Diplomés de niveau collégial ayant des incapacités

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Cegep Graduates With Disabilities

College Exit (CRC) Scores of Graduates Registered for Disability Related Services Compared to Non-registered Graduates and Graduates Without Disabilities

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Final Report Presented to PAREA
Rapport final présenté à PAREA

Spring / Printemps 2007

Authors / Auteurs

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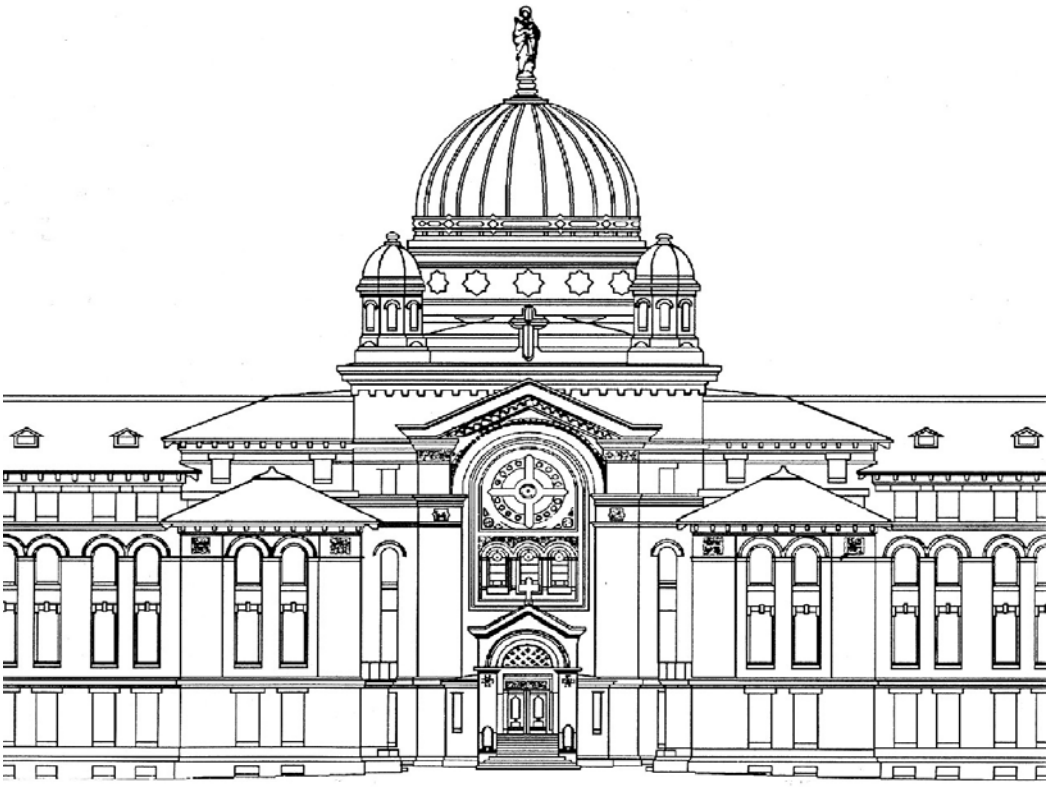

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Office of Institutional Research / Recherche Institutionelle, Dawson College / Collége Dawson
Adaptech Research Network / Réseau de Recherche Adaptech - Dawson College / Collége Dawson

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Table of Contents

Table of Contents Con't

Table of Contents Con't

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Executive Summary

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College Exit (CRC) Scores of Graduates Registered for Disability Related Services Compared to Non-registered Graduates and Graduates Without Disabilities

Final Report Presented to Parea
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***Key descriptors**: graduates with disabilities; academic success, learning disabilities; perceptions of college experiences; high school grades*

Introduction

The results of self-report surveys administered to first year students indicate that only a small proportion of students with disabilities in the postsecondary population actually register for disability related services at their institutions. Little research has been done to compare the educational outcomes of the two groups. In order to understand the extent that integration into the workforce and higher education has been successful, it is important to find out how both registered and unregistered college students with disabilities fare following graduation. Reliable information on their success needs to be made available to those involved in planning pedagogical changes, counseling students with disabilities and providing disability related services. This project, using the college exit score (CRC) as an indicator, will compare how competitive registered and unregistered college graduates are relative to their non-disabled peers in seeking entry into Quebec universities. In addition it will compare registered and unregistered graduates' perceptions of factors contributing or inhibiting their success, and evaluate whether the extent of the difficulties perceived are correlated to their college exit scores.

Goals and Objectives

The goal of the project was to determine whether junior/community college (cegep) graduates with disabilities have the same opportunities to access higher education as their non-disabled peers. The CRC score (a weighted grade average) is an important determinant in ensuring entrance to universities in Quebec following the completion of a college diploma (DEC). We, therefore, chose to compare the CRC scores of graduates with disabilities (both those who registered for disability related services at a large English college in Quebec, and those who did not) with those of their non-disabled peers. In Part 1 of the study we examined the relative competitiveness in gaining access to university of the three groups of graduates as measured by their exit CRC. To isolate factors important for academic success, in Part 2 we examined whether the ease with which graduates experienced aspects of their college (cegep) studies was related to their CRC scores.

Method

To test our hypotheses we obtained data from a number of archived college databases. The graduate sample consisted of all graduates who completed their diploma between 2002 and 2006 (N = 9406, 5872 males and 3534 females). Of these, approximately a third completed at least one college survey during the period.

We identified whether a graduate had a disability as well as the nature of that disability from two sources: from the archives of the Services for Students with Disabilities office (N = 275) and from self-reports on surveys conducted at the college during this period (N = 145). An estimated 300 - 400 graduates in the sample had a disability, but could not be identified as they neither registered for services nor self-reported. Approximately 60% of all three groups (graduates without disabilities, graduates with disabilities who had registered for disability related services, graduates with disabilities who had not registered) were females. CRC scores and survey results of graduates with learning disabilities (LD) were compared to those of graduates with disabilities other than LD and graduates without disabilities.

Main Findings

Methodological Findings

- In the process of analyzing the research results we found that graduates who completed at least one college survey had higher high school leaving grades and higher CRCs than their counterparts who had not completed any surveys. This was true whether or not the graduate had a disability. This 'survey responder effect' has important methodological and conceptual implications for studies of college students and graduates in general, and for students and graduates with disabilities in particular. In this case, because the range of grades on which the analysis was based is constrained, underlying differences between populations may be masked.

- Because of the 'survey responder effect' it was not appropriate to compare scores of graduates with disabilities who completed a survey with those of graduates who did not do so. Since graduates with disabilities who had not registered to receive disability related services from the college and who had not completed a survey could not be identified, the only meaningful comparisons for graduates with disabilities either excluded the group who self-reported or excluded the group who had registered for disability related services, but who did not respond to a survey.

Part I – Comparison of CRC Scores of Graduates With and Without Disabilities

- If the survey responder effect was taken into account, there was no significant difference between the CRC scores of graduates with disabilities who had and those who had not registered for disability related services from the college. This was true for both graduates with LD and graduates with disabilities other than LD.

- Graduates with LD tended to have lower CRC scores (and high school averages) than either graduates with other disabilities or graduates without disabilities. However, there was no difference in CRC scores between graduates with disabilities other than LD, and graduates without disabilities.

- Overall, males tended to have lower CRC scores and high school averages than females. However, there were no differences in CRC scores of males and females without disabilities for equivalent high school averages. This was also true for graduates with disabilities other than LD. Males with LD, however, tended to obtain lower CRC scores than other graduates who had similar high school grades.

- The percentage of graduates with LD who had high school averages below 75 was 65%, compared to 34% for graduates without disabilities and to 40% for graduates with disabilities other than LD. The figure was particularly high for male graduates with LD (78%).

- The high school average had a relatively high correlation with the CRC score and was moderately successful in predicting whether a graduate obtained a CRC above or below 26 (a score usually considered acceptable for admission by major universities).

Part II – Relationship Between CRC Scores and Perceptions About College Experiences

- Graduates who were registered for disability related services experienced aspects of their college experience as easier than graduates with disabilities who did not register, and graduates without disabilities. Graduates with disabilities who did not register rated their college experience as hardest.

