

A Comparison of Factors Related to University Students' Learning: College-Transfer and Direct-Entry from High School Students

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Abstract

Articulation agreements between colleges and universities, whereby students with two-year college diplomas can receive advancement toward a four-year university degree, are provincially mandated in some Canadian provinces and highly encouraged in others. In this study, we compared learning in college-transfer and direct-entry from high school (DEHS) students at the University of Guelph–Humber in Ontario, using eight factors related to learning: age, gender, years of prior postsecondary experience, learning approach, academic performance, use of available learning resources, subjective course experience, and career goals. Our results show that while college-transfer students tend to be older than DEHS students, they do not significantly differ in either learning approach or academic performance. This is an important finding, suggesting that college-transfer programs are a viable option for non-traditional university students. We conclude that the academic success of college-transfer students is attainable with careful consideration of policies, such as admissions criteria, and the drafting of formal articulation agreements between institutions.

Résumé

Les ententes d'articulation entre les collèges et les universités (qui permettent aux étudiants de programmes d'études collégiales de deux ans d'être admis dans un programme universitaire de quatre ans) sont prescrites dans certaines provinces canadiennes et fortement encouragées dans d'autres. Chez des étudiants de l'Université de Guelph-Humber en Ontario, la présente étude a comparé huit facteurs liés à l'apprentissage, entre les études universitaires après un séjour au collège et les études universitaires directement après les études secondaires (DEHS), soit l'âge, le sexe, les années d'expérience postsecondaire, la méthode d'apprentissage, le rendement scolaire, l'utilisation de ressources d'apprentissage disponibles, l'expérience subjective en matière de cours et les objectifs de carrière. Nos résultats démontrent que, tandis que les étudiants qui passent par le collège ont tendance à être plus âgés que les étudiants DEHS, leurs méthodes d'apprentissage et leurs résultats scolaires restent sensiblement les mêmes. Cette constatation est importante et suggère que les programmes avec transfert collégial sont une solution acceptable pour les étudiants non traditionnels. Nous concluons que la réussite scolaire des étudiants qui transitent au collégial est réalisable si on étudie attentivement les politiques, comme les critères d'admission et la rédaction d'ententes d'articulation formelles entre les institutions.

Introduction

In higher education, transfer programs are created by two postsecondary institutions formally agreeing to allow students to use previous academic experience from one institution to achieve advanced standing in a related program at the second institution (Boggs & Trick, 2009). This type of partnership is common between colleges and universities: students with two-year college diplomas can receive advancement toward a four-year university degree or vice versa. When focusing on student mobility from colleges to universities, articulation agreements typically take one of three forms: bilateral agreements, whereby two institutions with related programs allow credits from a college program to be transferred toward a university degree program; multilateral agreements, whereby several universities with related programs accept transfer credits from a single college program; and concurrent programs, whereby students work toward the requirements of a college diploma from one institution and a university degree from another at the same time and in one geographic area (Boggs & Trick, 2009). Students—especially those in college programs—often expect to be able to move between colleges and universities to “combine the strengths of both sectors and support the pursuit of continuous lifelong learning” (Decock, McCloy, Liu, & Hu, 2011, p. 6).

Transfer Programs in Canada

In the United States, community colleges were originally established to encourage the movement of students, particularly from racialized or less affluent backgrounds, into four-year degree-granting institutions (Boswell & Wilson, 2004). In Canada, particularly in British Columbia (BC) and Alberta, colleges were developed for similar reasons. Ac-

According to Dennison (1995), colleges allow students facing a variety of barriers—for example, financial, academic, or geographic—to access postsecondary education (PSE). For example, “for students from the lowest income categories in Canada, the participation rate is about 50% greater in colleges than in universities, indicating that colleges play an important role in equitable access to PSE” (Drolet, 2005, p. 30). In BC and Alberta, articulation agreements between colleges and universities are provincially mandated (Decock et al., 2011). Québec has a unique postsecondary system in which high school graduates can pursue either a two-year pre-university program or a three-year technical program within a Collège D’enseignement Général et Professionnel (CÉGEP; Colleges Ontario, 2009). Thus, this system allows both traditional general arts and science college graduates and applied or technical college graduates to transfer into university programs. Approximately 25% of CÉGEP graduates in the technical stream go on to university, compared to 78% in the pre-university stream (Colleges Ontario, 2009).

Several organizations exist to help create articulation agreements between colleges and universities and to conduct research on transfer programs. For example, the British Columbia Council on Admissions and Transfer (BCCAT) and the Alberta Council on Admissions and Transfer (ACAT) help facilitate the creation of transfer agreements between colleges and universities and conduct periodic studies on transfer student mobility and experiences in their respective provinces (ACAT, 2009; BCCAT, 2009). In 2006, an ACAT survey showed that two years after graduation, approximately 20.5% of graduates from two technical institutes¹ in Alberta were pursuing some sort of further education (Colleges Ontario, 2009). Of this 20.5%, 36.1% were enrolled in undergraduate-level degree programs and 4.5% in graduate-level degree programs. In BC, the overall college–university transfer rate was reported to be 19% in 2007 (Colleges Ontario, 2009).

Transfer Programs in Ontario

Ontario established colleges in 1965 as a solution to the postsecondary system’s inability to sustain the increasing number of high school graduates. Renaud (2000) notes that Ontario colleges are a separate postsecondary pathway from universities, have a different set of high school prerequisites, and lead to a distinct set of career pathways. Because the job market has shifted toward preferring candidates with university degrees, students appear more reluctant to enter college diploma programs that do not enable them to transfer into a university-level program upon graduation (Renaud, 2000). However, college-transfer programs in Ontario have been slower to develop than in provinces such as BC and Alberta and are not provincially mandated, although they are highly encouraged by educational planners (Decock et al., 2011). According to the Council of Ontario Universities (Constantineau, 2009, p. 4):

While university courses are fairly standardized across the country, making them relatively easy to assess with regard to level and depth across the disciplines, the same cannot be said about community college courses. These will vary greatly from one province to the next, and often from one community college to the next, as each college attempts to respond to the educational needs of its students within a given community, instead of responding to a more abstract disciplinary norm.

