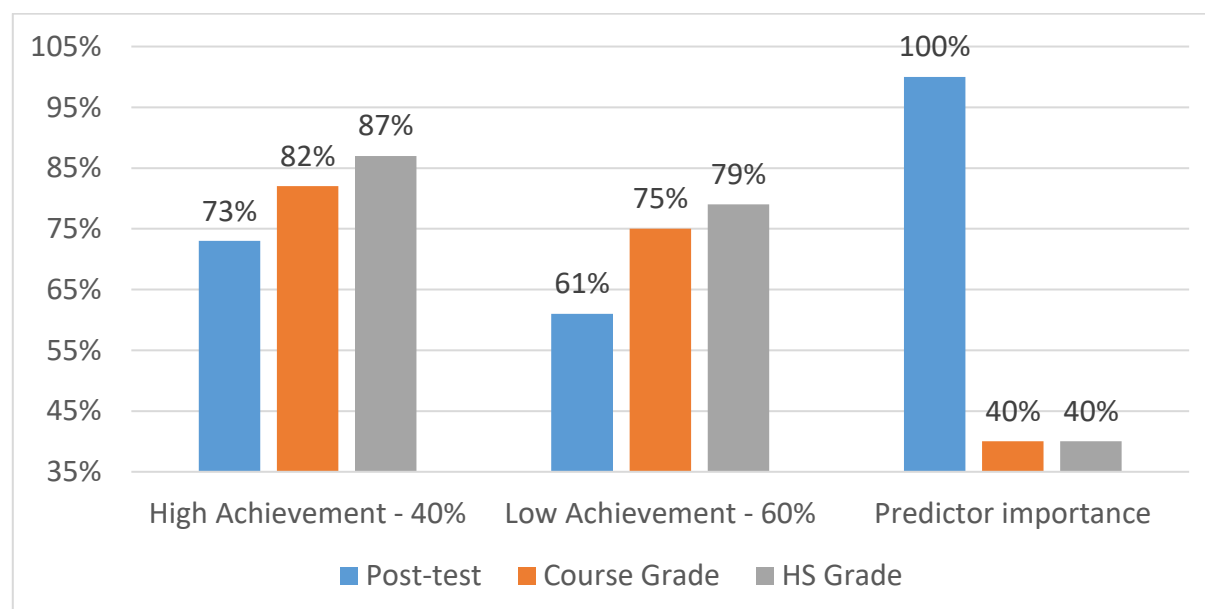
8. Achievement Groups

To present an easily understood picture of the foregoing, a two-step cluster analysis was employed. Because of the previously noted overlap between post-test scores and final grades in 1000 B, the results for 1010 and 1000 were analysed separately. High school grades, course grades, and post-test scores were included in the procedure. The results are presented in Figures 11 and 12. To facilitate graphing, predictor importance was expressed in percent (instead of 1, .4, etc.).

As seen in Figure 11, in 1010 B and C, two clear groups emerged from the analysis. Forty percent (40%) of students fell in what has arbitrarily been termed a high achievement group. The remaining 60% comprised low achievers.

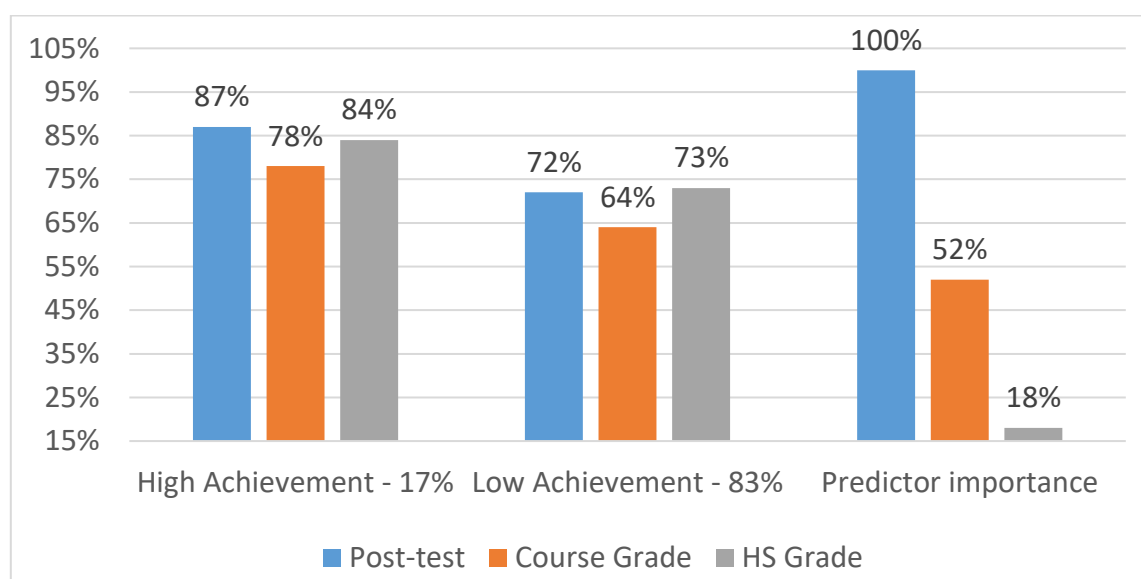
The former group compared to the latter is characterized by high post-test scores (73% vs 61%); high course grades (82% and 75%); and high secondary school grades (87% vs 79%). Predictor importance is a measure of the importance of each variable to group classification. Consistent with the previously discussed regression results, post-test scores are of overwhelming importance to group placement. The average silhouette measure of cohesion and separation was .4 (fair). A discriminant analysis revealed the differences between the groups to be statistically significant.