- Overall, graduates who perceived aspects of their college experience as harder had, on average, lower CRC scores. This pattern of lower CRC scores held for unregistered graduates with disabilities and graduates without disabilities. It did not hold for graduates registered for disability related services. For this group, only 3% had a score in the non-facilitating range. This compares with 23% of unregistered graduates with disabilities and 10% of graduates without disabilities.

- Graduates who registered for disability related services tended to have a higher proportion of graduates who reported more facilitating experiences, but this did not necessarily translate into better CRC scores. CRCs of graduates who had registered for disability related services did not differ significantly from those of unregistered graduates with disabilities.

- When all graduates were considered, nine items related to college experiences rated by respondents were significantly correlated to CRC scores. Three of these were also significant for graduates with disabilities. 'Study Habits' and 'Level of Personal Motivation' showed the strongest relationship with CRC scores for graduates with and without disabilities. 'Disability Related Support Services Off-Campus' was also significant for graduates with disabilities. 'Level of Personal Motivation' was particularly important for graduates with disabilities and accounted for the largest amount of variability in CRC scores after high school grades.

- Using regression modeling we found that three variables accounted for 11% - 12% of the variability in the linear relationship with the CRC (Study Habits, Availability of Computers Off-Campus, Attitudes of Professors). 'Study Habits' had the strongest relationship. The model predicted that if each of the three variables rose by one unit, then the CRC score increased by 1.34. When the model was run for graduates with disabilities, only the 'Study Habits' variable was entered, and it accounted for 9% of the variability in CRC score.

- When the high school average was entered into a hierarchal regression model for all graduates, along with the nine perceptions about college experiences variables, five of the nine variables (High School Grade, Study Habits, Attitudes of Professors, Computers Off-Campus, Level of Personal Motivation) were significant predictors. The High School Grade had the strongest relationship with the CRC score, accounting for about 51% of the total variability of 56%. The remaining four variables accounted for 5.2% of the variability in CRC scores. 'Study Habits' accounted for 3.6%, followed by 'Attitudes of Professors' (0.7%), 'Computers Off-Campus' (0.5%) and 'Level of Personal Motivation' (0.4%).

- When the hierarchal regression was repeated for graduates with disabilities, only the High School Grade and one perception about college experiences variable (Level of Personal Motivation) were entered. The 'Level of Personal Motivation' accounted for 8% of the linear relationship with the CRC score once the

variability due to the high school average was partialled out. The High School Grade accounted for 54% of the variability.

- The high school average proved to be a moderately good predictor of whether non-disabled graduates obtained a High (>26) or Low (<=26) CRC score, classifying between 75% and 80% of cases correctly. The perceptions about college experiences variables added little in predictive ability. However, these variables alone did result in better than chance prediction, but were a poor predictor of the Low CRC group.

- Four variables showed statistically significant differences between those correctly classified by our discriminant analysis, and those who underachieved relative to their high school averages. Underachievers had lower perceptions about college experiences scores for 'Financial Situation', 'Level of Personal Motivation', and 'Availability of Computers Off-Campus', and higher scores for the 'Accessibility of Building Facilities (doorways, classrooms/labs etc)' variable. In a similar manner, differences between correctly classified and the misclassified overachievers were compared. The only variable showing a significant difference in the mean CRC was 'Private Tutoring'. Graduates who overachieved reported higher scores on this variable (4.65) than those who were correctly classified (4.05) in the Low group.

- A discriminant function analysis was used to determine how accurately non-disabled graduates could be classified in the Low (<=26) or High (>26) CRC range. The high school average alone was able to classify 77% of graduates correctly (78% of the Low group and 76% of the High group). The perceptions about college experiences variables did not add to the ability to classify graduates. Nonetheless, using the four perceptions about college experiences variables identified by our regression model resulted in better than chance prediction (63%). However, the membership of the Low group classified correctly (44%) was poor compared to the High group (78%).

- When the discriminant function was repeated using graduates with disabilities, use of the 'Study Skills' variable identified in our regression modeling did not result in better than chance prediction (57%). When using the high school average alone 79% of cases were classified correctly (88% of the Low group and 66% of the High group).

Conclusions and Implications for Practice

The fact that higher college exit grades could not be associated with registration for disability services should not be interpreted as indicating that registration for disability related services does not result in improved success for this group of students. We do not know the extent to which disability related services contributes to improved retention and graduation of students with disabilities by easing their progress through their college studies. Evidence was provided for this from our examination of graduate responses to the perceptions about college experiences questionnaire. Graduates with disabilities who registered for disability related services perceived aspects of their college experience as significantly easier than non-disabled graduates and graduates with disabilities who did not register.

The more positive perceptions about their college experiences of graduates registered for disability services may well be related to a number of services provided to students with disabilities as they proceed through to graduation**.** It is possible that many students with disabilities who do not register for disability related services will fail to persist. In a study comparing high school completers and non-completers with LD it was suggested that it may not be academic skill per se but a student's application of skills such as motivation to attend class and complete assigned tasks that are important in determining high school completion. This may be true of college completion as well. Graduates in the present study who registered for disability related services reported higher levels of motivation and more facilitating study habits than unregistered

graduates with disabilities: these may be important determinants of persistence that are facilitated by the service provider.

Nine perceptions about college experiences were positively related to the CRC score for graduates without disabilities. For graduates with disabilities, 'Study Habits', 'Level of Personal Motivation' and 'Disability Related Support Services Off-Campus' were most strongly related to the CRC score. College units and departments that provide support for students in the nine areas identified are likely to enhance student success. The availability of disability related services off-campus was related to higher CRC scores. Therefore, students with disabilities may need to be made aware of the types of community based resources and services available to meet their needs.

The results indicate that graduates with learning disabilities have lower CRC scores than other groups, and compared to other groups, males with LD under-perform relative to their high school averages. Therefore, students with learning disabilities may be considered a 'population at risk.' More intense efforts to assist them in college should probably be made. One possible avenue for this is to provide the kinds of support designed to improve motivation as well as study behaviors.

The findings show that graduates with disabilities who register with the college for disability related services perceive their circumstances, including aspects of the college environment, to be more facilitating of their academic success than do graduates with disabilities who do not register for such services. This suggests that students who currently do not register for such services may benefit from doing so. Thus, the results suggest that publicity campaigns which showcase the benefits of registering may promote student success.

That motivation is important has been demonstrated in our findings and the findings of others. Registering for disability related services may help students sustain the level of personal motivation that is required for them to succeed. Academic advisors need to assist students by providing a forum for students to discuss how instructors can become more sensitive to the needs of students with disabilities, and the role the students themselves may play in achieving this. Because study habits were shown to be linked with college exit grades, advisors and service providers need to support students' efforts to improve their study habits. For example, students can be assisted with developing scheduling and time management skills that would allow them to meet assignment deadlines.

Contact Information

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Sommaire

Diplomés de niveau collégial ayant des incapacités

Étude comparative des résultats de la cote de rendement scolaire (CRC ou « cote R ») chez les diplômés sans incapacité, diplômés ayant des incapacités inscrits aux services spécialisés et ceux non inscrits à ces services

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Mots-clés : *diplômés ayant des incapacités*; réussite *scolaire; troubles d'apprentissage; perception des expériences vécues au collège; moyenne au secondaire*

Introduction

Les résultats des sondages des déclarations volontaires auxquels ont participé des étudiants de première année indiquent que seule une faible proportion des étudiants ayant des incapacités au post-secondaire s'inscrivent, dans leur établissement, à des services spécialisés reliés aux incapacités. Peu de recherches ont été effectuées dans le but de comparer les succès scolaires de ces deux groupes. Afin de comprendre dans quelle mesure l'intégration à la population active et l'enseignement supérieur sont réussis, il importe de connaître le cheminement ultérieur des étudiants avec incapacités qui étaient inscrits ou non à des services spécialisés. Des renseignements fiables à propos de leur réussite doivent être mis à la disposition des personnes qui planifient des changements pédagogiques, conseillent les étudiants ayant des incapacités et leur offrent des services spécialisés. Ce projet consiste à comparer, en utilisant la cote de rendement au collégial (CRC) ou 'cote R' à titre d'indicateur, comment les diplômés du collège inscrits et non inscrits se mesurent à leurs pairs sans incapacité lorsqu'il s'agit d'être admis aux universités du Québec. Par ailleurs, il consiste à comparer les perceptions des diplômés inscrits et non inscrits quant aux facteurs qui contribuent ou nuisent à leur réussite, de

Objectifs

L'objectif du projet consistait à établir si les diplômés de collèges (cégeps) ayant des incapacités ont les mêmes possibilités d'accès à l'enseignement supérieur que leurs pairs sans incapacité. La cote de rendement au collégial, ou CRC ou cote R (une moyenne pondérée des notes) est un important facteur déterminant au moment d'assurer l'admission aux universités du Québec suivant l'obtention d'un diplôme d'études collégiales (DEC). Par conséquent, nous avons choisi de comparer les CRC des diplômés ayant des incapacités (ceux qui sont inscrits à des services spécialisés à l'intention des étudiants ayant des incapacités dans un important collège anglophone et ceux qui ne le sont pas) avec les CRC de leurs pairs sans incapacité. Dans la première partie de l'étude, nous avons examiné la compétitivité relative à l'égard de l'accès à l'université de trois groupes de diplômés en fonction de leur CRC de sortie. Afin de cerner les facteurs qui revêtent une importance en matière de réussite scolaire, nous avons tenté, dans la deuxième partie, d'établir si la façon dont les diplômés ont perçu certains aspects de leurs études collégiales comme étant plus faciles étaient reliés à leur CRC.