Despite this challenge in creating a system where appropriate courses can be recognized as transfer credits, the recognition of the important opportunities that college-transfer programs could create has sparked a proliferation of articulation agreements between numerous postsecondary institutions. Boggs and Trick (2009) noted that college–university articulation agreements will have a particular importance in the future, given projections that Ontario’s higher education system may grow by 100,000 students or more by 2021, principally in southern Ontario. To provide a relevant example of the efforts that Ontario postsecondary institutions are making to increase student mobility between institutions, the University of Guelph recently indicated in its Strategic Mandate Agreement with the Ministry of Training, Colleges and Universities (2014) that “institutional collaboration to support student mobility” (p. 14) will be a major institutional priority from 2014 to 2017. To this end, Guelph and six other universities have established a University Credit Transfer Consortium, which “has set clear standards for inter-institution equivalency of foundational courses, and will integrate expanded credit-transfer processes and agreements in upper-year courses and professional programs” (p. 14).

Data on college students undertaking transfer programs in Ontario are lacking compared to data available for other provinces (Decock et al., 2011). Colleges Ontario (2009) reported that transfer rates in Ontario were perhaps lower than in other jurisdictions in Canada, since in 2009, less than 10% of college graduates went on to pursue a university education. However, the report concluded that student demand for transfer programs was high: “Almost one-quarter of college applicants have identified preparation for university as a major reason for enrolling in college[, and] the number of college students/graduates seeking access to Ontario university programs has more than doubled in the last eight years” (Colleges Ontario, 2009, p. 14). In 2011, Decock et al. (2011) published *The Transfer Experience of Ontario College Graduates Who Further Their Education* for the Higher Education Quality Council of Ontario (HEQCO), which provided data on Ontario transfer programs from 2001 to 2007. The report showed an overall increase in the percentage of college graduates continuing their education, especially at the university level. Most of these students cited career advancement as a major reason for continuing on in PSE. In 2006 to 2007, 17% of college graduates went on to another college program after graduation, eight percent went to university, and two percent pursued some other type of education.

Demographic Profiles of College-Transfer Students

According to Decock et al. (2011), “[Ontario] college graduates who transfer to a university are more likely to be female, under age 22, [and graduating] with a ‘Basic Diploma’ or an ‘Advanced Diploma’ from a large college in Metropolitan Toronto or [a] central region of Ontario” (p. 11). They tend to attend university in a similar geographic area to where they attended college and are most likely to have completed a general arts and sciences program in college (Decock et al., 2011). Despite being on the younger end of the age distribution within the broader college-student population, college-transfer students in both Ontario and other jurisdictions tend to be five to seven years older than their direct-entry from high school (DEHS) counterparts, whose average age upon entry is under 19 (CUCC, 2007; Decock et al., 2011; Heslop, 2002; Wiggers & Arnold, 2011). While women are more likely to be college-transfer students than men both in Ontario and elsewhere, this pattern is also true among DEHS students as more women than men pursue university degrees in Canada (Decock et al., 2011; Heslop, 2002; Wiggers & Arnold, 2011).

Approaches to Learning

College-transfer students may have a different approach to learning than DEHS students. In 1976, research by Marton and Säljö determined that there are two main approaches to learning: surface and deep. The approach to learning describes how students arrive at different understandings of a course, with the deep approach being associated with internalizing content, making learning meaningful, and growing personally (high-level engagement), and the surface approach being associated with rote memorization and fact reproduction (low-level engagement) (Marton & Säljö, 1976). The use of the deep approach is considered evidence of meaningful learning, and an academic environment that encourages deep learning is argued to improve the quality of learning outcomes, which are an important part of students' academic performance (Trigwell & Prosser, 1991).

Conditions that have been shown to facilitate a deep versus surface learning approach include: (i) students finding a topic interesting (Biggs, 1987); students perceiving a topic to be relevant and relatable to their lives (Biggs, 1987); and students using problem-based learning (PBL) (e.g., McParland, Noble, & Livingston, 2004; Newble & Clarke, 1986; Tiwari et al., 2006; Ward, 2011), although not all studies using PBL have found the same result (e.g., Groves, 2005; Papinczak, Young, Groves, & Haynes, 2008). Courses with applied content may help promote a deep approach to learning because they often emphasize problem-focused learning and encourage students to make connections between concepts and their real-life applications (Ryan, Baird, Mulholland, & Irwin, 2009). There also exists a correlation between a deep learning approach and age: older students are more likely to adopt a deep learning approach than younger ones (Baeten, Kyndt, Struyven, & Dochy, 2010; Groves, 2005). Thus, as we expect students in college-transfer programs to be older and more accustomed to hands-on, applied learning, which is a key characteristic of a college education, it is not unreasonable to hypothesize that they might adopt a deeper approach to learning than DEHS students.

Academic Performance and Use of Learning Resources

Given that some studies have reported that the GPA of college-transfer students declines significantly compared to their DEHS counterparts upon transfer to a university-level degree program (e.g., Andres, 2001; Bach et al., 2000; Cameron, 2005; Diaz, 1992; Glass & Harrington, 2002), the academic performance of college-transfer students in university has been of considerable interest to educational researchers. Studies conducted on this topic in the past two decades have given inconsistent results. For example, in a meta-analysis of 62 studies, Diaz (1992) reported that college-transfer students in 79% of the studies experienced "transfer shock" but recovered either partially or completely from the decline in grades 67% of the time, usually within the first year of transfer. In other instances, studies have reported that college-transfer students perform at the same level as, or even higher than, their DEHS counterparts (e.g., Bell, 1998; Best & Gehring, 1993; Coffey et al., 2012; CUCC, 2007; Martinello & Stewart, 2013; Weiss, 2011). The academic performance of college-transfer students may depend on their program of study, as college-transfer students in business, science, engineering, and mathematics typically experience greater drops in their GPA than those in other programs of study (Carlan & Byxbe, 2000; Cejda, 1997).

It has been suggested that college-transfer students' grades in university-level programs improve considerably and often become indistinguishable from those of DEHS students when the former have completed at least two years of a college program prior to entering university, are older, and/or have attained a "B"-level GPA or higher in their college program (e.g., Best & Gehring, 1993; Cejda, Rewey, & Kaylor, 1998; CUCC, 2007; Graham & Hughes, 1994; Townsend, McNerny, & Arnold, 1993). Studies reporting "transfer shock" in college-transfer students often attribute its occurrence to differences in curriculum and policy between college- and university-level programs, as well as non-academic factors such as work or family commitments, which may be more prevalent for college-transfer students because they are older (Andres, 2001; Coffey et al., 2012; Martinello & Stewart, 2013; Whitfield, 2005). One study suggested that college-transfer students might also be less likely to access learning resources, particularly in the earlier years of their transfer, which could negatively impact their academic performance (Anglin, Davis, & Mooradian, 1995). However, few studies have explored potential differences in factors related to learning—for example in approaches to learning, which may influence the performance of college-transfer students in university-level degree programs.

