The Canadian Journal for the Scholarship of Teaching and Learning

Volume 2 | Issue 2 Article 2

12-23-2011

Evaluating the Outcomes of a Peer-Mentoring Program for Students Transitioning to Postsecondary Education

Lori Goff
McMaster University, lgoff@mcmaster.ca

Follow this and additional works at: http://ir.lib.uwo.ca/cjsotl_rcacea
http://dx.doi.org/10.5206/cjsotl-rcacea.2011.2.2

Recommended Citation
Goff, Lori (2011) "Evaluating the Outcomes of a Peer-Mentoring Program for Students Transitioning to Postsecondary Education," *The Canadian Journal for the Scholarship of Teaching and Learning*: Vol. 2: Iss. 2, Article 2.
DOI: http://dx.doi.org/10.5206/cjsotl-rcacea.2011.2.2
Available at: http://ir.lib.uwo.ca/cjsotl_rcacea/vol2/iss2/2

Evaluating the Outcomes of a Peer-Mentoring Program for Students Transitioning to Postsecondary Education

Abstract
A peer-mentoring program was developed for students in an introductory biology course at a university in Ontario, Canada. Students could attend up to five peer-mentoring sessions during their first semester. Quantitative-survey, participation, and academic data spanning from 2003 through 2007 were reviewed for the purpose of evaluating the program. An objectives-oriented approach was used to determine if the program was meeting its goals to improve students' introductory biology grades, facilitate transitioning experiences, and encourage students to pursue studies in biology. Data analysis revealed that students who participated in the program felt that it was a valuable experience. Students attending three or more sessions performed significantly better in their introductory biology courses, measured by final grades achieved, than those attending fewer sessions. There were no indications that the peer-mentoring program had any impact on students' perceptions of transitioning to university or on their program selection preferences. Recommendations are made to improve the peer-mentoring program to better align its components and objectives.

Un programme de mentorat par les pairs destiné aux étudiants qui suivent un cours d'introduction à la biologie a été implanter dans un université situé dans la province de l'Ontario. Les étudiants avaient accès à cinq séances de mentorat par les pairs au cours du premier semestre. Afin d'évaluer le programme, les chercheurs ont effectué des sondages quantitatifs, examiné la participation et les notes des étudiants entre 2003 et 2007. Ils ont utilisé une méthode axée sur les objectifs afin de déterminer si le programme atteignait ses objectifs qui consistaient à améliorer les notes des étudiants au cours d'introduction à la biologie, à faciliter leur transition et à les encourager à poursuivre des études en biologie. L'analyse des données révèle que les étudiants qui ont participé au programme de mentorat, l'ont trouvé utile. Les notes des étudiants qui ont participé à trois ou quatre séances étaient considérablement plus élevées que celles de ceux qui ont assisté à moins de séances. Rien n'indique que le programme de mentorat par les pairs influe sur la perception des étudiants en ce qui a trait à la transition vers l'université ni sur leurs préférences en matière de choix de programmes. Les chercheurs recommandent d'améliorer le programme de mentorat afin de mieux harmoniser ses composantes et ses objectifs.

Keywords
post-secondary education, university, transition, peer-mentoring, evaluation

This research paper/rapport de recherche is available in The Canadian Journal for the Scholarship of Teaching and Learning:
http://ir.lib.uwo.ca/cjsotl_rcacea/vol2/iss2/2

Transitioning from high school to university can be difficult for students. Many factors are involved in predicting the academic success of students entering university. As suggested by Astin (1993), the ability of a student to meet academic standards is not the only factor that affects student success. Other factors may include the ability to adapt to new social situations, peer pressures, financial pressures, and different teaching styles (Salinitri, 2005). Skills, such as time management and organization, are large factors in transitioning successfully to university.

In trying to answer whether and what type of learning programs make a difference in student learning and persistence to graduation, Tinto (1995) found that students involved in community and collaborative learning programs, where students learn with and from their peers, were involved in a wider range of learning activities, learned more, and persisted at a higher rate than did similar students in more traditional learning settings. In being part of such shared learning experiences, the students found academic and social support for their learning among their peers and they became more actively engaged in their learning.

It is clear, then, that academic ability is not the only factor that predicts academic success at the postsecondary level. Social and academic support from peers is repeatedly reported in the literature as desired by and beneficial to students. The development of essential thinking skills and habits (Levine, 2007), as well as involvement in shared learning experiences (Tinto, 1995) are instrumental in easing the difficulties of transitioning to postsecondary education and increasing the likelihood of a student persisting to graduation.