Méthodologie
Afin d'étayer nos hypothèses, nous avons obtenu des données d'un certain nombre de bases de données collégiales archivées. L'échantillon était composé de tous les diplômés qui ont obtenu leur diplôme entre 2002 et 2006 (N = 9 406, 5 872 hommes et 3 534 femmes). Parmi ceux-ci, environ un tiers ont rempli au moins un sondage collégial au cours de cette période.

Afin de déterminer si un diplômé avait une incapacité et d'établir la nature de cette incapacité, nous avons consulté deux sources : les archives du bureau des services aux étudiants ayant des incapacités (N = 275) et les déclarations volontaires effectuées dans le cadre des sondages menés au collège durant cette période (N = 145). Un nombre estimatif de 300 à 400 diplômés de l'échantillon avaient une incapacité mais ne pouvaient être identifiés car ils n'étaient pas inscrits à des services et n'avaient pas fait de déclaration volontaire. Environ 60 % des trois groupes (diplômés sans incapacité, diplômés avec incapacités inscrits à des services spécialisés et diplômés avec des incapacités mais non inscrits) étaient des femmes. Les CRC et les résultats de sondages des diplômés ayant des troubles d'apprentissage ont été comparés à ceux des diplômés ayant des incapacités autres que des troubles d'apprentissage ainsi que des diplômés sans incapacité.

Principales constatations

Constatations méthodologiques

- Au moment d'analyser les résultats de la recherche, nous avons constaté que les diplômés qui ont rempli au moins un sondage collégial ont obtenu une moyenne générale au secondaire et une CRC supérieure à celles de leurs collègues qui n'avaient rempli aucun sondage. Cela s'appliquait aussi bien aux diplômés ayant des incapacités qu'aux diplômés sans incapacité. Cet « effet des répondants aux sondages » a d'importantes conséquences méthodologiques et conceptuelles pour les études portant sur les étudiants au collégial et les diplômés en général, et plus particulièrement les étudiants et diplômés ayant des incapacités. Dans le cas présent, puisque la plage de notes sur laquelle l'analyse est fondée est limitée, les différences sous-jacentes entre les populations pourraient être masquées.

- Compte tenu de l'« effet des répondants aux sondages », il ne convenait pas de comparer les résultats des diplômés ayant des incapacités qui ont rempli un sondage avec ceux des diplômés qui n'en ont rempli aucun. Comme il était impossible d'identifier les diplômés ayant des incapacités qui n'étaient pas inscrits à des services spécialisés de leur collège et qui n'avaient rempli aucun sondage, les seules comparaisons significatives pour les diplômés ayant des incapacités excluaient soit le groupe de personnes qui ont fait une déclaration volontaire, soit le groupe de personnes inscrites à des services spécialisés, mais qui n'ont pas répondu à un sondage.

Partie I – Comparaison des CRC des diplômés avec ou sans incapacités

- Si l'on tient compte de l'effet des répondants aux sondages, il n'y avait aucune différence significative entre la CRC des diplômés ayant des incapacités qui étaient inscrits ou qui n'étaient pas inscrits à des services spécialisés du collège. Cela s'appliquait aussi bien aux diplômés ayant des troubles d'apprentissage qu'aux diplômés sans troubles d'apprentissage.

- Les diplômés ayant des troubles d'apprentissage avaient tendance à obtenir une « cote R » et une moyenne au secondaire inférieures à celles des diplômés ayant d'autres incapacités ou sans incapacité. Toutefois, il n'y avait aucune différence entre les CRC des diplômés ayant des incapacités autres que les troubles d'apprentissage et des diplômés sans incapacité.

- Globalement, les hommes avaient tendance à obtenir des CRC et des moyennes au secondaire inférieures à celles des femmes. Cependant, il n'y avait aucune différence dans les CRC des hommes et des femmes sans incapacité pour des moyennes équivalentes au secondaire. Cela s'appliquait également aux diplômés ayant des incapacités autres que les troubles d'apprentissage. Les hommes ayant des troubles d'apprentissage avaient tendance à obtenir des CRC inférieures à celles des autres diplômés ayant obtenu des moyennes similaires au secondaire.

- Le pourcentage de diplômés ayant des troubles d'apprentissage dont la moyenne au secondaire était inférieure à 75 se situe à 65 %, par rapport à 34 % pour les autres diplômés et à 40 % pour les diplômés ayant des incapacités autres que les troubles d'apprentissage. Ce chiffre était particulièrement élevé dans le cas des hommes diplômés ayant des troubles d'apprentissage (soit 78 %).

- La moyenne au secondaire avait une corrélation relativement élevée avec la CRC et était une façon modérément efficace de prédire si un diplômé aurait une « cote R » supérieure ou inférieure à 26 (soit une cote normalement considérée comme acceptable pour l'admission aux principales universités).

Partie II – Relation entre les CRC et la perception des expériences vécues au collège

- Les diplômés inscrits à des services spécialisés ont vécu les différents aspects de leurs expériences collégiales avec plus de facilité que les diplômés ayant des incapacités qui n'étaient pas inscrits à ces services de même que les diplômés sans incapacité. Les diplômés ayant des incapacités qui n'étaient pas inscrits ont considéré leur expérience collégiale comme étant la plus difficile.

- Globalement, les diplômés qui ont perçu certains aspects de leur expérience collégiale comme étant plus difficiles avaient obtenu, en moyenne, une CRC inférieure. Cette tendance à l'égard des CRC plus faibles valait également pour les diplômés ayant des incapacités qui n'étaient pas inscrits à des services spécialisés de même que les diplômés sans incapacité. Elle ne valait pas pour les diplômés inscrits à des services spécialisés. De ce groupe, seulement 3 % affichaient une cote dans la plage non facilitante. Cela se compare à 23 % des diplômés ayant des incapacités qui n'étaient pas inscrits à des services spécialisés et à 10 % des diplômés sans incapacité.

- Les diplômés inscrits à des services spécialisés avaient tendance à être plus nombreux à signaler des expériences plus facilitantes, mais cela ne se traduisait pas nécessairement en CRC supérieures. Les CRC des diplômés inscrits à des services spécialisés ne différaient pas de façon significative de celles des diplômés ayant des incapacités qui n'étaient pas inscrits à des services spécialisés.

- Tous diplômés confondus, neuf éléments reliés aux expériences collégiales vécues par les répondants étaient reliés de façon significative aux CRC. Trois d'entre eux étaient également significatifs pour les diplômés ayant des incapacités. La relation avec les CRC pour les diplômés avec ou sans incapacités était la plus marquée dans les cas de la gestion du travail scolaire et du degré de motivation personnelle. Les services spécialisés offerts à l'extérieur du cégep revêtaient également de l'importance pour les diplômés ayant des incapacités. Le degré de motivation personnelle était particulièrement important pour les diplômés ayant des incapacités; aussi, c'est à ce facteur qu'on pouvait attribuer la plus grande variabilité des CRC, après les moyennes obtenues au secondaire.