Study Background and Objectives

The kinesiology program at the University of Guelph–Humber is an applied course of study that teaches students about the science of human movement. In this program, students have the opportunity to participate in hands-on learning in fitness courses, labs, and internships. As a result of these unique course offerings, students graduate with the background to pursue numerous other credentials, and, as with more traditional kinesiology programs, are positioned for further studies in professional schools, graduate programs, or faculties of education. Not surprisingly, the Guelph–Humber kinesiology program is extremely popular, with over 700 students applying for approximately 110 spots in 2011. The applied, hands-on courses in the kinesiology program are combined with traditional course offerings, such as cell biology, physiology, and biochemistry, which are taught using primarily didactic teaching methods.

The University of Guelph–Humber kinesiology program is a concurrent program in which students graduate with both a Bachelor of Applied Science (BASc) from the University of Guelph and a Diploma in Fitness and Health Promotion from Humber Institute of Technology and Advanced Learning. A unique aspect of the University of Guelph–Humber kinesiology program is the enrollment of two streams of students, college-transfer and DEHS. College-transfer students are enrolled in the program after completion of a college diploma (usually in fitness and health promotion). The University of Guelph–Humber has agreements with several colleges, whereby credits taken in fitness and health diploma programs can be transferred and applied towards a BASc degree, which can be completed in an additional two years plus a bridging semester of study. While students may enter the college-transfer program after completing diplomas at several colleges, the majority of students entering the program have completed a Diploma of Fitness and Health Promotion from Humber Institute of Technology and Advanced Learning. Students in the college-transfer stream may be older and have a different educational background than the DEHS students, who enter the program immediately following the completion of a high school diploma.² Another difference between the two streams is class size in lower-level

courses: college-transfer classes are approximately two-thirds the size of traditional university classes in the early course offerings (35–45 students, as compared to 60–70 students), although the streams merge to complete the upper-year courses as a larger group.

Given the vast literature suggesting that there may be relevant differences between college-transfer and DEHS students, the objective of our study was to assess eight factors related to learning differences between college-transfer and DEHS students: age, gender, years of prior postsecondary experience, learning approach, academic performance, use of available learning resources, subjective course experience, and career goals. We presumed that examining whether these variables differ between these two groups of students would allow us to (i) better understand how to more effectively accommodate college-transfer students as they seek access to university in increasingly greater numbers, as well as (ii) contribute to the growing body of evidence that will be used for determining the feasibility of future programs of this nature.

Methods

Sample

Students enrolled in three separate course offerings of KIN*2070 (Biochemistry and Metabolism II) at the University of Guelph–Humber were invited to participate in the study. Students from the winter 2012 and winter 2013 course offerings were college-transfer students, while students from the fall 2012 course offering were DEHS students. A total of 70 college-transfer students and 45 DEHS students gave informed consent to participate in our study and were administered two surveys: one at the beginning of the semester (September or January) and one at the end (December or April). The surveys collected information on demographics, learning approach (as measured by the Revised Two-Factor Study Process Questionnaire), use of available learning resources, and subjective course experience (as measured by the Course Experience Questionnaire). Students were awarded a one percent bonus toward their mark on the final exam for successfully completing and submitting each survey. Our study was approved by the Research Ethics Board at the University of Guelph.

Data Collection

Demographic profile. To determine whether there were any major demographic differences between college-transfer and DEHS students, we extracted students' age, gender, and years of prior postsecondary experience from the survey administered at the end of the course.

Learning approach. We measured potential differences in college-transfer versus DEHS students' approaches to learning using the Revised Two-Factor Study Process Questionnaire (R-SPQ-2F). This questionnaire was developed as a tool for evaluating student learning approaches using fewer items (20) than Biggs' (1987) original Study Process Questionnaire (SPQ) (Biggs, Kember, & Leung, 2001). The R-SPQ-2F has been tested in a variety of contexts, is a good fit with the intended two-factor structure, and has acceptable reliability for its four subscales: deep motive (Cronbach's alpha = 0.74); deep strategy (Cronbach's alpha = 0.58); surface motive (Cronbach's alpha = 0.67); and surface strategy (Cronbach's alpha = 0.63) (Biggs et al., 2001).

On the R-SPQ-2F questionnaire, students are asked to indicate, on a Likert-type scale, how closely they identify with statements that correspond to deep learning motives, deep learning strategies, surface learning motives, or surface learning strategies. These responses are then used to determine a deep learning score and a surface learning score for each student. The scale has a minimum value of 10 and a maximum value of 50, where the higher a value is for a given learning approach, the more likely a student is to use that approach. An example of a statement corresponding to a deep learning strategy is: “I find most new topics interesting and often spend extra time trying to obtain more information about them,” while an example of a statement corresponding to a surface learning strategy is: “I only study seriously what’s been given out in class or what’s in the course outline.” In our study, student approaches to learning were determined by including the R-SPQ-2F as part of the survey that students were administered at the beginning of the semester, and scoring responses based on Biggs et al. (2001).

Academic performance. To determine whether there were any differences in the academic performance of college-transfer and DEHS students, we used two approaches: (i) a direct comparison of student grades on the final examination, and (ii) a comparison of student performance on the final examination, in three categories established by Bloom’s Taxonomy: remembering, understanding, and applying. Comparing students’ final examination grades allowed us to make an overall comparison of academic performance between the two groups, while a comparison of performance across individual Bloom categories allowed us to see whether the groups differed in performance in more specific domains of learning. We chose to assess performance on the final examination because the midterm examinations were optional, and we predicted that some students therefore would not put full effort into studying for them, since their midterm mark could be dropped if they performed better on the final examination. Course activities, on the other hand, were group assignments and did not allow for an individual comparison of grades.

The original Bloom’s taxonomy was developed in 1956 and provided definitions for six major categories in the cognitive domain: knowledge, comprehension, application, analysis, synthesis, and evaluation (Bloom, Engelhart, Furst, Hill & Krathwohl, 1956; Krathwohl, 2002). Knowledge, comprehension, and application were considered forms of lower-order cognition, while analysis, synthesis, and evaluation were considered higher-order forms (Krathwohl, 2002). The hierarchical and cumulative nature of the original taxonomy has been criticized (Anderson, 2005). The categories are listed in a hierarchy from simple to complex, yet in some situations, a lower-order task, such as an application question, could be more complex than a higher-order task, such as a synthesis question. Furthermore, the original taxonomy assumed that one would need to master all lower-order categories before becoming competent in a higher-order category, but it was later identified that some students could perform well in higher-order categories without necessarily having mastered lower-order categories (Anderson, 2005). For example, a literary critic may not be able to produce an original novel (synthesis, according to the original taxonomy) but is presumably competent in evaluating one, which is a higher-order task (Ari, 2011). As a result of these criticisms, the taxonomy was revisited in the 1990s, resulting in several revisions: (i) all nouns were changed to verb forms to reflect the active nature of the thinking process, and the term knowledge was retitled as remembering; (ii) the original taxonomy was converted from one-dimensional (i.e., with a cognitive process

dimension only) to two-dimensional (i.e., with both a cognitive process dimension and a knowledge dimension); and (iii) the taxonomy was revised to be more applicable to a wider variety of audiences (Anderson, 2005; Krathwohl, 2002).