Several studies have indicated the need for social support programs to facilitate the transition process from high school to university (Lamothe et al., 1995; Pratt et al., 2000; Wintre & Bowers, 2007). Many universities now include programs to aid students in transitioning to university (Tremblay & Rodger, 2003) and to aid students in acquiring some of the key attributes described by Levine (2007). Summer preparation programs (see Hicks, 2005; Walpole et al., 2008) and mentoring programs exist at postsecondary institutions to help facilitate transition and adjustment to university life and improve retention rates (Fisher, Cavanagh, & Bowles, 2011; Hicks, 2005; Walpole et al., 2008). Researchers are now realizing that academic advising, orientations, tutoring, skills development, first year experience courses, and mentoring are critical components of successful first-year experience (FYE) programs. These programs have been provided, formally and informally, on an optional or required basis and for the purpose of imparting knowledge and experience to students transitioning to postsecondary studies (Gelb, 2007; VanderStoep & Pintrich, 2008).

Several reviews of mentoring and peer-mentoring programs in higher education (Budge, 2006; Crisp & Cruz, 2009; Jacobi, 1991) have found large variations in the definitions, goals, parameters, training, and organization of such programs. Kram and Isabella (1985) differentiated mentoring programs on the type of support that they provided, those that had a task- or career-related function (providing advice, support, and information related to task accomplishment) and those that had a psychosocial function (providing emotional and psychological support). Jacobi (1991) agreed that mentoring relationships are helping, reciprocal, and personal relationships that include any or all of the following: (a) emotional and psychological support; (b) direct assistance with career, academic, and professional development; and (c) role modeling. More recently, Nora and Crisp (2007) cited evidence that effective mentoring programs could provide: (a) psychological and emotional support, (b) degree and career support, (c) academic subject knowledge support, and (d) role modeling.

Regardless of what the mentors provide, relative to their protégés, mentors show greater experience, influence, and achievement within a particular organization or environment.

However, some programs employ the concept of *peer* mentoring. Although peer mentors will show greater experience and achievement than their protégés, the difference in experience and achievement levels are usually less pronounced. In following recommendations put forth to operationally define mentoring (Crisp & Cruz, 2009) in this paper, peer-mentoring is defined in the context of academia as a relationship between two or more students whereby one student, only slightly more experienced, takes on a mentor role and provides guidance, instruction, and support to another less-experienced student or group of students.

But are new mentoring programs effective? Course and program quality in higher education are most often evaluated through survey research by means of questionnaires that students complete (Husbands & Fosh, 1993; Mayes, 2001; Saroyan & Amundsen, 2001). With the widespread growth of information and communication technology (ICT) in university education, electronic versions of student questionnaires seem to be a logical next step in evaluating university courses or programs (Moss & Hendry, 2002). Further, with growing class sizes, electronic questionnaires have the potential of reducing the administrative burden, cost, and resources related to paper-based questionnaires (Moss & Hendry, 2002; Porter, 2004; Shannon & Bradshaw, 2002; Smither, Walker, & Yap, 2004). However, regardless of how the data are collected, an approach to program evaluation is required to lay the foundation of the evaluation.

The program evaluation model most often used is the goal-based model, also called the objective attainment model and objectives-oriented approach (Boulmetis & Dutwin, 2005). Ralph Tyler is credited with conceptualizing and popularizing the objectives-oriented approach to evaluation in the 1930s and 1940s when he directed a large educational study that spanned 8 years (Fitzpatrick, Sanders, & Worthen, 2004). His model or approach requires the evaluator to first identify the purpose or goal of some activity or program and then focus the evaluation upon the extent to which those purposes or goals are achieved. Objective achievement is used as the method of judging the extent of success or failure of the program. Often issues pertaining to the scholarship of teaching and learning (SoTL) can be addressed through objectives-oriented approaches, particularly SoTL impact questions (Hubball & Clarke, 2010) that aim to rate the quality of an educational initiative or identify where an initiative meets, surpasses, or falls shorts of its goals and expectations. The practical purpose of an objectives-oriented approach is to justify improvements, maintenance, and termination of a program. Its simplicity and practicality are key that have allowed it to dominate evaluation research since the 1930s (Luo & Dappen, 2005; Madeus & Stufflebeam, 1989) and to more recently become an attractive approach for SoTL work.

The purpose of this study was to evaluate a peer-mentoring program that was developed at a university in Ontario using an objectives-oriented approach to determine whether the program has value and should be continued as is, continued with improvements, or terminated. The program was designed to help students transition from high school to university, achieve higher academic success in their first year biology courses, and select biology programs for their upper year studies. Thus, value of the program was determined by the extent to which these three objectives were met.