- À l'aide de la modélisation de régression, nous avons constaté qu'entre 11 et 12 % de la variabilité dans la relation linéaire avec la « cote R » était attribuable à trois variables (la gestion du travail scolaire, la disponibilité des ordinateurs à l'extérieur du cégep et l'attitude des professeurs). La gestion du travail

scolaire présentait la plus forte relation. Le modèle prédisait que si chacune des trois variables augmentait d'une unité, la CRC serait en hausse de 1,34. Lorsque le modèle a été exécuté pour les diplômés ayant des incapacités, seule la variable de gestion du travail scolaire a été utilisée; 9 % de la variabilité de la « cote R » y était attribuable.

- Lorsque la moyenne au secondaire a été utilisée dans un modèle de régression hiérarchique pour tous les diplômés, conjointement avec les neuf perceptions à propos des variables liées aux expériences collégiales, cinq des neuf variables (moyenne obtenue au secondaire, gestion du travail scolaire, attitude des professeurs, disponibilité des ordinateurs à l'extérieur du cégep et degré de motivation personnelle) étaient des indicateurs prévisionnels significatifs. Les moyennes obtenues au secondaire présentaient la plus forte relation avec la CRC, soit environ 51 % de la variabilité totale de 56 %. Les quatre autres variables représentaient 5,2 % de la variabilité des CRC. La gestion du travail scolaire représentait 3,6 %, suivie de l'attitude des professeurs (0,7 %), la disponibilité des ordinateurs à l'extérieur du cégep (0,5 %) et le degré de motivation personnelle (0,4 %).

- Lorsque la régression hiérarchique a été répétée pour les diplômés ayant des incapacités, seules la moyenne obtenue au secondaire et une perception à propos des expériences collégiales (degré de motivation personnelle) ont été utilisées. Seulement 8 % de la relation linéaire avec la CRC était attribuable au degré de motivation personnelle une fois que la variabilité attribuable à la moyenne obtenue au secondaire a été ventilée. La moyenne obtenue au secondaire représentait 54 % de la variabilité.

- La moyenne au secondaire s'est révélée un indicateur prévisionnel relativement efficace de la mesure dans laquelle les diplômés sans incapacité ont obtenu une CRC élevée (>26) ou faible (<=26), classant entre 75 et 80 % des cas correctement. Les variables de perception à propos des expériences collégiales ont ajouté peu de valeur de prévision. Néanmoins, ces variables ont donné à elles seules de meilleurs résultats que les prévisions au hasard, mais étaient un piètre indicateur prévisionnel dans le groupe ayant obtenu une faible CRC.

- Quatre variables ont présenté des différences statistiquement significatives entre ceux qui se sont classés correctement selon notre analyse discriminante, et ceux qui ont sous-performé relativement à leur moyenne au secondaire. Les sous-performants affichaient une cote supérieure quant à la perception à propos de leurs expériences collégiales en ce qui a trait à la situation financière, au degré de motivation personnelle et à la disponibilité des ordinateurs à l'extérieur du cégep, et une cote supérieure pour l'accessibilité des salles de cours et laboratoires. De même, les différences entre les sur-performants classés correctement et incorrectement ont été comparées. La seule variable affichant une différence significative sur le plan de la CRC était le tutorat privé. Les diplômés qui ont surperformé ont accordé des cotes supérieures à cette variable (4,65) que ceux qui se sont correctement classés (4,05) dans le groupe faible.

- Une analyse discriminante a permis de déterminer dans quelle mesure les diplômés sans incapacité pouvaient être classés correctement dans la plage de CRC faibles (<=26) ou élevées (>26). La moyenne au secondaire a permis à elle seule de classer 77 % des diplômés correctement (78 % dans le groupe faible et 76 % dans le groupe élevé). Les variables de perception à propos des expériences collégiales n'ont pas augmenté la capacité de classer les diplômés. Cependant, l'utilisation des quatre variables de perception à propos des expériences collégiales identifiées par notre modèle de régression a donné de meilleurs résultats que les prédictions au hasard (63 %). Néanmoins, les personnes appartenant au groupe faible qui ont été classées correctement (44 %) étaient peu nombreuses par rapport au groupe élevé (78 %).

- Lorsque la fonction discriminante a été répétée pour les diplômés ayant des incapacités, l'utilisation de la variable d'expériences collégiales relative aux habiletés pour les études, qui a été établie par notre modélisation de régression, n'a pas donné de meilleurs résultats que les prédictions au hasard (57 %). La moyenne au secondaire a permis à elle seule de classer 79 % des cas correctement (88 % dans le groupe faible et 66 % dans le groupe élevé).

Conclusions et possibilités concrètes

Le fait que des notes de sortie supérieures à la moyenne n'ont pu être associées à l'inscription à des services spécialisés ne devrait pas être interprété comme s'il signifiait que l'inscription à des services spécialisés ne résulte pas en une réussite accrue pour ce groupe d'étudiants. Nous ne connaissons pas la mesure dans laquelle les services spécialisés contribuent à améliorer la rétention et la diplomation des étudiants ayant des incapacités en facilitant leurs études collégiales. Des preuves en ce sens ont été dégagées de notre examen des réponses des diplômés au questionnaire sur la perception des expériences collégiales. Les diplômés ayant des incapacités qui étaient inscrits à des services spécialisés ont perçu certains aspects de leurs expériences collégiales comme étant considérablement plus faciles que les diplômés sans incapacité et les diplômés avec incapacités qui n'étaient pas inscrits.

Les perceptions plus positives des expériences collégiales par les diplômés inscrits à des services spécialisés pourraient bien être reliées au nombre de services fournis aux étudiants avec incapacités au cours de leur cheminement vers la diplomation**.** Il est possible que bon nombre d'étudiants ayant des incapacités qui n'étaient pas inscrits à des services spécialisés ne persévèrent pas. Dans le cadre d'une étude comparant les finissants et les non-finissants du secondaire ayant des troubles d'apprentissage, on suggérait que ce n'est peut-être pas les habiletés scolaires en soit mais plutôt l'application de ces habiletés par l'étudiant, notamment la motivation d'assister aux cours et d'effectuer les travaux, qui est importante pour l'achèvement des études secondaires. On pourrait peut-être en dire autant de l'achèvement des études collégiales. Les diplômés visés par la présente étude qui étaient inscrits à des services spécialisés ont signalé un degré plus élevé de motivation et une gestion du travail scolaire plus facilitante que les diplômés avec incapacités qui n'étaient pas inscrits; il pourrait s'agir d'importants facteurs déterminants de persévérance qui sont facilités par le fournisseur de services.

La disponibilité de services spécialisés offerts à l'extérieur du cégep était reliée à des CRC plus élevées. Par conséquent, il conviendrait que les étudiants ayant des incapacités soient mis au courant des types de ressources et services communautaires à leur disposition.

Neuf perceptions à propos des expériences collégiales avaient un lien positif avec les CRC pour les diplômés sans incapacité. Dans le cas des diplômés ayant des incapacités, la gestion du travail scolaire, le degré de motivation personnelle et les services spécialisés offerts à l'extérieur du cégep étaient le plus fortement reliés à la CRC. Les unités et les départements du collège offrant un soutien aux étudiants dans les neuf domaines identifiés sont susceptibles de contribuer à la réussite des étudiants appartenant aux deux groupes.

Les résultats indiquent que les diplômés ayant des troubles d'apprentissage obtenaient des CRC inférieures à ceux des autres groupes, et par rapport aux autres groupes, les hommes ayant des troubles d'apprentissage sous-performaient relativement à leur moyenne au secondaire. Aussi, on pourrait considérer que les étudiants ayant des troubles d'apprentissage constituent une « population à risque ». Il faudrait probablement déployer des efforts accrus pour les aider au collégial. Une des possibilités consiste à offrir le type de soutien destiné à améliorer la motivation de même que les comportements de gestion du travail scolaire.

Les constatations démontrent que les diplômés ayant des incapacités qui sont inscrits à des services spécialisés offerts par le collège perçoivent leurs circonstances, y compris les aspects liés au milieu collégial, comme étant plus facilitantes sur le plan de la réussite scolaire que les diplômés ayant des incapacités qui ne sont pas inscrits à de tels services. Cela suggère que les étudiants qui ne sont pas actuellement inscrits à des services spécialisés auraient peut-être intérêt à le faire. Par ailleurs, les résultats suggèrent que des campagnes publicitaires faisant la promotion de ces services pourraient favoriser la réussite des étudiants.