Table 1.

Key Skills Assessed by the Six Levels of the Cognitive Domain of Bloom's Taxonomy, and Examples of Sample Examination Questions for a Biochemistry Course (Adapted from Crowe, Dirks, & Wenderoth [2008])

Bloom's Taxonomy	Key Skills Assessed
1. Remembering	Identify, recall, list, recognize, or label e.g., How many molecules of ATP are used in glycolysis?
2. Understanding	Describe or explain in your own words, retell, or summarize e.g., Give an example of an enzyme that is regulated allosterically.
3. Applying	Predict an outcome using information provided or use existing knowledge in a new context e.g., Using the following graph, predict what would happen to levels of X if Y increased.
4. Analyzing	Infer and understand how components relate to each other and the process as a whole e.g., Given the following symptoms, what condition is the patient likely to have? (The example should not be identical to one that has been taught or discussed in class.)
5. Evaluating	Determine or critique relative value and merit e.g., Do the following data support the researchers' hypothesis?
6. Creating	Create something new using or combining disparate sources of information e.g., Design a concept map that summarizes glucose metabolism.

To categorize final examination questions into Bloom levels, we used the first (cognitive) dimension of Bloom's revised taxonomy to rank all questions on the KIN*2070 final examinations that were administered to students in each of the three course offerings (Table 1). The final examinations, in which approximately 45% of the total marks were allotted to multiple-choice questions and 55% to written responses, tested knowledge on only the first three levels of Bloom's Taxonomy (remembering, understanding, and applying), because the remaining three higher-order categories were tested in the form of assignments (e.g., concept mapping) that were completed in groups and precluded the individual analysis of outcomes. Students' academic performance was determined based on their score (percentage of correct responses) in each of the three Bloom levels examined on the final examination. The analysis of student performance across different levels

of Bloom's Taxonomy allowed for distinctions to be made across different levels of cognition, although we also compared overall student performance on the final examination between the two groups, as noted above.

Use of available learning resources. Student use of available learning resources was measured by tracking student views of online lecture-capture videos and by assessing student use of a mobile study tool, via the end-of-semester survey. Podcasts—audio or video files that can be downloaded to one's computer or portable player for listening—have been previously found to be popular among students and effective at reinforcing student learning outcomes (Aguiar, Carvalho, & Carvalho, 2009). In our study, lecture-capture videos for each lecture (a total of 21) were available to students in all course offerings of KIN*2070. Students could access the lecture-capture videos through an Internet-hosting site requiring login information that enabled the number of video views per student to be tracked and downloaded at the end of the semester, once students had completed the course.

A second learning resource, the NutriBiochem mobile application (or app), was developed as a learning tool for the KIN*2070 course at the University of Guelph–Humber to supplement (but not replace) lecture material and to aid students in studying and reviewing course content. It was available to students enrolled in the fall 2012 and winter 2013 course offerings of KIN*2070, the first a DEHS class and the second a college-transfer class. The app was not available to students enrolled in the winter 2012 course offering (a college-transfer class), as it had not yet been developed. Students could freely download the application onto a number of different mobile platforms or access the app content through an Internet-hosting site that could be accessed on a desktop or laptop computer. On the end-of-semester survey, students were asked to declare whether they had used the app during the semester. If they answered “yes,” they were also asked to indicate their frequency of use, out of the following options: daily, a few times per week, once a week, every couple of weeks, and only on a few occasions.

Subjective course experience. To compare subjective course experience between our two groups, we used the shortened version of Ramsden's (1991) Course Experience Questionnaire (CEQ). This questionnaire is a valid and reliable tool for evaluating subjective course experience (i.e., as a performance indicator of teaching effectiveness at the level of the whole course or degree in institutes of higher education; Ramsden, 1991; Wilson, Lizzio, & Ramsden, 1997). The shortened form of the questionnaire retains the strongest loading items from the long-form CEQ but uses the generic-skills subscale instead of the more weakly constructed emphasis-on-independence subscale. It is the most widely used version of the CEQ and examines 23 items across five subscales (Table 2): good teaching (Cronbach's alpha = 0.81), clear goals and standards (Cronbach's alpha = 0.53), appropriate assessment (Cronbach's alpha = 0.48), appropriate workload (Cronbach's alpha = 0.64), and generic skills (Cronbach's alpha = 0.79)³ (Ramsden, 1991; Wilson et al., 1997). These factors have all been associated with either deep or surface learning approaches, with increased student interest being related to use of a deep approach (Biggs, 1987) and a heavy workload, while ineffective teaching and assessment methods that reward memorization encourage the use of a surface approach (Entwistle & Tait, 1990; Lizzio, Wilson, & Simon, 2002; Trigwell & Prosser, 1991). In our study, students' subjective course experiences were evaluated by determining a score for each of the five aspects listed above, by including the CEQ as part of the survey that students were administered at the end of the semester.

Table 2.

Summary of the Characteristics of the Five Subscales Comprising the Shortened Course Experience Questionnaire (Based on Ramsden [1991])

Subscale	Summary of the Characteristics
Good Teaching (Six Items)	Providing useful and timely feedback Providing clear explanations Motivating students Making course interesting Understanding student problems
Clear Goals and Standards (Four Items)	Establishing clear aims and objectives for the course Establishing clear expectations of the standard of work expected
Appropriate Assessment (Three Items)	Measuring higher-order thinking and understanding as opposed to simple factual recall <i>Note:</i> This scale <i>does not</i> measure other important aspects of assessment practices, such as the congruence of the assessment with the material actually taught, or the level of difficulty and the consistency of the quality of assessment.
Appropriate Workload (Four Items)	Providing reasonable workloads that do not interfere with student learning
Generic Skills (Six Items)	Encouraging the development of skills recognized as important outcomes of university education (e.g., critical thinking) in addition to discipline-specific skills and knowledge

Career aspirations. We were interested in gaining insight into potential differences between the career aspirations of college-transfer and DEHS students, given the importance of this variable to students in selecting a postsecondary program. As stated earlier, most college-transfer students choose to pursue a university education to advance their career opportunities; however, career prospects are also very important in DEHS students' decision to enroll in university (CUSC, 2013; Decock et al., 2011). In our study, we collected information on students' career aspirations by asking them to indicate their career goal on the end-of-semester survey as a freeform, typed response in a comment box.