The Peer-Mentoring Program

During the summer of 2003, a new peer-mentoring program was developed at a university in Ontario, Canada where the overall goal was to help first-year students adjust and transition to university education and to succeed in their introductory biology studies. It was designed to include an upper-level university credit course and was available to 3rd- and 4th-year students interested in gaining leadership, teaching, and mentoring experience. Interested upper-year students who had recently taken the first year biology courses applied and interviewed for positions as peer mentors. Those who were accepted enrolled in an upper-level university credit course in which they learned about principles of lesson design, active learning strategies, science education theory and practice, learning styles. They were encouraged to practice their leadership, mentoring, teaching, and facilitating skills both within the university and in the community, all while building teaching portfolios as a culminating assignment for the course.

The peer mentors designed 50-minute peer-mentoring sessions that incorporated activities aimed to help the first year students improve their study strategies and discuss issues related to their transition to university. In small groups, the peer mentors designed lesson plans for each of five peer-mentoring sessions. They practiced facilitating the sessions they designed with the other peer mentors, received feedback, and made revisions. Up to 30 minutes of the session was designated to facilitate learning activities that specifically applied to the lecture content of the introductory biology course. The remaining 20 minutes of each session was intended to help the students adjust to life at university through group social and learning activities that were not specific to the content of the introductory biology course. A total of five peer-mentoring sessions were designed by the peer-mentors and made available for each student to attend during the fall semester. Attendance was optional for the first year students, but each student was scheduled into a timeslot for these sessions by the registrar's office. At the end of the semester, students were offered 0.5% of their final grade for participating in the online surveys that are posted each year. Some of the questions from these end-of-term surveys related to their experiences with the peer-mentoring program.

Methods

Research Design

This study was designed to be evaluative in nature and framed within the objectives-oriented approach or goal-based model. The objectives of the biology peer-mentoring program formed the basis of the research questions, and as such, the goal was to provide evidence for whether or not there were differences in academic achievement, reported ease of transition to university, or program selection between students who participated in the program at varying rates. The methodology of this study was positivist in its approach and data were collected and analyzed objectively in a manner that could produce reproducible and verifiable results. A group comparison design was used where groups were defined based upon students' levels of participation in the peer-mentoring program. The data were primarily quantitative. They came from three separate sources: (a) academic records that included term grades in the introductory biology course; (b) participation records that indicated how many peer-mentoring sessions each student attended throughout the semester; and (c) survey data that originated from questionnaires

that used selected-response items on perceived ease of transitioning, perceived value of the program, and other demographical variables.

Site and Participant Selection

This research was conducted within the biology department at a mid-sized university in Ontario. Participants included all students who registered into the 1st introductory-level biology course offered in the fall semester of each year.

Data Collection and Preparation

Survey data were previously collected from 1200 to 1500 individuals who were enrolled in the first year biology courses each year. The surveys were reviewed and questions that related to the research questions and objectives of the peer-mentoring program were identified. In addition to obtaining ethics clearance, permission to use data from these questions from 2003 to 2007 was obtained, along with permission to use academic and attendance data from the same years. The richest data came from the 2007-2008 academic year, where academic and attendance records were collected from 1,474 students and survey data were collected from 1,192 of 1,474 students (81%). Academic, attendance, and survey data were collected and reviewed from previous years, dating back to the 2003-2004 academic year.

Beginning with the 2007-2008 survey data, the data from each question on the survey were scored according to the scoring column shown in Appendix A. The scored data, in addition to survey responses to age, gender, location, and year of study, were entered into the Statistical Package for the Social Sciences (SPSS, v17.0). The data were carefully inspected and where obvious entry or scoring errors existed (e.g. outside of the possible range), data were eliminated from analysis. Data from respondents who skipped three or more questions were also eliminated from the data analysis. Analyses included t-tests and ANOVAs to determine whether differences existed in groups as well as correlations and regressions to determine whether variables were related.

Results & Discussion

Students were grouped into three groups based on attendance. The low-attendance group included 229 students who attended 0, 1, or 2 sessions. The mid-attendance group included 454 students who attended 3 sessions. The high-attendance group included 765 students who attended 4 or 5 sessions. There were no statistical differences in group composition with respect to gender, high school location (within Ontario, within Canada but outside of Ontario, or outside Canada), living accommodations during university studies (on-campus or off-campus), self-reported high school grades, or mean expected grade in the introductory biology course.