L'importance de la motivation a été démontrée par nos constatations et par celles d'autres études. L'inscription à des services spécialisés pourrait aider les étudiants à maintenir le degré de motivation personnelle nécessaire à leur réussite. Les conseillers pédagogiques pourraient être appelés à aider les étudiants en leur accordant une tribune pour discuter des façons dont les professeurs devraient être sensibilisés davantage aux besoins des étudiants ayant des incapacités, ainsi que du rôle que les étudiants pourraient eux-mêmes jouer à cette fin. Puisque le lien entre la gestion du travail scolaire et les notes de sortie a été démontré, les conseillers et les fournisseurs de services pourraient être appelés à appuyer les efforts des étudiants qui veulent améliorer leur gestion du travail scolaire. Par exemple, ils pourraient aider les étudiants à améliorer leurs habiletés d'établissement d'horaire et de gestion du temps pour qu'ils réussissent à terminer leurs travaux à temps.

Information pour nous rejoindre:

Pour plus d'informations et pour le texte intégral du rapport, consultez la site du web Réseau de Recherche Adaptech (http:/www.adaptech.org) ou contactez l'un des principaux chercheurs.

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Cegep Graduates With Disabilities

College Exit (CRC) Scores of Graduates Registered for Disability Related Services Compared to Non-registered Graduates and Graduates Without Disabilities

1 Introduction

People with disabilities will only be able to participate fully in the social and economic life of their communities if they have equal access to employment opportunities and further education following graduation from cegep (Québec junior/community colleges are called cegeps). It is important, therefore, that cegeps have in place effective services to ensure graduates with disabilities are able to overcome educational disadvantages associated with their disability, and are able to graduate and compete for places at university and job opportunities following the completion of their college diploma (DEC).

1.1 Research on Students With Disabilities

Little recent research has been conducted either in Canada or Québec to evaluate whether providing accommodations for students with disabilities facilitates their success. It is only by having such data that services can be improved and a better understanding of the obstacles to success can be achieved.

Although there was much work done on the integration of students with disabilities in the late 1970s and during the 1980s (e.g., Coallier, Leblanc, Leblanc, & Lemire, 1987; Direction générale de l'enseignement collégial, 1989; Fédération des cégeps, 1988; Lavoie, 1986; Leblanc, 1999; Picard, 1986; Tremblay & Charron, 1992), there has been relatively little research attention paid to this topic in the 1990s. Because of substantial growth in the number of students with disabilities serviced by cegeps during this time, it is clearly time to revisit this topic and evaluate how students are faring in the system over a decade later.

At most North American colleges and universities, including the cegeps, there is at least one designated person whose responsibility it is to provide disability related services and accommodations to students with documented disabilities. Examples of the kind of services offered include exam accommodations, advocacy, peer tutoring, production of academic material in alternative formats and assistance with specialized computer technologies (e.g., Juhel, 2000a). Students have the option to register for disability services, and in most cases need to provide documented proof of the disability and the need for specialized services.

Various surveys have shown that students with disabilities who do not register for services constitute the largest group of students with disabilities enrolled in colleges and universities. Our previous research has shown that students who do not register with their disability service provider perceive the factors that contribute success at college as less facilitating than either graduates with disabilities who do register, or graduates without disabilities (Fichten, Jorgensen & Havel & Barile, 2006). Therefore, it is now time to find out how students with disabilities who do not register for services fare. By comparing academic success of students with disabilities who register for services with those who do not can lend some insight into whether receiving disability related services helps eliminate the educational obstacles that individuals may encounter as a consequence of their disability.

To enhance opportunities for cegep students with disabilities, and to enable them to succeed, it is vital that reliable and valid information on their academic success is available and compared to that of students without disabilities. It is also important that the information is made available to those involved in planning and providing pedagogical changes and disability related access services. If it can be established that those students who do not receive services perceive their cegep experience to

be more difficult, and that they have lower college exit scores, this has important implications for counsellors and disability service providers.

The results of self-report surveys administered to postsecondary students indicate that only a small proportion of students with disabilities in the college or university population actually register for services. Students may fail to register for a variety of reasons (Amsel & Fichten, 1990; Fichten, Asuncion, Barile, Robillard, Fossey, & Lamb, 2003, Fichten, Bourdon, Creti, & Martos, 1987; Greenbaum, Graham, & Scales, 1995, Livneh, 2001). For example, they may not register because they feel they do not need services, because they 'want to do it like everyone else' or because they do not wish to be singled out and 'stigmatized' as a student who has a disability. Consequently, the rate of disability in college populations is higher than that reflected in the figures provided by the disability service providers at their postsecondary institutions. Estimates of the number of North American postsecondary students with some disability have ranged from 5% to 11%, with colleges having a larger proportion of students with disabilities than universities (Fichten, Asuncion, Barile, Robillard, Fossey, & Lamb, 2003). The 1995-96 National Postsecondary Aid Study (cited by Horn & Berktold, 1999) indicates that approximately 6% of 21,000 American university undergraduates surveyed indicated that they had a disability. A 1994 freshman survey conducted by the Cooperative Institutional Research Program (Henderson 1995) and a 1998 freshman survey reported by Henderson (1999) indicated that 9% of students reported at least one disability (Henderson, 1995, 1999). According to CADSPPE, 7% percent of persons with disabilities reportedly participate in postsecondary education in Canada (Canadian Association of Disability Service Providers in Postsecondary Education (CADSPPE), 1999). More recently, the freshman survey has looked only at university students. Here the data show that 6% of freshmen reported having a disability (Henderson, 2001). A recent American study surveyed 120,000 students randomly selected from enrolment lists at about 1,600 postsecondary institutions. The study showed that, overall, 12.2% of public two year junior/community college students reported having a disability. The corresponding figure for public four year universities with and without a doctoral program were 9.4% and 11% respectively (D'Amico, 2006; Munsey, 2006).

Two surveys of enrolled students conducted at our own cegep in 2002 and 2005 indicated that the percentage of students who reported a disability represented between 6.5% and 9% of the college's student population, consistent with the figures reported in the literature. In our recent study of the obstacles and facilitators of student success, three cegeps administered the Cegep Experience Questionnaire to graduates in the 2005 academic year, and graduates were asked to report their disability status (Fichten, Jorgensen, Havel & Barile, 2006). Of the 1486 graduates who replied 182 (12.2%) reported a disability. Of these 182, only 24 (13.2%) registered with their disability service providers. The rate of disability in the student population measured using only those graduates who registered would be 1.6%. In a survey of disability service providers at all public Canadian universities and colleges, it was found that the percent of Canadian post-secondary students with a disability who registered to receive services represented only 3% of the student population (Fichten, Barile, & Asuncion, 1999). Clearly the majority of students with disabilities enrolled in postsecondary institutions do not receive disability related accommodations, and estimating the rate of disability in the student population using only those students who register for disability related services under-reports the actual rate.

Most researchers obtain their study samples of students with a disability from two sources: self-reports using probability samples of all the institution's students, and from the records of the offices responsible for providing services to students with disabilities. However, little research has been done to compare the educational outcomes of the two groups. It is especially important to show the extent to which disability related accommodations can facilitate the academic success and vocational

attainments of students with disabilities. It is also important to know whether those students who choose not to register with the campus disability service provider would fare better if they did and, therefore, should be encouraged by counsellors to use the services provided in order to optimize their opportunities for success.

The Ministère de la Santé et des Services sociaux (1992) established goals for the year 2002. Among these was the intention to, "diminuer les situations qui entraînaient un handicap". The first priority concerned school and vocational integration (MSSS, 1992, p. 128). The Strategic Plan of the Ministère de l'Éducation, du Loisir and du Sport (2005) reiterates its commitment to support students with special educational needs and to foster their success and integration. Though much of the government policy relates to the secondary schools, full integration of individuals with disabilities requires providing equal access to higher education and integration into the workforce.