FIGURE 11. CHARACTERISTICS OF ACHIEVEMENT GROUPS 1010 B AND C



Source: own editing

FIGURE 12. CHARACTERISTICS OF ACHIEVEMENT GROUPS 1000 B



Source: own editing

Recall that the number of independent variables in regression analyses precluded the inclusion of students in 1000 B in certain procedures. This was less of a limitation in cluster analyses. Still, because of low numbers, results should be treated with caution.

This qualification notwithstanding, the figures in Figure 12 are comparable to those in Figure 11. Compared to low achievers, high achievers had high scores for: the post-test (87% compared to 72%); course grades (78% vs 64%); and high school grades (84% and 73% respectively). By far, post-test scores are the most important predictor of group placement. The average silhouette measure of cohesion and separation was .7 (good). The results of a discriminant analysis indicated that differences between the two groups were statistically significant.

The implication of these two cluster analyses is clear. In both 1000 B and 1010 C and B students could be divided into two groups. In each, group placement is consistent across measures of high school grades, course grades, and particularly post-test scores: there are no contradictory defining measures. Moreover, particularly in 1000 B, high achievers are a minority.

9. Practical Considerations

While the foregoing contributes to an understanding of the general relationships among high school grades, generic skills, and academic achievement, more information is needed if the data are to be used to inform potential curricular changes. More specifically, what level of skill development makes a difference in terms of academic achievement?

An answer to that question was provided in the following way. First, scores on the post-test were divided into quartiles. Second, dummy variables were created for each quartile. Using the lowest quartile as a reference category, course grade was then regressed on high school grades, and quartiles two, three, and four. The results are shown in Figure 13.

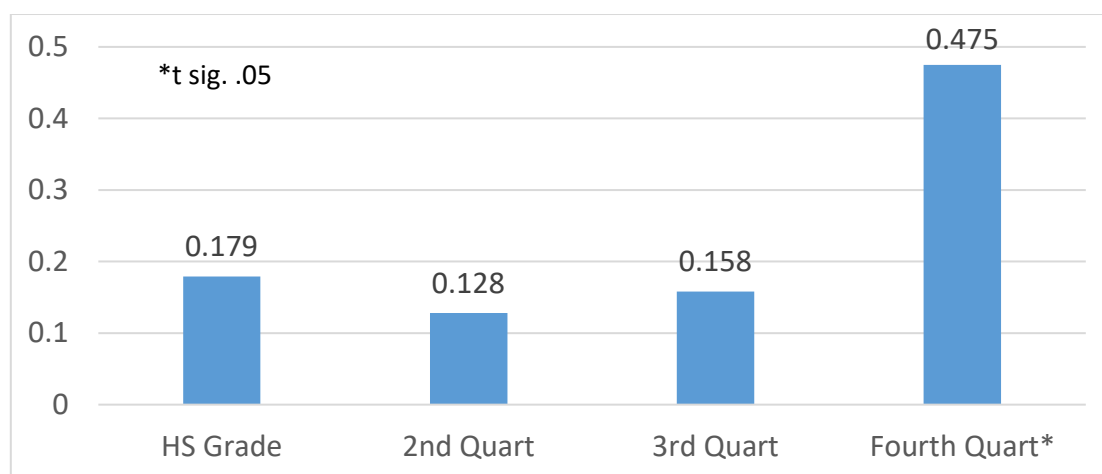
The figure shows that, consistent with previous analyses, the beta for high school grades was a low .18. When compared to students in the lowest quartile, the increase in grades for those in

quartiles two and three was minimal. Betas were .13 and .16 respectively. Moreover, high school grades and being in the second and third quartiles did not contribute to academic achievement in a statistically significant way. By contrast, post-test scores in the fourth quartile compared to the first, with a statistically significant beta of .48, had a considerable impact on course grades. Put plainly, the foregoing indicates post-test scores under 75% are of little consequence for academic achievement. The overall model is statistically significant (.01).