The analyses resulting from the available data revealed that students who participated in four or five peer-mentoring sessions were most likely to be first year students. This is not surprising given that the students were told through lectures that the peer-mentoring program was designed to provide new students with the support, guidance, and advice from upper-year students who had “been there, done that” with respect to the transition to undergraduate studies at the university. This mentoring program aimed to provide academic support (task-related function) and transitioning support (psychosocial function), two of the main mentoring functions

that were discussed by Kram and Isabella (1985) and supported by Jacobi (1991). Without a working knowledge of how to navigate the university environment, a mentor's ability to fulfill these main functions of a mentoring program would be compromised (Terrion & Leonard, 2007). That "been there, done that" experience, acquired through successful completion of at least a portion of their university studies, is important to establish a working relationship between peer mentor and protégé. Although all students were encouraged to attend the sessions for both academic and transitioning support, upper-year students were likely to see less need for transitioning support since they themselves would have already been through at least a year of university studies.

Those that attended sessions more frequently rated the value of the peer-mentoring program higher on the end-of-term survey, suggesting a significant positive relationship between attendance and perceived value of the program (r (963) = .272, $p < .0005$). It is not too surprising that the highest value ratings came from students who attended the most sessions. The peer-mentoring program was available for everyone registered in the introductory biology course, but participation in the program was not a requirement, thus providing individual students the option to attend or not depending on whether they found any value in the program. Although programs within academia can have both intrinsic and instrumental value, programs are not necessarily of value to those individuals who do not recognize any intrinsic value in either its academic or social manifestations (Watts & Bridges, 2006). Because attendance was optional, students who attended one or two sessions and found them to have little value may have been more likely to stop participating than those students who rated the program as more valuable.

Participation and Academic Achievement

To determine whether high participating students achieve higher academic success than low participating students, attendance and grade data were examined for normality and equal variance (F (2, 1,447) = 2.16, p =.56).

An ANOVA was performed initially without grouping the students into the three participation groups to help determine if the high-, mid-, and low-attendance groups were appropriate. The participation factor thus had six attendance groups, based on the actual number of sessions, from 0 to 5, that were attended by students. The ANOVA with post-hoc Bonferroni corrections revealed highly significant differences among the six attendance groups in their final grades achieved (F (5, 1,442) = 25.0, $p < .0005$). Data from additional grade items, including scores on tests and exams, were reviewed. ANOVA tests were repeated using Test 1 (F (5, 1,147) = 8.91, $p < .0005$), Test 2 (F (5, 1,147) = 12.7, $p < .0005$), and the final exam (F (5, 1,147) = 11.53, $p < .0005$) scores. Data from previous years were analyzed to help confirm that the groups created for the analysis of this study were logical and appropriate. ANOVA tests were performed using final mark and attendance data from the 2003-2004 (F (5, 1209) = 19.0, $p < .0005$) and 2005-2006 (F (5, 1512) = 37.9, $p <.0005$) academic years. All five ANOVA tests revealed that highly significant differences existed in academic achievement between the six participation groups (0 to 5 sessions). The Bonferroni or Tamhane post-hoc analyses consistently revealed that there were no significant differences between students who attended 0, 1, or 2 sessions for all grade items in all years that were analysed. There were also no significant differences between students who attended 4 or 5 sessions. Based on this finding, further group comparison analyses were conducted by grouping the students who attended 0, 1, or 2 sessions in the low-attendance group, 3 sessions in the mid-attendance group, and 4 or 5 sessions in the

high-attendance group. The differences in academic achievement between these three groups are shown in Table 1.

Table 1
Mean Percent Score Earned (± SE) on the Two Term Tests and Exam and Calculated Final Marks (± SE) for Each of the Three Participation Groups

	Low-Attendance	Mid-Attendance	High-Attendance
Sessions attended	2 or fewer	3	4 or more
N	229	454	765
Test 1 Mark	57.47% ± .75	63.03% ± .50	65.09% ± .37
Test 2 Mark	52.60% ± .74	58.60% ± .43	60.86% ± .34
Exam Mark	52.80% ± .86	58.68% ± .61	60.17% ± .47
Final Mark	57.10% ± .80	64.07% ± .51	66.01% ± .38

A correlation analysis between final mark (M = 64.0, SD = 11.3, N = 1,448) and attendance in 2007-2008 subsequently showed a highly significant yet moderate relationship between these two variables (r (1,146) = .269, p < .0005). A linear regression analysis revealed that attendance was a significant predictor of final marks (B = 2.12, β = .269, t = 10.6, p <.0005), accounting for 7.2% of the variance in academic achievement.

Reviewing and analyzing historical data dating back to 2003 revealed similar relationships from previous years (r ranged from .263 to .330) accounting for between 6.8% and 10.8% of the variation (average variance = 8.3%). This indicates that attendance can predict on average approximately 8% of the variation in final marks.