Data Analysis

Student responses were extracted from the electronic surveys that were administered to each class at the beginning and end of each semester; responses from both surveys were matched because students were required to include their name on each survey. In addition, the number of views of lecture-capture videos and final examination performance data were compiled. Responses from the winter 2012 and winter 2013 classes were pooled into a single treatment group ($n = 70$) that comprised the college-transfer students in our study, while responses from the fall 2012 class comprised the DEHS students ($n = 45$).

Microsoft Excel 2007 and SPSS version 21 were used to perform statistical analysis. Independent, two-tailed *t*-tests were used to compare college-transfer and DEHS students across all categories except app use. In the case of app use, percentages of students using the app were compared between the two streams using a chi-square test, and frequency of app use among students using the app with a one-way ANOVA, since the categories of use frequency are arranged continuously. The *p* value was set at $p \leq 0.05$, except for the CEQ analyses, which were set at $p \leq 0.01$, calculated based on the Bonferroni correction, where 0.05 is divided by the total number of comparisons being made.

Missing Cases

Table 3.

A List of the Variables Used in Our Study and the Number of Missing Data Points from Each of the Two Groups Studied

Variable Name	Number of Missing Cases	
	DEHS Fall 2012 (n = 45)	College-Transfer Winter 2012 and 2013 (n = 70)
Age	-	5
Years of PSE	6	5
Gender	-	-
Deep Approach Score	-	5
Surface Approach Score	-	4
App Usage	-	41
Video Views	-	-
CEQ – Good Teaching	-	5
CEQ – Goals	-	6
CEQ – Assessment	1	5
CEQ – Workload	1	4
CEQ – Skills	-	4
Exam Mark	-	1
BL1 Score	-	1
BL2 Score	-	1
BL3 Score	-	1
% of Classes Missed	-	-
Career	-	4

Note. For college-transfer students, only one class (winter 2013) had access to the app. Therefore, the sample size is reduced to 42 students for this variable (as opposed to 70).

Missing data points for the variables in our study arose for one of three reasons: (i) a student only completed one of the two surveys administered as part of this study; (ii) a student failed to complete all of the questions on a given survey; or (iii) a student dropped the course prior to writing the final examination (this occurred in only one instance). Table 3 provides a complete listing of the small number of missing cases in our study. We dealt with missing cases on a variable-by-variable basis; thus, if a student's response was missing for one variable, we still utilized that person's responses for other variables, provided that the answers were complete.

Results

Demographic Profile

A statistically significant difference was found between the average ages of students in the college-transfer group ($M = 23.97$, $SD = 0.71$) compared to the DEHS group ($M = 19.67$, $SD = 0.88$), $t(69) = 6.47$, $p < 0.05$. College-transfer students were more likely to be male (61%), and DEHS students were more likely to be female (71%). There was also a significant difference in mean years of postsecondary education completed between the two streams, $t(96) = 9.42$, $p < 0.05$. On average, students in the DEHS stream ($M = 2.03$, $SD = 0.71$) had completed fewer years of postsecondary education than students in the college-transfer stream ($M = 4.17$, $SD = 1.59$).

Learning Approach

Deep-approach learning scores determined using the R-SPQ-2F questionnaire did not differ significantly between college-transfer ($M = 27.88$, $SD = 6.03$) and DEHS ($M = 26.67$, $SD = 5.95$) students, $t(108) = 1.04$, $p = 0.30$. Surface-approach learning scores determined by the same questionnaire also did not significantly differ between the college-transfer ($M = 23.47$, $SD = 6.63$) and DEHS ($M = 25.60$, $SD = 5.86$) students, $t(109) = 1.74$, $p = 0.08$.

Academic Performance

There were no significant differences between the overall academic performance of college-transfer ($M = 69.0\%$; $SD = 12.5\%$) and DEHS ($M = 65.3\%$; $SD = 15.3\%$) students as measured by final examination grades, $t(112) = 1.35$, $p = 0.18$. Furthermore, no significant differences were found between the academic performance of the two groups in any of the first three levels of Bloom's Taxonomy—BL1 (remembering): $t(112) = 1.83$, $p = 0.07$; BL2 (understanding): $t(110) = 0.26$, $p = 0.80$; BL3 (applying): $t(72) = 1.81$, $p = 0.07$.

Use of Available Learning Resources

No significant differences were found in the number of lecture video views between the college-transfer group ($M = 16.94$, $SD = 18.21$) and the DEHS group ($M = 14.69$, $SD = 16.22$), indicating that on average, both groups accessed this learning resource equally, $t(113) = 0.68$, $p = 0.50$. All DEHS students in our study had access to the NutriBiochem app as a learning resource. Of these students, 56% stated that they had used the app during the course, while the remaining 44% had not. A similar percentage (58%) of the college-transfer stream students with access to the app indicated that they had used the learning resource, demonstrating no significant differences in app use between the two

streams, $\chi^2(1, N = 86) = 0.26, p = 0.61$. Table 4 shows the relative frequencies of application use among students who reported that they had used the app during the semester. There were no significant differences between the college-transfer group and the DEHS group in the frequency across different categories of use. Close to half of the students using the app, regardless of stream, indicated that they had only used it on a few occasions, which was the most common frequency reported.

Table 4.