Our previous research was based on the constructs of Fougeyrollas' PPH model (Processus de production du handicap (Fougeyrollas, Lippel, St-Onge, Gervais, Boucher, Bernard, & Lavoie, 1999). We examined the obstacles and facilitators that influenced success at cegep from the perspective of this dominant Quebec conceptual framework. This PPH model was designed in Québec and is widely used in the rehabilitation community. According to this model the presence of a handicap reduces the ability to perform daily activities that result from the interaction with personal and environmental factors (Fougeyrollas et al., 1999). In the case of education, daily activities ('habitude de vie') would involve attending college, studying, writing, reading and participating in the extracurricular and social activities offered at the college (cf.Lemieux-Brassard, 1996). This approach recognizes that through the individuals' abilities, and with appropriate interventions the obstacles that the individual encounters in the educational setting can be overcome. These interventions in colleges are mediated though the disability service providers who provide accommodations to those students with disabilities who register for their services. However, the largest percentage of students with disabilities do not receive such support to overcome the obstacles they may encounter daily as a result of their impairment, as they fail to register with their service providers. Our previous research, using the Cegep Experience Questionnaire based on the PPH model, has shown that students who do not register with their disability service provider perceive the factors that influence success at college as less facilitating than either graduates with disabilities who do register for services or graduates without disabilities. Does a less facilitating environment have an impact on academic success of the unregistered students and the ability to compete for places at university? The present study examines the academic success (as measured by the college exit grades or CRC scores) of graduates who register for disability related services , and compares this to the outcomes of graduates who did not register and to graduates who do not have a disability. The aim was to assess the how competitive the three groups are in accessing places at university. We also examine the obstacles and facilitators of success as perceived by graduates, and examine if these factors are correlated with the college exit grades.

1.2 Policy framework – Education for Students With Disabilities

In 2002 the Quebec Ministère de l'Éducation published a policy on special education (Adapting Our Schools to the Needs of All Students, 2002) where it is stated:

'*Young people with difficulties ask that we not only show concern for them but also help them achieve success. This is an obligation from which no one can be exempted'.*

In achieving these policy objectives the cegeps have an important role to play. Postsecondary education needs to ensure that people with disabilities are able to compete equally in the job market

and for places at university. This allows individuals with disabilities to fulfill personal goals, contributes to their independence and financial security and reduces reliance on public funds.

As the number of people with disabilities in postsecondary education continues to increase both in Québec and elsewhere in North America (Clermont, 1995; Lavoie, 1986; Leitch, 1995; Harris Interactive Inc., 2000; McGill, Roberts, & Warick, 1994; Tousignant, 1995; Wolforth (1995); Fichten, Bourdon, Creti, & Martos, 1987; Leblanc, 1999), postsecondary institutions have increasingly recognized the need to grant accommodations to people with disabilities (Fichten, Bourdon, Creti, & Martos, 1987; Leblanc, 1999). It is important that decision makers responsible for budget allocations are provided with evidence based research that shows how investment in disability support services results in improvements in graduation rates as well as post-graduation outcomes, and contributes toward the policy goal of achieving "*the full integration of young people with special needs".*

According to the report, "*À l'unisson : Une approche canadienne concernant les personnes handicapées*," only 6% of Canadians with disabilities held a university degree about a decade ago (Ministres Fédéral, Provinciaux et Territoriaux Responsables des Services Sociaux, 1998). The comparable figure for non-disabled Canadians was 14% (14.8% by 1999: Canadian Global Almanac 2001, 2000). The rates of employment for people who have a university degree are higher than those of students who did not complete university, who, in turn, generally fare better than those who never went to college (Fawcett, 1996; Government of Canada, 1996; Harris Interactive Inc., 2000).

Postsecondary education is the key to training a labour force and, as M. Rochon noted (Ministère de la Recherche, de la Science et de la Technologie, 2000), Québec is working hard to meet the challenges of the new knowledge-based economy. "*Postsecondary education has been targeted as one of the key vehicles for providing a labour force ready to meet the challenges of the new workplace. Human Resources Development Canada estimates that nearly half of the jobs created in the next decade will require a minimum of 17 years of education*" (Butlin, 1999, p. 9).

Among the educational objectives announced by the Conseil supérieur de l'éducation (2000) is the goal that 40% of the Québec population under age 30 attend university within the next decade (compared to the current 20% of the population over age 15), with 30% graduating. For youth with disabilities similar targets need to be adopted and monitored. Providing an educational environment in which students with disabilities can succeed requires that services provided to students be evaluated for their effectiveness. In addition, the academic outcomes of all students with disabilities, including those not registered for disability services, need to be monitored and compared to those of their non-disabled peers.

2 Goals and Objectives

The goal of the project was to determine whether graduates with disabilities have the same opportunities to access higher education as their non-disabled peers. The exit CRC score (cote de rendement au collégiale) is an important determinant in ensuring entrance to universities in Quebec following the completion of a DEC. We, therefore, chose to compare the CRC scores of graduates with disabilities (both those who registered for disability related services and those who did not) with their non-disabled peers to assess the competitiveness of the three groups in gaining access to university. For the three groups of graduates we also examined whether the ease with which they experienced aspects of their cegep studies correlated with their CRC scores. This was done in order to isolate factors that are important for success at college as perceived by the graduates themselves.

The hypotheses we tested are listed below:

- Graduates who register to receive disability related services have CRC scores that exceed those of graduates with disabilities who do not register for services – and opportunities for access to higher education are, therefore, enhanced.

- Graduates with disabilities who register to receive disability services have CRC scores that are equivalent to those of graduates without disabilities. Receiving services assists students with impairments to overcome the potential effect of the disability in limiting their access to higher education, and allows them to effectively compete with their non-disabled peers in gaining access to university.

- Graduates with low CRC scores perceive factors that contribute to success at cegep as less facilitating than those who have high CRC scores.

- CRC scores differ depending on the nature and severity of the disability: graduates with learning disabilities/attention deficit disorder (LD/ADD) have lower CRC scores compared to graduates with other types of disabilities. Graduates with LD/ADD who register for services have higher CRC scores than graduates with LD/ADD who do not register.

- The CRC scores of males are lower than those of females, regardless of the presence of a disability, regardless of the type of disability and, if an impairment is present, regardless of whether or not they register for disability services.

3 Method

The study was conducted at a large urban English college in Quebec. The college enrols approximately 7500 full-time day students in diploma programs and a further 1500 – 2000 students in continuing education.

To test our hypotheses it was necessary to obtain data from a number of the College's databases (including the College's records system, those maintained by the office of Services for Students with Disabilities and those held in the Office of Institutional Research). Graduate surveys, conducted by the College in 2003 and 2004, asked graduates to identify whether they had a disability, and the nature of that disability. College wide student satisfaction surveys were conducted in 2002 and 2005, again asking the students to identify whether they had a disability and the nature of the disability. In addition, the office of Services for Students with Disabilities collects information on students who register for their services. The graduates with disabilities were identified using these archives, and sorted into those graduates who registered for disability services and those who did not. In addition, a third group of graduates without disabilities were identified. CRC scores for graduates at the point of exiting their programs were obtained from the College's records.

Since our previous research has shown that there are large differences in success outcomes as a function of sex, sex differences as well as disability status were taken into consideration in examining the differences in CRC scores among the three groups of graduates.

3.1 Sample Selection For Inclusion in the Study

This study included all graduates who completed their college diploma in either a pre-university or career program between 2002 – 2006, and for which the exit CRC score (cote de rendement au collégial or standardized college exit score) was available. This essentially included all graduates who completed a DEC during this period. Table 1 outlines the number of graduates with a CRC score included in the study by the session of graduation. To carry out the comparisons that would

allow us to test our hypotheses, it was important to identify those graduates who had a disability, the nature of the disability and whether they were registered for disability services with the service provider. It was possible to identify graduates with disabilities who registered for disability services through the records of the office of Services for Students With Disabilities. To identify those graduates with disabilities who did not register for services, it was necessary to use data collected on various surveys administered by the College where students were asked to indicate whether they had a disability and the nature of the disability.

Table 1 Graduates Included in the Study and the Session of Graduation

Calendar Year	Grad Session	Number	%
2002	Winter	1258	13.4
	Summer	265	2.8
	Autumn	427	4.5
Total 2002		**1950**	**20.7**
2003	Winter	1321	14.0
	Summer	257	2.7
	Autumn	457	4.9
Total 2003		**2035**	**21.6**
2004	Winter	1394	14.8
	Summer	262	2.8
	Autumn	128	1.4
Total 2004		**1784**	**19.0**
2005	Winter	1357	14.4
	Summer	240	2.6
	Autumn	418	4.4
Total 2005		**2015**	**21.4**
2006	Winter	1357	14.4
	Summer	265	2.8
Total 2006		**1622**	**17.2**
Total		**9406**	**100.0**

3.2 Determining the Disability Status of Graduates - Sources of Information

The College has collected information on the disability status of its students on a number of surveys since 2002. In 2002 and 2005 the Noel-Levitz Student Satisfaction Inventory (SSI) was administered on-line to all students enrolled in the spring semesters. Since 2004 the Incoming Students Survey (ISS) has also been administered to students entering the college. In addition, the College administers by mail, each year, a Graduate Destinations Survey (GDS) to graduates 6 – 12 months following the completion of their diploma. In 2004 and 2005 all students who had graduated in the prior three semesters were sent this survey, with an extra question asking them to identify whether they had a disability, and the nature of the disability. These GDS surveys also included questions

that collected information used in our previous research, a study that investigated factors that graduates felt either hindered or facilitated their success at cegep (Fichten, Jorgensen & Havel, & Barile, 2006). This data is used in the present study to determine whether there is a correlation between CRC scores and degree of difficulty perceived by graduates related to their personal backgrounds or the cegep environment.