Reviewing the available data on past academic performance in the field of biology showed that there were no significant differences between those students who were high-attendance participants to those who chose to participate less fully or not at all. This therefore suggests that it was not just the high-achieving high-school students who opted to participate in the peer-mentoring program. A multiple regression analysis was used to determine whether there were other factors that predicted grades (Table 2). High-school grades from the prerequisite course and expected grades in the introductory course were the two factors that alone predicted some variation in final grade. Together, the final grade in the introductory biology course could be predicted using the equation:

y = 24.1 + 1.22 * attendance + 1.74 * high school grade + 2.45 * expected grade

This equation suggests that participation in the peer-mentoring program might be one factor that impacts academic achievement to some degree. Assuming that the other factors are held constant, attendance in one peer-mentoring session relates to an increase of 1.22% on the final mark in the introductory biology course.

Table 2
Summary of Multiple Regression Analysis for Variables Predicting Final Grade

Variable	B	SE (B)	Beta	t	p
(Constant)	24.1	2.25		10.7*	.000
Attendance	1.22	.188	.145	6.47*	.000
Self-reported high-school grade	1.74	.211	.194	8.25*	.000
Expected Grade	2.45	.105	.550	23.4*	.000

Note. R^2 = .439. * p < .01

It is important to note that only 43.9% of the variation in final mark was accounted for by the three factors (attendance, high-school prerequisite grade, and expected grade in the course), suggesting that there were other factors, not addressed by variables for which data existed in this study, that were involved in predicting students' academic achievement in the course. These variables may possibly include motivation, psychological well-being, stress levels, relationships with parents, study strategies, and use of additional academic support. Wintre and Yaffe (2000) used multiple inventories to measure many of these variables in their study on adjustment to first year as a function of relationships with parents and found that mutual reciprocity and discussion with parents, as well as the psychological well-being variables, had direct links to adjustment to university, both academically and socially.

Participation and Transitioning

There was no evidence that there were any differences between the three participation groups with respect to students' perceived ease of transitioning, nor were there any relationships between any of the transitioning questions and attendance. Mentoring programs that provide transitioning support are addressing the emotional and psychological (Crisp, 2009; Jacobi, 1991) or psychosocial (Kram & Isabella, 1985; Swenson, Nordstrom, & Hiester, 2008) needs of participants. Only four questions from the available survey data addressed issues related to transitioning. No significant differences between the groups were identified either in the summed score, or for any of the individual items that comprised the summed score. There were no data available that asked students directly whether they believed that peer-mentoring program had any impact on their transition to university. So, while there were no differences between the groups on the four available questions that had some relation to transitioning, further investigation would be needed to determine whether the peer-mentoring program was meeting this objective.

The recent literature review by Crisp and Cruz (2009) did not provide any evidence to indicate that mentored students adjusted more readily to university than non-mentored students but other authors (e.g. Lamothe et al, 1995) have reported empirical evidence that mentored students adjust better to university than non-mentored students. The finding from this study is preliminary and should be confirmed with a survey instrument designed specifically to measure

transitioning. Baker and Siryk's (1984) Student Adaptation to College Questionnaire (SACQ) or Crisp's (2009) College Student Mentoring Scale (CSMS) include survey questions that would have been able to more reliably measure students' social support systems and adaptations and adjustments to university.

Participation and Program Selection

Because mentoring and peer-mentoring programs have been developed and utilized for the purpose of role modelling (Jacobi, 1991; Nora & Crisp, 2007) and because upper-year biology students were acting as peer mentors, it was hypothesized that some of the protégés may be more likely to select biology programs themselves for their study options. Students were asked what their second-year program selection preferences were in both September and December of their first year. In September, 452 students planned to select a major in biology, but 180 of these students changed their preference to another program outside biology by December. Of the 668 students who did not plan to major in biology as of September, 101 students decided that biology was their program of choice by December. A chi-square statistical analysis revealed that those who attended the biology peer-mentoring sessions were no more or less likely to prefer biology majors than those students who attended fewer sessions. A literature search revealed no studies that provided evidence of mentoring program's impact on students' undergraduate programming preferences. Evidence from this data analysis suggested that the biology peer-mentoring program neither deterred students from nor attracted students to selecting biology programs.

Implications & Conclusion

Data from this study thus suggest that the peer-mentoring program was effective in meeting its objective on having an impact on academic achievement. No evidence existed from this study to support that the program had an effect on transitioning or program selection.

Given that there is evidence that the program is indeed meeting its objective to aid students with their academic achievement in the introductory biology course, the program has some value and continuation of the program should be considered, but with modifications made to meet its other objectives.