Frequency of Use of the NutriBiochem Mobile Application Among College-Transfer and DEHS Students Who Reported Using the Application at Least Once

	Daily	A Few Times Per Week	Once Per Week	Once Every Couple of Weeks	On a Few Occasions
College-Transfer (n = 22)	1 (4%)	1 (4%)	3 (14%)	5 (24%)	12 (55%)
DEHS (n = 25)	0 (0%)	2 (8%)	6 (24%)	6 (24%)	11 (44%)

Subjective Course Experience

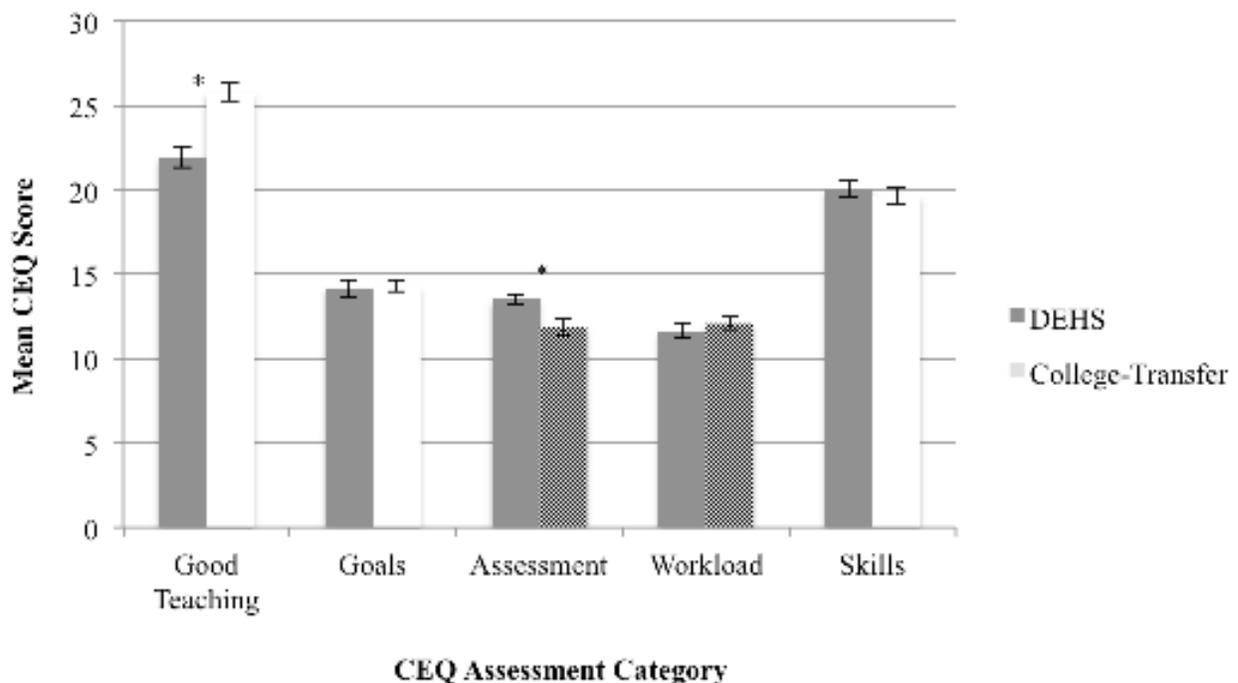


Figure 1. Course Experience Questionnaire (CEQ) scores of college-transfer and DEHS students. The CEQ assesses five categories related to subjective course experience: good teaching, goals, assessment, workload, and skills. An asterisk (*) denotes a statistically significant difference between the two groups, and error bars report standard errors of the means.

Figure 1 shows student perceptions of their course experience in KIN*2070. Students in both groups were most satisfied with the quality of teaching provided and the skills obtained. They were least satisfied with the course workload. Following the Bonferroni correction, significant differences between the college-transfer group and the DEHS group in subjective course experience as measured by the CEQ were found only on two of the subscales: good teaching and assessment. College-transfer student scores on the good-teaching subscale ($M = 25.77$, $SD = 4.14$) were significantly higher than DEHS student scores in the same category ($M = 21.96$, $SD = 4.30$), $t(108) = 4.67$, $p < 0.001$; conversely, college-transfer student scores on the assessment subscale ($M = 11.85$, $SD = 3.95$) were significantly lower than DEHS student scores in the same category ($M = 13.50$, $SD = 1.87$), $t(98) = 2.93$, $p = 0.01$.

Career Aspirations

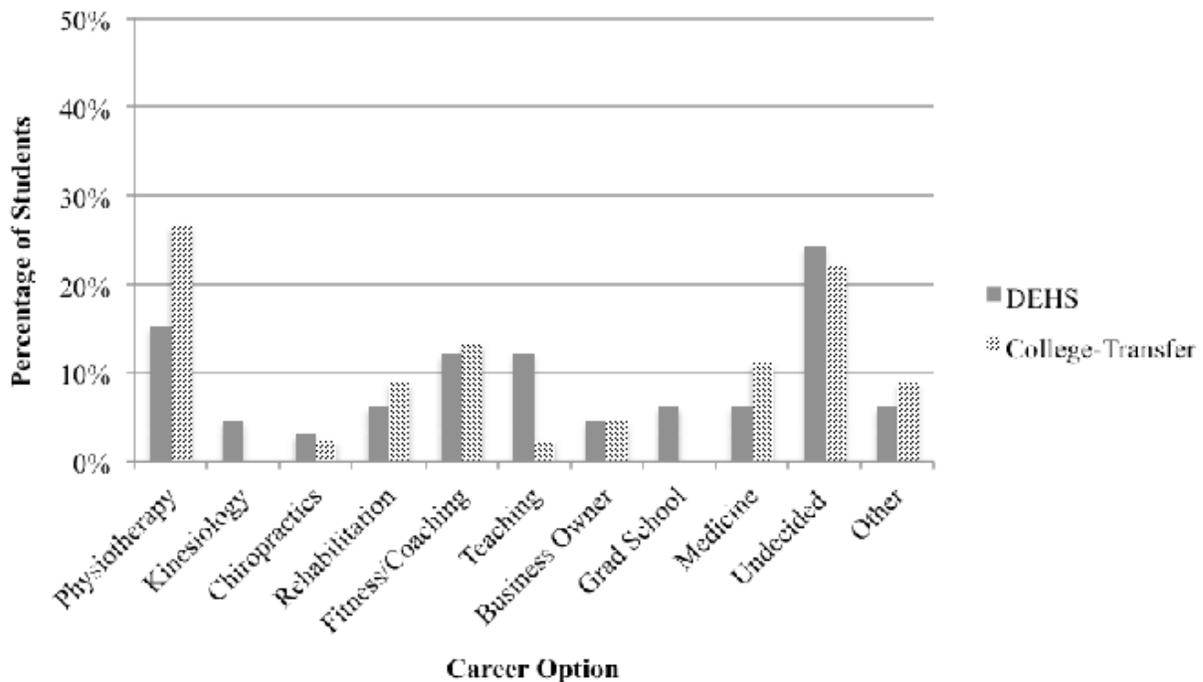


Figure 2. A comparison of the career aspirations of college-transfer and DEHS students.