3.2.1 Identifying Graduates With and Without Disabilities

All the information collected using the surveys described above is held in archived files in the Office of Institutional Research. The graduates with disabilities were identified from either their responses to these surveys or through the office of Services for Students With Disabilities. Information obtained from surveys was necessary, as this was the only possible way to identify graduates with disabilities who did not register with the service provider. In order to identify these graduates, a list of all students who graduated between 2002 (winter session) and 2006 (winter session) was first obtained from the College's records system. This was the basis of the sample used in this study.

The student identification numbers of graduates were then cross-referenced against the list of students who had responded to any of the surveys during the study period. If the graduate did respond to the disability related questions, this was recorded along with the nature of the disability. All graduates, both with and without disabilities included in the study would have had the opportunity to respond to at least one survey while enrolled at the College, and this was the reason the period was chosen (Table 2). Information regarding whether the graduate was registered for services was obtained by cross-referencing their student identification numbers with the database maintained by the Services for Students With Disabilities office. The information relating to the nature of the disability was also obtained from the service provider's database.

Table 2 Surveys to Which Graduates in Each Session Had the Opportunity to Respond

Graduation Session	Survey
Winter 2002	SSI 2002 (April)
Summer 2002	SSI 2002 (April)
Autumn 2002	Graduate Destination 2004
Winter 2003	Graduate Destination 2004
Summer 2003	Graduate Destination 2004
Autumn 2003	Graduate Destination 2005
Winter 2004	Graduate Destination 2005
Summer 2004	Graduate Destination 2005
Autumn 2005	SSI 2005 (April)
Winter 2006	ISS 2004

Using this method to cross-reference data, it was possible that a graduate responded to more than one survey. If this was the case, duplicates were removed. When a choice was necessary, any records associated with responses to the GDS surveys in 2004 and 2005 were retained as these surveys provided information on an additional measure, the index of difficulty (IDF), used in this study.

Since it is possible that survey responders and non-responders have different response characteristics, all graduates were assigned a status of 'responder' if they responded to at least one of the surveys or 'non-responder' if they had no record of responding to any of the surveys. This was made possible through the archives of the Office of Institutional Research. The Office holds records for all students or graduates that were targeted by the SSI and the GDS surveys. However, for the ISS survey it was not possible to identify the non-responders specifically associated with that survey,

as the survey was not administered through the Office of Institutional Research, and it was not possible to obtain a list of students targeted. However, graduates from the ISS survey in 2004 would have been enrolled at the time the SSI was run in 2005, and would have been either a responder or non-responder to that survey. Table 2 outlines the surveys to which graduates in each session would have had the opportunity to respond.

Graduates registered with the Services for Students With Disabilities who graduated from 2002 onwards, and who did not reply to at least one of the surveys were also included as non-responders (N = 198). Some graduates with disabilities who self-reported on surveys were also registered to receive services. Therefore, registered graduates with disabilities consisted of a group of responders (N = 77) and non-responders (N = 198) for a total of 275 registered graduates. It should also be noted that it was not possible to identify a hidden group of graduates with disabilities - i.e. those who did not reply to any survey and were not registered to receive services with the disability service provider.

3.2.2 Response Profile

The identification and removal of duplicate responders resulted in a final sample of N = 9406, consisting of 420 graduates with at least one disability and 8986 graduates without disabilities (Table 3). Of the 9406 graduates, 3181 responded to at least one of the surveys. Graduates with disabilities made up 4.5% of the total sample, but it should be noted that this does not include the non-responder graduates with disabilities who did not register for services as there was no way of identifying this group. Of the 420 graduates with disabilities, 275 (65.5%) were registered with the Services for Students With Disabilities and 145 self-reported on one of the surveys, but did not register with the disability service provider (Table 5). Of the 275 who registered, 77 also responded to at least one survey.

Table 3 Sample Sources – Showing the Number of Graduates Who Responded to at Least One Survey

Disability Status	Data Source	Did Not Respond	*Responded	Grand Total
With Disabilities	Service provider	198		198
	GDS		104	104
	ISS		13	13
	SSI		105	105
With Disabilities Total		**198**	***222**	**420**
Without Disabilities	GDS	2383	966	3349
	ISS	unknown	500	500
	SSI	3644	1493	5137
Without Disabilities Total		**6027**	**2959**	**8986**
Grand Total		**6225**	**3181**	**9406**

**Of the 222 graduates with disabilities who responded to the surveys, 77 were registered to receive services. The remaining 145 were graduates with disabilities who self-reported having a disability but were not registered with the service provider.*

As previously mentioned, the large group of graduates labelled ‘without disabilities’ may include graduates with disabilities who did not register with the service provider and did not self-report on any of the surveys (an estimated 300 – 400 graduates). However, given the normal rate of disability in the college population, and the fact that many in the group have already been identified, the

number of remaining graduates with disabilities will be small relative to the total sample of non-responders (6225), and their presence will not significantly distort the measures for this group.

It was possible to determine that 28.9% of graduates targeted by either the SSI or GDS surveys responded to a least one of them. This is not a true response rate however, since graduates who responded to two or more of the surveys were counted only once in the sample. This compares to a figure of 26.1% for graduates with disabilities who registered with the disability service provider (Table 4). It was not possible to calculate the response rate for graduates with disabilities who were not registered, as the total number of graduates with disabilities targeted by the surveys but who were not registered for services is unknown. It was also not possible to calculate the response rate for the ISS, as it was not possible to determine the total number of graduates who were targeted by the survey.

Table 4 Survey Response Profile

Disability Status	Did not respond	*Responded	Total	% Responders
With Disabilities (Registered) - GDS or SSI	198	70	268	26.1%
Without Disabilities – GDS or SSI	**6027	2459	8486	29.0%
Add Grads Who Self Reported a Disability - GDS or SSI	na	139	139	na
Total (SSI,GDS)	**6225**	**2668**	**8893**	**28.9%**
Add ISS - Registered With Disabilities	na	7	7	na
Add ISS - Unregistered With Disabilities	na	6	6	na
Add ISS Grads – Without Disabilities	na	500	500	na
Total Sample	**6225**	**3181**	**9406**	**na**

**Responded to at least one of the surveys. ** The 6027 graduates who responded to the GDS or SSI includes graduates with disabilities who did not self-report and who were not registered for services.*

Table 5 Number of Registered and Unregistered Graduates With Disabilities

Disability Status	Responded to at least one survey	Did not respond to any survey	Total
Registered With Disabilities	77	198	275
Unregistered With Disabilities (Self-reported)	145	unknown	145
Without Disabilities	2959	6027	8986
Total Sample	**3181**	**6225**	**9406**

Once the graduates' response characteristics were identified, information concerning the sex, CRC score, high school grade (Secondary V average), session of graduation, program, diploma type and age at graduation were obtained from the College's records.

3.3 Sample Characteristics

3.3.1 Sex

The sample consisted of approximately 60% females 40% males for both graduates with and without disabilities. Although Table 6 shows that graduates with disabilities had a slightly higher percentage

of males compared to graduates without disabilities, a chi-square test (2 Gender X 3 Disability Status) indicated that the differences in the percentages across the three groups were not statistically significant (χ^2 (2, N = 8986) = 1.02, p = 0.60) (Table 6).

3.3.2 Average Age at Graduation

The average age of graduates at the time of graduation was 21.0 years. A 2 X 3 ANOVA (2 Sex X 3 Disability Status) showed no significant difference in the average age for either Sex (F (1,19400) = 0.21, p = 0.64) or Disability Status (F (2,19400) = 0.82, p = 0.44) and no significant interaction between the two variables (F(2,19400) = 0.40, p = 0.67 (Table 7).