The program designers should spend some time reviewing the program's objective on transitioning. Is there any evidence that first year students need and want help with transitioning from high school to university? If so, do they need or want this help through a program linked with an academic course? These questions can be answered through a survey that can be distributed to students in the introductory biology course through the university's learning management system. If there is evidence that students feel this is important and that they need this help, then more focus would be needed on developing the biology peer-mentoring program to meets its transitioning goal. One idea would be to include a research project within the peer-mentoring training program that would require the peer mentors to review the literature on transitioning, issues related to transitioning, and measurement of transitioning beliefs. It may also be beneficial to recruit a guest speaker with expertise in transitioning issues and teach the peer mentors how best to be a support person during transitioning periods. Peer mentors could be trained by representatives from various student support services (e.g., residence life services, career services, student development, health services, counselling services, etc.) so that the peer

mentors could better assist the first year students with general campus resources relating to both academic transitioning and social transitioning. It is well documented in the literature that these types of support services can positively influence ease of transition, academic achievement, and student retention (Astin, 1993; Budge, 2006; Jacobi, 1991; Tinto, 1987; Tremblay & Rodger, 2003).

Most of the peer mentors spent at least half of one session reviewing the various programming options for second year. However, this seems not to have had much of an impact on encouraging students to select biology program options for their second year of studies. In order to recruit students into biology programs, the biology department will first need to understand the reasons behind why students choose to or choose not to apply for biology programs in second year. The biology peer-mentoring program would need to then focus on making sure that students are aware of the benefits of a biology program.

Institutionally-initiated engagement activities have the potential to address the personal, social, and academic competences of students who are transitioning to university. The peer-mentoring program described in this study is one example of a first-year experience program that had the some success with supporting the academic needs and growth of first-year students. While this program was designed specifically for first-year science students, it was administered in collaboration with the first year biology courses and provided academic support specific to biology. Krause and colleagues (2005) suggested that this type of program supports a piecemeal approach of discrete first-year initiatives that is rarely linked across an institution. This piecemeal approach, as compared to an institution-wide approach, continues to be most prevalent in first-year experience initiatives (Kift, Nelson, & Clark, 2010). But before a program should grow to be institution-wide, program evaluations of the smaller, course- or program-specific initiatives should be conducted. Impact studies to determine the level of impact on student's reaction, learning, behaviour, and results should be conducted (Kirkpatrick, 1994) , and the program should be revised and optimized prior to expansion to a university-wide program. Further, as Astin (1993, 1998) suggested, curriculum and program designers can only create instructional strategies that appeal to students and encourage learning and academic success if we know what motivates students, what students believe, and what goals students have. Thus, it will be important to conduct additional research in these areas, make modifications to the current program structure, organization, and objectives, and continue program evaluations in an effort to create a peer-mentoring program that better helps students in their transition to their first year of university studies.

References

Astin, A. W. (1993). *What matters in college: Four critical years revisited*. San Francisco: Jossey-Bass.

Astin, A. W. (1998). The changing American college student: Thirty-year trends, 1966-1996. *The Review of Higher Education*, *21*(2), 115-135.

Baker, R. W., & Siryk, B. (1984). Measuring adjustment to college. *Journal of Counselling Psychology*, *31*, 179-189. http://dx.doi.org/10.1037/0022-0167.31.2.179

Boulmetis, J., & Dutwin, P. (2005). *The ABCs of evaluation: Timeless techniques for program and project managers* (2nd ed.). San Francisco: Jossey-Bass.

Budge, S. (2006). Peer-mentoring in post-secondary education: Implications for research and practice. *Journal of College Reading and Learning*, *37*(1), 73-87.

Crisp, G. (2009). Conceptualization and initial validation of the college student mentoring scale (CSMS). *Journal of College Student Development*, *50*(62), 177-194.

Crisp, G., & Cruz, I. (2009). Mentoring college students: A critical review of the literature between 1990 and 2007. *Research in Higher Education*, *50*(6), 525-545. http://dx.doi.org/10.1007/s11162-009-9130-2

Fisher, R., Cavanagh, J., & Bowles, A. (2011). Assisting transition to university: Using assessment as a formative learning tool. *Assessment & Evaluation in Higher Education, 36*(2), 225-237. http://dx.doi.org/10.1080/02602930903308241

Fitzpatrick, J. L., Sanders, J. R., & Worthen, B. R. (2004). *Program evaluation: Alternative approaches and practical guidelines* (3rd ed.). Boston: Pearson.

Gelb, A. (2007). *The complete student: Achieving success in college and beyond.* Clifton Park, NY: Thomson-Delmar Learning.

Hicks, T. (2005). Assessing the academic, personal and social experiences of pre-college students. *Journal of College Admission*, *186*(1), 19-24.