Figure 2 provides an overview of student career aspirations. The most common career pathways listed by both groups were physiotherapy (CT: 15%, DEHS: 27%), undecided (CT: 24%, DEHS: 22%), and fitness/coaching/training (CT: 12%, DEHS: 13%). A higher percentage of college-transfer students (12%) were interested in teaching compared to DEHS students (2%); conversely, more DEHS students (11%) than college-transfer students (6%) wished to pursue medicine.

Discussion

Demographic Profile

The demographic profiles of the college-transfer and DEHS students in our study match the profiles of the broader college-transfer and DEHS student populations in Canada across all variables except for gender. In our study, college-transfer students were about four years old than DEHS students, which is close to the five- to seven-year age difference reported by studies in both Ontario and British Columbia (CUCC, 2007; Decock et al., 2011; Heslop, 2002; Wiggers & Arnold, 2011). As expected, the college-transfer students in our study had completed approximately two more years of postsecondary education than their DEHS counterparts, which is also consistent with other analyses (Decock et al., 2011; Heslop, 2002). Given the higher prevalence of women pursuing a university degree in Canada (Wiggers & Arnold, 2011), we expected there to be more females in both the college-transfer and the DEHS groups. Interestingly, while there were more females than males in our DEHS group (71% female), there were more males than females in our college-transfer group (61% male). Sampling bias is unlikely to be responsible for this gender difference, as our samples closely match the gender distribution in the classes from which they were drawn. Without examining other classes of college-transfer and DEHS students in the kinesiology program and at the University of Guelph–Humber more broadly, we were unable to ascertain why the distribution of females was high in the DEHS group but low in the college-transfer group.

One other area that we did not examine in any detail was differences in the prevalence of under-represented groups within our two streams. There is some evidence to suggest that “university applicants from under-represented groups (Aboriginal students, students with disabilities, first generation students and low/moderate income students” are more likely to apply from college than directly from high school (Kerr et al., 2010, p. 12); thus, future studies may be interested in exploring this area in greater detail.

Learning Approach

We hypothesized that college-transfer students would differ from DEHS students in their approach to learning. In particular, we expected that college-transfer students would be more likely to adopt a deeper approach to learning than DEHS students because they tend to be older and more familiar with applied forms of learning, both of which have been shown to facilitate a deep learning approach (Groves, 2005; Ryan et al., 2009). Surprisingly, no differences in learning approach were found between the two groups. An absence of any differences in learning approach between college-transfer and DEHS students may indicate that these two groups of students are more similar than we expected, which aligns well with the growing body of evidence suggesting that college-transfer programs are a viable option for students who, for a variety of reasons, do not enter university directly from high school (e.g., Andres, 2001; Berger & Malaney, 2003; Decock et al., 2011; Heslop, 2002; Weiss, 2011).

On the whole, regardless of whether they were in the college-transfer or DEHS stream, students in KIN*2070 tended to score slightly higher on the deep learning scale than on the surface learning scale. This finding contrasts with prior studies that have shown evi-

dence of a relationship between learning approach and discipline and that have thereby suggested students in science, engineering, and business are more likely to be surface learners than students in the arts and the humanities (see Kember, Leung, & McNaught, 2008 for a review of studies linking learning approach with discipline). However, according to results from a national study by Siddiqui (2006), wherein a distinction was made between different types of sciences, students in the health sciences tended to score higher on the deep learning scale than students in the natural sciences; thus, this provides some support for the results that we obtained in our study. Presumably, since students in KIN*2070 are not in their first year of study at Guelph–Humber, they would have some experience with the courses that are a part of the kinesiology program. These courses tend to be very applied and often have a hands-on lab component. More didactic courses, such as KIN*2070, still attempt to encourage higher-order thinking on class assignments (e.g., concept mapping) and to emphasize the applications and relevance of important concepts. Given the link between applied learning and adopting a deeper approach to learning (Ryan et al., 2009), the nature of the kinesiology program at Guelph–Humber may have had a role in facilitating deep learning among both the college-transfer and the DEHS students in our study.

Academic Performance

Besides being similar in learning approach, the college-transfer and DEHS students in our study were also similar in academic performance. Our results contradict those that have shown that college-transfer students in science-related disciplines perform more poorly academically than their DEHS counterparts (e.g., Carlan & Byxbe, 2000; Cejda, 1997; Mickelson & Laugerman, 2011; Whitfield, 2005), but support several Ontario studies showing equivalent or superior performance of college-transfer students compared to DEHS students (e.g., Bell, 1998; Coffey et al., 2012; CUCC, 2007; Martinello & Stewart, 2013). In a survey of college-transfer students in Ontario, 85% reported that they felt academically prepared for their transition to university (Decock et al., 2011). This may indicate that college-transfer students are receiving adequate preparation for university-level programs at the college level, although it is probably more likely that transfer to university self-selects for those college students who are academically strong. To further underscore this point, studies that have compared the performance of college-transfer students admitted with a cumulative GPA of “B” or higher in a two-year diploma program with DEHS students found no appreciable differences in academic performance (Best & Gehring, 1993; Cejda et al., 1998; CUCC, 2007; Graham & Hughes, 1994; Townsend et al., 1993). At Guelph–Humber, students must have a cumulative GPA of 75% or higher in a related two-year diploma program to be admitted into the kinesiology program. In addition, the majority of college-transfer students enter the program after completing a Diploma in Fitness and Health Promotion from the Humber Institute of Technology and Advanced Learning, which is affiliated with the University of Guelph–Humber and reduces the unfamiliarity of having to transfer to a completely separate institution. Whitfield (2005) noted that students transferring between institutions are most disadvantaged when there are no formal articulation agreements between their college and the university they wish to attend, as this results in considerable policy and curriculum differences that can hinder academic performance. The relationship between Humber Institute of

Technology and Advanced Learning and the University of Guelph is well established, and the curricula at both institutions are aligned to position students for continued academic success when they transfer into a university program. Our results demonstrate that the academic success of college-transfer students is possible with careful consideration of policies, such as admissions criteria, and the drafting of formal articulation agreements between institutions.

Use of Available Learning Resources

Another factor related to student learning is the use of learning resources. College-transfer students in our study did not appear to have difficulty accessing learning resources, despite previous evidence suggesting that they may be less likely to access them (Anglin et al., 1995). Again, this may be a result of transfer students' increased familiarity with campus and university expectations, due to the close alignment between the Humber and Guelph–Humber programs. It is worth noting that the learning resources that we evaluated were online resources, which Coffey et al. (2012) found to be especially helpful for college-transfer students because these students tended to find non-academic factors to be more of a barrier to learning than DEHS students do. Since these students performed no worse academically than their DEHS counterparts, it is possible that the presence of online resources, such as lecture-capture videos, enabled them to revisit concepts that they might have missed in lecture. This would be consistent with results from Coffey et al. (2012), who reported that with the right academic resources, support from peers and faculty, and program design, “RPN-BScN [college-transfer] nursing students [could work] full-time, study full-time, and at the same time, outperform their collaborative nursing program and health science student [DEHS] counterparts” (p. 20).