What does the foregoing mean in terms of concrete grades? To answer this query, an analysis of covariance was carried out with course grade as the dependent variable. High school grades were specified as a covariate. The estimated grades for those in quartiles one, two, three, and four were 75%, 77%, 77%, and 83% respectively. Differences between the grades of quartile four and each of the others were statistically significant. The significance level for the overall model was .01.

Consistent with prior analyses these results indicate little difference in the course grades of students in the first three quartiles. By contrast, there is a statistically significant increase in course grades for those in quartile four compared to all others (the figures also show that students with weak generic skills are still able to obtain B+ averages for the course).

FIGURE 13. BETAS OF POST-TEST QUARTILE CONTRIBUTION TO ACADEMIC ACHIEVEMENT



Source: own editing

Why are skills scores in the first three quartiles of little relevance to measures of academic achievement? One possible explanation involves the realization that in many large courses the evaluation of students is based on tests. The utilization of, for example, analytical and writing skills may be required for a relatively low portion of the overall grade. As a result, as long as students have test writing skills, they can expect to do well.

A second possibility is that given the low level of students' skills, were instructors to insist on 'high' standards, they would be penalized by students in course evaluations. This possibility would be of particular concern to precarious instructors. They might feel that the awarding of low grades, via resulting unfavourable teaching evaluations, could have implications for future university employment. Also, in most universities, instructors are required to explain why their

grades might deviate from accepted norms. In any given situation, each of these possibilities may be at work (Côté & Allahar, 2007, 2011; Authour et al., 2019)

10. Consistencies Across Studies

As noted earlier, the current study was built on a prior survey of Introductory Sociology students and a separate survey of students in faculties comparable to York's Liberal Arts and Professional Studies at the University of Toronto, the University of Waterloo, and Western University. Although these studies were based on students' self-assessments of their skills, the results were consistent with the current study, based on objective measures.

Before summarizing these similarities, in the current analysis, in order to identify 'natural breaks' for the pre-test, a univariate two step cluster analysis was conducted (Fournier et al., 2007; Sriwanna et al., 2016). The procedure resulted in the identification of two groups. The largest group, comprising 72% of the sample, had an average pre-test score of 74%. The remaining 28% were defined by a score of 51%. These figures indicate that 28% of students studied have low levels of generic skills. The average silhouette measure of cohesion and separation was .7 (good). The results of a discriminant analysis indicated that differences between the two groups were statistically significant.

A summary of the findings of the current objective study and prior surveys resulted in four points of similarity and difference.

- a) The survey of sociology students referenced earlier found that while 62% of students could be considered 'functional' in terms of generic skills, 38% were at risk. In the four-university study only 44% were functional. The current study indicates that based on 'objective' measures a higher 72% might be viewed as functional. There are two possible explanations for the higher numbers defined as functional based on objective measures.

First, the foregoing classifications (functional, at-risk), for all studies, were based on the results of cluster analyses. As such, the emerging groups are a function of natural breaks in the particular data set rather than on the basis of an external criterion. As a result, variation is to be expected. This said, independent of methodology, *each study identified many students with low levels of generic skills.*

Second, the completion of the diagnostic test required more intellectual commitment on the part of responders than the survey. As a result, it is possible that the skills of those who chose to complete tests in 1010 B and C were higher than those of non-responders. Even were this the case, in view of effect sizes, the likely consequence of any resulting bias would have been minimal.

- b) In the sociology and four-university surveys, and in the current undertaking, there was little association between high school grades and generic skill levels.
- c) In the survey of sociology students, the four-university study, and in the current endeavour, skill levels did not vary with level of study. In other words, time on campus did not translate into generic skill improvement.
- d) In the two surveys, and in the current study based on objective information, generic skill levels were the best predictors of academic achievement. High school grades, that are the primary basis for university admission, were of minor consequence.

11. Conclusion

In Ontario, as in some other jurisdictions, students' teachers are responsible for assessing the degree to which students meet educational objectives at the primary and secondary levels. There are no external criteria with which their evaluations are compared. As a result, the skills and abilities reflected in grades awarded in high schools can vary from one institution to the next. It is for this reason that although many high school graduates in Ontario achieve good grades, their generic skills are often insufficient to the challenges of university and employment.