Hubball, H., & Clarke, A. (2010). Diverse methodological approaches and considerations for SoTL in higher education. *The Canadian Journal for the Scholarship of Teaching and Learning*, *1*(1). Retrieved from http://ir.lib.uwo.ca/cjsotl_rcacea/vol1/iss1/2

Husbands, C. T., & Fosh, P. (1993). Students' evaluation of teaching in higher education: Experience from four European countries and some implications of the practice. *Assessment and Evaluation in Higher Education*, *26*(4), 327-339.

Jacobi, M. (1991). Mentoring and undergraduate academic success: A literature review. *Review of Educational Research*, *61*, 505-532.

Kift, S., Nelson, K., & Clarke, J. (2010). Transition pedagogy: A third generation approach to FYE – A case study of policy and practice for the higher education sector. *The International Journal of the First Year in Higher Education, 1*(1), 1-20. http://dx.doi.org/10.5204/intjfyhe.v1i1.13

Kirkpatrick, D. L. (1994). *Evaluating Training Programs.* San Francisco: Berrett-Koehler.

Kram, K., & Isabella, L. (1985). Mentoring alternatives: The role of peer relationships in career development. *Academy of Management Journal*, *28*, 110-132. http://dx.doi.org/10.2307/256064

Krause, K. L., Hartley, R., James, R., & McInnis, C. (2005). *The first year experience in Australian universities: Findings from a decade of national studies*. Canberra, Australia: Australian Department of Education, Science and Training. Retrieved from: http://www.griffith.edu.au/__data/assets/pdf_file/0006/37491/FYEReport05.pdf

Lamothe, O., Currie, E., Alisat, S., Sullivan, T., Pratt, M., Pancer, S. M., et al. (1995). Impact of a social support intervention on the transition to university. *Canadian Journal of Community Mental Health*, *14*, 167-180.

Levine, M. (2007). The essential cognitive backpack. *Educational Leadership*, *64*(7), 17-22.

Luo, M., & Dappen, L. (2005). Mixed-methods design for an objective-based evaluation of a magnet school assistance project. *Evaluation and Program Planning*, *28*(1), 109-118. http://dx.doi.org/10.1016/j.evalprogplan.2003.12.001

Madeus, G. E., & Stufflebeam, D. L. (Eds). (1989). *Educational evaluation: Classic works of Ralph W. Tyler*. Boston: Kluwer.

Mayes, J. T. (2001). Quality in an e-university. *Assessment and Evaluation in Higher Education*, *26*(5), 465-473. http://dx.doi.org/10.1080/02602930120082032

Moss, J., & Hendry, G. (2002). Use of electronic surveys in course evaluation. *British Journal of Educational Technology*, *33*(5), 583-592. http://dx.doi.org/10.1111/1467-8535.00293

Nora, A., & Crisp, G. (2007). Mentoring students: Conceptualizing and validating the multi-dimensions of a support system. *Journal of College Retention: Research, Theory, and Practice*, *9*(3), 337-356.

Porter, S. (2004). Pros and cons of paper and electronic surveys. *New Directions for Institutional Research*, *121*, 91-97. http://dx.doi.org/10.1002/ir.103

Salinitri, G. (2005). The effects of formal mentoring on the retention rates for first-year, low achieving students. *Canadian Journal of Education*, *28*(4), 853-873. http://dx.doi.org/10.2307/4126458

Saroyan, A., & Amundsen, C. (2001). Evaluating university teaching: Time to take stock. *Assessment and Evaluation in Higher Education*, *26*(4), 341-353. http://dx.doi.org/10.1080/02602930120063493

Shannon, D. M., & Bradshaw, C. C. (2002). A comparison of response rate, speed and costs of mail and electronic surveys. *Journal of Experimental Education, 70*(2), 179-192. http://dx.doi.org/10.1080/00220970209599505

Smither, J. W., Walker, A. G., & Yap, M. K. (2004). An examination of the equivalence of Web-based versus paper-and-pencil upward feedback ratings: Rater- and ratee-level analyses. *Educational & Psychological Measurement*, *64*, 40-61. http://dx.doi.org/10.1177/0013164403258429

Swenson, L. M., Nordstrom, A., & Hiester, M. (2008). The role of peer relationships in adjustment to college. *Journal of College Student Development*, *49*(6), 551-567. http://dx.doi.org/10.1353/csd.0.0038

Terrion, J., & Leonard, D. (2007, May). A taxonomy of the characteristics of student peer mentors in higher education: Findings from a literature review. *Mentoring & Tutoring: Partnership in Learning*, *15*(2), 149-164. http://dx.doi.org/10.1080/13611260601086311

Tinto, V. (1987). *Leaving college: Rethinking the causes and cures of student retention*. Chicago: The University of Chicago Press.