Subjective Course Experience

Students' subjective experiences of KIN*2070 varied only slightly depending on the group that they were in, with no significant differences between college-transfer students and DEHS students in CEQ scores on the workload, skills, and goals subscales. College-transfer students had significantly higher scores on the CEQ good-teaching subscale, possibly because they were more familiar with the instructor's approach to teaching, which involved incorporating more inquiry-based activities into the course, such as relevant application questions or concept-mapping assignments. Students without prior exposure to such methods tend to find them more challenging or even frustrating, especially when they are given less direction than they are used to (Cliff & Wright, 1996; Davies, 2004). College-transfer students had significantly lower scores than DEHS students on the CEQ assessment subscale, perhaps because the major tests and final examination were less inquiry-based and required lower-order thinking (i.e., Bloom Levels 1–3), to which DEHS students may be more accustomed from their high school studies. Although both groups would have had some prior exposure to other courses at Guelph–Humber prior to taking KIN*2070, the college-transfer students in our study had more postsecondary experience, particularly in a college environment, where they might have become accustomed to more inquiry-based modes of teaching and assessment. As a result, college-transfer students may have looked more favourably upon university environments that used simi-

lar approaches to what they were used to from their prior studies in college. Nonetheless, results from the CEQ show that the two groups were similar in subjective course experience in more ways than not, which provides further evidence in support of the feasibility of college-transfer programs.

Career Aspirations

Career aspirations were expected to be reasonably similar between college-transfer and DEHS students, due to their enrollment in the same program. Indeed, the top three career choices (physiotherapy, undecided, and fitness/coaching/training) were the same between both groups. Many students in both groups reported an interest in continuing with postgraduate studies of some form; most commonly, students were interested in applied disciplines related to mobility, exercise, and health. A contradictory finding from several studies is that college-transfer students are less likely to continue with further education after completing their undergraduate degree (e.g., Martinello & Stewart, 2013; McPhee, 2006; Mickelson & Laugerman, 2011). Studies have also consistently reported lower graduation rates and longer time taken toward degree completion for college-transfer students, despite them performing at the same level academically as DEHS students (e.g., Bell, 1998; Best & Gehring, 1993; CUCC, 2007; Glass & Harrington, 2002; Martinello & Stewart, 2013; Weiss, 2011). Therefore, it would be useful for future studies to explore differences in graduation rates and postgraduation pathways between college-transfer and DEHS students, particularly as results from our study indicate that most students in both the college-transfer and the DEHS groups hope to further their education after completing their undergraduate degrees in kinesiology.

Limitations

One limitation of our study is its small sample size, particularly for the DEHS group, as well as the disproportionate number of females in the DEHS group and males in the college-transfer group. While these gender differences are unlikely to be the result of sampling bias, they may reflect broader trends in enrolment in the kinesiology program at Guelph–Humber. A second limitation is that our study was fairly narrow in its assessment of student academic performance. Only grades from students' final examinations, which assessed lower-order thinking corresponding only to the first three levels of Bloom's Taxonomy, were used to compare college-transfer and DEHS students. In future studies, academic performance should be broadened to include scores on both term tests and course assignments, the latter of which may reveal differences in performance on tasks requiring higher-order cognitive skills. A final limitation is that the scope of our study was limited only to one course (KIN*2070) and one institution (University of Guelph–Humber), so it is recommended that future studies seek to explore differences in factors related to learning between college-transfer and DEHS students in a broader context.

Conclusion

Our results suggest that differences in learning-related factors between college-transfer and DEHS students, at least within the scope of the KIN*2070 course at Guelph–Humber, are limited. Although college-transfer students tend to be older and have completed

more years of postsecondary education, their approaches to learning and academic performance do not differ significantly from those of DEHS students. This result is important evidence in favour of the continued establishment of college-university articulation agreements that enable students to transfer credits from college-level diploma programs to university-level degree programs. It is anticipated that the demand for college-transfer programs will continue to grow as a university education becomes an increasingly important qualification for employment and as students become more interested in flexible pathways that will allow them to develop the skills necessary for employment in their fields of interest. Several characteristics of the Guelph–Humber kinesiology program, in which college-transfer students appear to have become successfully integrated into the university system, could be generalized to other contexts and may be of interest to those designing future college-transfer programs: strong alignment between college and university curricula, the use of reasonably competitive admission criteria, and a program structure that is properly aligned with transfer student needs (e.g., flexibility in program design, and small classes that encourage inquiry-based learning and participation).

Although future studies should consider graduation rates and postgraduation outcomes of students who have transferred from college to university, our results indicate that college-transfer programs are a suitable alternative for students who do not enter university directly from high school. It appears to be possible to create programs where college-transfer students can become successfully integrated into the university system and perform as well as DEHS students from an academic standpoint. However, it is important for studies to continue assessing the college-to-university transition from a learning perspective to ensure that an appropriate knowledge base exists for the creation and implementation of college-transfer programs in Canada and elsewhere. 🍁

Notes

- ¹ The Northern Alberta Institute of Technology (NAIT) and the Southern Alberta Institute of Technology (SAIT) were selected for this analysis because they are the most comparable to Ontario's college system. Other Albertan colleges have specific university-transfer programs that are very different from those in Ontario.
- ² Students transferring into the BASc program from the college Diploma in Fitness and Health Promotion must have attained a minimum cumulative GPA of 75% in their college courses, which include, but are not limited to, courses in reading and writing, mathematics, physiology, anatomy, nutrition, and other discipline-specific areas. Admission requirements for students entering the degree program directly from high school include a 75–80% average in the following courses: one English 4U credit; one Mathematics 4U credit; two credits from SBI 4U, SPH 4U, SCH 4U, or PSE 4U; and two additional 4U or 4M credits.
- ³ The original four subscales of the CEQ were tested for reliability in Ramsden (1991), where corresponding Cronbach's alpha coefficients are reported. Cronbach's alpha coefficients were first reported for the generic-skills subscale in Wilson et al. (1997), where reliability was tested using three student samples. For the purposes of this article, we have selected the Cronbach's alpha value corresponding to the most recent sample (1994).

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