In the Introduction I showed that in Canada in general, and in Ontario in particular, students' and graduates' lack of generic skills has not gone unnoticed. Concern has been expressed by educators, employers, and journalists. While each might have unique interests, overall, there is an assumption that low skill levels are inconsistent with academic achievement and job success. Unfortunately, in Canada, until now, studies attempting to link objectively measured skill levels to high school and university grades have not been conducted.

In this study, I was able to link objective measures of generic skills to academic achievement. Overall, I found that:

- a) There was a weak association between high school grades, the central criterion used in university admission, and generic skills.
- b) In university, generic skills were better predictors of academic achievement than high school grades.
- c) Generic skills did not increase with the number of courses completed by students.

I also found that students' generic skill deficiencies can be remedied through their taking an online course on skills development. Via this course students were able to bring their skill scores (as measured in the post-test) up to 74%. As a result, they were only 1% lower than the threshold of 75%. Scores of at least this magnitude were of considerable consequence for academic achievement.

Overall, in some jurisdictions, like Ontario, entrance to university is based primarily on the evaluations of students' teachers. As a result, assumptions about the validity of high school grades, and the degree to which they signify readiness for the challenges of university and the future job market, must be made cautiously. Should additional studies confirm current findings, where appropriate, universities might consider making courses designed to remedy skill deficiencies readily available.

12. Discussion

All else being equal, the results of this analysis indicate that, in 1010 B and C, generic skills, as measured in the post-test, particularly were they in the fourth quartile, contributed to high course grades and to overall academic achievement. Moreover, as shown for 1000 B, it is possible to increase students' skills almost to the level of the fourth quartile.

The results of this study point to the possibility, via a dedicated course on skills development, of increasing students' generic skills to an acceptable level. This finding does not rule out the possibility of there being other ways to achieve the same objective.

There is, however, a note of caution. Were generic skills developed in whatever way not demanded in other courses, they would atrophy.

In addition to information presented in this article, my experience as the instructor for 1000 B is relevant to an understanding of the difficulty of increasing students' generic skill levels. In the course it was clear that while students developed *knowledge* of certain skills, *application* was a different matter. For example, the course included a module devoted to developing and researching a thesis for an essay. While students encountered no difficulty in answering several test questions dealing with theses, some subsequently showed an inability to develop their own thesis for a required essay. When confronted with this challenge, rather than following the example of a module on thesis development, they regressed to approaches that had likely served them well in high school or in other courses. The same problem emerged in the course offered in 2020-2021.

More specifically, in the thesis module students were advised that a thesis should be of the following format: "In this essay I will argue that Justin Trudeau won the Canadian election because the Conservatives failed to present a coherent policy on climate change." Instead, the better students wrote variations of: "In this essay I will examine the factors contributing to the election of Justin Trudeau." While the difference may seem small, analytically, it is huge. Not only did most students miss the point the first time, in many cases it took three more attempts before they got it right.

This point is mentioned because if we are to be successful in developing students' generic skills, we must do more than provide them with new knowledge. We must also ensure that this knowledge is embodied in practice, and that students do not revert to past practices. Faculty with tenure are in the best position to meet this challenge. More than others, they are relatively immune to student push-back.

Overall, we must devise ways of ensuring that students develop the capacity to apply generic skills to their academic endeavours. This objective cannot be accomplished only through a course, or courses, that focus on, or include, knowledge of relevant skills. Offerings such as these must be accompanied by efforts, across all courses, to ensure that students are rewarded for their utilization of generic skills.

13. Limitations

The first limitation of the current research is that despite in most cases statistically significant results, the number of students on which the research is based is relatively small. This is particularly true of Sociology 1000 B.

A second limitation is that it was not possible to determine if courses on skill development offered in traditional in-class fashion would be as efficacious as the online option. Quite simply, the required traditional courses were unavailable. Were an assessment of the relative efficacy of web delivery to be undertaken, it would be important to note that the relevant comparison is not between online and traditional courses. Rather, it is the degree to which either can embody effective teaching and learning and practices. There are both good and bad traditional and online courses.

Third, we should not readily assume that findings deriving from a sociology program are automatically applicable to other disciplines. That being said, considerable numbers of students in Introductory Sociology and in Skills for Success in Sociology were from disciplines other than sociology.

Fourth, and consistent with the foregoing, we also should not too readily accept the notion that findings from one institution can be generalized to others. For example, university student bodies vary by characteristics like class, race, first language, and sex/gender. In addition, institutions have varying entrance requirements, cultures, and release their students into different labour markets. For reasons such as these it would be misleading to automatically assume that successful measures initiated in one institution will likely work elsewhere. Before introducing courses/programs to deal with skill deficiencies, universities should seriously consider the peculiar characteristics of their students.

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