Tinto, V. (1995, March). Learning communities, collaborative learning, and the pedagogy of educational citizenship. *AAHE Bulletin*, *47*(7), 11-13.

Tremblay, P. F., & Rodger, S. (2003). The effects of a peer-mentoring program on academic success among first year university students. *The Canadian Journal of Higher Education*, *33*(3), 1-8.

VanderStoep, S. W., & Pintrich, P. R. (2008). *Learning to learn: The skills and will of college success* (2nd ed.). Upper Saddle River, NJ: Pearson-Prentice Hall.

Walpole, M., Simmerman, H., Mack, C., Mills, J. T., Scales, M., & Albano, D. (2008). Bridge to success: Insight into summer bridge program students' college transition. *Journal of the First-Year Experience and Students in Transition*, *20*(1), 11-30.

Watts, M., & Bridges, D. (2006). The value of non-participation in higher education. *Journal of Education Policy*, *21*(3), 267-290. http://dx.doi.org/10.1080/02680930600600267

Wintre, M. G., & Bowers, C. D. (2007). Predictors of persistence to graduation: Extending a model and data on the transition to university model. *Canadian Journal of Behavioural Science*, *39*(3), 220-234. http://dx.doi.org/10.1037/cjbs2007017

Wintre, M. G., & Yaffe, M. (2000). First-year students' adjustment to university life as a function of relationships with parents. *Journal of Adolescent Research*, *15*(1), 9-37. http://dx.doi.org/10.1177/0743558400151002

Appendix

Summary of Variables Gathered and Scored from Survey Questions Asked of the 2007-2008 Cohort of Introductory Biology Students

Variable	Items from Questionnaire	Score
Expected Grade[a]	What do you expect your Biology course mark to be this semester? - Answer options ranged from F through A+ and were scored on a 12-point scale	0-12
High School Grade[a]	What was your Grade 12U Biology (or equivalent) mark? - Answer options ranged from F through A+ and were scored on a 12-point scale	0-12
Program (Sept)[b]	Before you started your first year at the University, what program did you plan to major in? - A Biology program within the Faculty of Sciences - A program within the Faculty of Sciences, but not within the Department of Biology. - A program outside of the Faculty of Sciences - I had no clue!	
Program (Dec)[b]	Now that you have completed one semester at the University, what program do you plan to major in? - A Biology program within the Faculty of Sciences - A program within the Faculty of Sciences, but not within the Department of Biology. - A program outside of the Faculty of Sciences - I still have no clue!	
Trans1	On a scale of 1 to 4, how would you rate your preparedness for this introductory biology course?	
	- My high school education left me much more prepared for this course than the majority of first-year students.	4
	- My high school education left me reasonably well prepared for this course.	3
	- My high school education left me under-prepared for this course.	2
	- My high school education left me totally unprepared for this course compared to the majority of first-year students.	1
Trans2	How would you rate your transition from high school to university?	
	- Transitioning was much easier than I thought it would be.	4
	- Transitioning was a little easier than I thought it would be.	3
	- Transitioning was a little more difficult than I thought it would be.	2
	- Transitioning was much more difficult than I thought it would be.	1
Trans3	Now that this semester is coming to an end, how difficult do you think this biology course was compared to your expectations?	
	- It was much easier than I thought it would be.	4
	- It was a little easier than I thought it would be.	3
	- It was a little more difficult than I thought it would be.	2
	- It was much more difficult than I thought it would be.	1

Trans4	How long would you say it took you to feel like you had adjusted to university (both socially and academically)?	
	- One month OR less than one month	4
	- Two months	3
	- Three months	2
	- Four months OR I still do not feel entirely adjusted	1
TransTtl[c]	Total Ease of Transitioning Score	4-16
Value1	Would you recommend the peer-mentoring sessions?	
	- Yes	4
	- No	1
Value2	How long should each peer-mentoring session run?	
	- Longer than they were	2
	- The same as they were	1.5
	- Shorter than they were	1
Value3	How often should peer-mentoring sessions be offered?	
	- More often than they were	2
	- As often as they were	1.5
	- Less often than they were	1
Value4	Would you attend peer-mentoring sessions in next semester's biology course?	
	- Yes	4
	- No	1
Value5	Do you feel that the peer-mentoring sessions have improved your overall performance in this biology course?	
	- Yes – quite a bit	4
	- Somewhat	3
	- Not very much	2
	- Not at all	1
ValueTtl[d]	Total Perceived Value of Peer-Mentoring Program Score	5-16

Notes. [a]variable that addresses academic achievement. [b]variable that addresses program selection preferences. [c]variable that addresses perceived ease of transitioning. [d]variable that addresses perceived value.