Table 6 Proportion of Males and Females - Graduates With and Without Disabilities

Disability Status	Sex	Number	%
With Disabilities - Registered	Females	164	59.6%
	Males	111	40.4%
	Total	**275**	**100**
With Disabilities – Not Registered	Females	89	61.4%
	Males	56	38.6%
	Total	**145**	**100**
Without Disabilities	Females	5619	62.5%
	Males	3367	37.5%
	Total	8986	100
Total Sample	Females	5872	62.4%
	Males	3534	37.6%
	Total	**9406**	**100%**

Table 7 Average Age of Graduates With and Without Disabilities at the Time They Graduated

Disability Status	Sex	M	SD	N
With Disabilities – Registered	Females	20.8	2.79	164
	Males	21.1	3.24	111
	Total	**20.9**	**2.98**	**275**
With Disabilities – Not Registered	Females	21.3	4.15	89
	Males	21.5	4.40	56
	Total	**21.4**	**4.23**	**145**
Without Disabilities	Females	21.0	3.90	5619
	Males	21.0	3.17	3367
	Total	**21.0**	**3.65**	**8986**
Total	Females	21.0	3.88	5872
	Males	20.1	3.20	3534
	Total	**21.0**	**3.64**	**9406**

3.3.3 Distribution and Types of Disabilities

Table 8 shows the number of graduates by disability type. Overall, the percentage of graduates with learning disabilities / attention deficit disorder (LD/ADD) averaged 44.0% percent. However the proportion of graduates with LD/ADD was much larger for registered graduates (58.5%) than for unregistered graduates (16.6%) (χ^2 (1, N = 420) = 67.9, p <.01). Therefore, the majority of graduates with disabilities who registered with the service provider were those with LD/ADD (Tables 9).

Table 8 Number and Percentage of Disabilities by Type – Registered and Unregistered Graduates

	Service Registration Number			Service Registration %		
Disability	**Registered**	**Not Registered**	**Grand Total**	**% Of Registered**	**% Of Unregistered**	**% Of Total**
Visual	6	44	50	2.2%	30.3%	11.9%
Hearing	11	8	19	4.0%	5.5%	4.5%
Communication/Speech	1	1	2	0.4%	0.7%	0.5%
LD/ADD	161	24	185	58.5%	16.6%	44.0%
Mobility	4	2	6	1.5%	1.4%	1.4%
Health	25	13	38	9.1%	9.0%	9.0%
Other	50	48	98	18.2%	33.1%	23.3%
Multiple	17	5	22	6.2%	3.4%	5.2%
Total	**275**	**145**	**420**	**100%**	**100%**	**100%**

Table 9 Comparison of Numbers of Graduates by Disability Group

Disability Group	**Learning**	**Other**	**Total**
Registered	161	114	275
	58.5%	**41.5%**	**100%**
Unregistered	24	121	145
	16.6%	**83.4%**	**100%**
Total With Disabilities	**185**	**235**	**420**
	44.0%	**56.0%**	**100%**

3.3.4 Sector of Study

Overall, there was no statistically significant difference in the distribution by sector of study (careers or pre-university) among graduates with LD/ADD, graduates with disabilities other than LD/ADD and graduates without disabilities (χ^2 (2, N = 9406) = 3.94, p = 0.139). When only graduates with LD/ADD were compared to graduates with other disabilities, the results were marginally significant (χ^2 (1, N =) = 3.72, p = 0.054) indicating that there was a larger proportion of LD/ADD graduates in the pre-university sector (Table 10).

Table 10 Distribution of Graduates by Sector of Study

Disability Status	**Pre-university**	**Careers**	**Total**
LD/ADD	153	32	185
	82.7%	17.3%	100%
Other Disabilities	176	59	235
	74.9%	25.1%	100%
Without Disabilities	6925	2061	8986
	77.1%	22.9%	100%
Total	**7254**	**2152**	**9406**
	77.1%	**22.9%**	**100%**

3.4 Sub-Cohorts Used in Analysis

Because of the difficulty in identifying disability types due to the different disability classifications used on the various surveys, and because of the relatively small numbers within the disability classifications (other than for learning disabilities), for the purpose of comparing disability types this study restricts itself to comparing two groups: graduates with learning disabilities (N = 185) and graduates with disabilities other than learning disabilities who were combined into one group (N = 235). However it should be noted that graduates with learning disabilities may also have had attention deficit disorder (ADD) with or without hyperactivity disorder. For simplicity, in the following discussion the learning disabilities group is referred to as LD/ADD.

In order to test hypotheses related to the comparison of CRC scores of graduates with and without disabilities, the whole sample was used. However, in order to test hypotheses related to how graduates perceived their studies at cegep, and their university entrance score (CRC), we used only a subset of graduates who responded to the Cegep Experience Questionnaire (CEQ). Consequently, the analysis has been split into two parts: Part 1 deals with the CRC comparisons using the whole sample and Part 2 deals with the relationship between graduates' cegep experiences and their CRC scores.

Part 1 UNIVERSITY ENTRANCE SCORES (CRC's) OF GRADUATES WITH AND WITHOUT DISABILITIES

4 The Survey Responder Effect

Unregistered graduates with disabilities consisted solely of survey responders (N = 145), while graduates who registered for disability related services consisted of both those who responded to surveys (N = 77) and those who did not (N = 198). Consequently any comparison of CRC scores for registered and unregistered graduates would be misleading if there were differences in mean CRC scores between survey responders and non-responders. In order to determine if there were differences between the two groups, CRC scores of responders and non-responders were compared for both graduates without disabilities (Table 11) and graduates with disabilities (Table 12).

4.1 Graduates Without Disabilities - Survey Responders and Non-Responders

When graduates without disabilities were compared, there was a statistically significant difference in CRC scores between responders (M = 27.13) and non-responders (M = 25.89). In order to determine whether this was a consistent pattern, a number of sub-groups within the sample were compared using t tests in order to cross-validate the results.

Means of responders and non-responders were compared for males, females, career programs, pre-university programs and the GDS and SSI surveys. The means and standard deviations, as well as the results of the t test comparisons are shown in Table 11. In each of these comparisons survey responders tended to have higher CRC scores than non-responders, with average differences ranging from 0.60 – 1.62.

4.2 Graduates With Disabilities – Survey Responders and Non-Responders

To further cross-validate the results, the differences in CRC scores of responders and non-responders for several sub-groups of graduates with disabilities were compared using independent t tests. The sub-groupings were: all graduates with disabilities, males with disabilities, females with disabilities, registered graduates with LD/ADD, and registered graduates with disabilities other than LD/ADD. The means and standard deviations, as well as the results of the t test comparisons are shown in Table 12. The pattern was similar to that of graduates without disabilities.

Table 11 Graduates Without Disabilities: Mean CRC Scores of Survey Responders and Non-Responders *(Results for the ISS are not shown as it was not possible to distinguish responders from non-responders)*

	Non Responder			Responder						
	N	**Mean**	**SD**	**N**	**Mean**	**SD**	**Diff**	**t**	**p**	**df**
Without Disabilities (N = 8986)	6027	25.89	3.56	2959	27.13	3.65	1.23	15.19	<.001	8984
Females Without Disabilities (N = 5619)	3676	26.28	3.48	1943	27.24	3.60	0.96	9.73	<.001	5617
Males Without Disabilities (N = 3367)	2351	25.29	3.59	1016	26.91	3.74	1.62	11.87	<.001	3365
Pre-university (2yr)	4638	26.06	3.70	2287	27.48	3.71	1.42	14.98	<.001	6923
Technical (3 yr)	1389	25.33	2.97	672	25.93	3.17	0.60	4.21	<.001	1242
Graduate Destinations Surveys (2004, 2005)	2383	25.86	3.60	966	26.74	3.55	0.88	6.43	<.001	3347
SSI Surveys (2002, 2005)	3644	25.92	3.53	1493	26.79	3.61	0.87	7.99	<.001	5135

Table 12 Graduates With Disabilities: Mean CRC Scores of Survey Responders and Non-Responders

	Non Responder			Responder						
	N	**Mean**	**SD**	**N**	**Mean**	**SD**	**Diff**	**t**	**p**	**df**
With Disabilities (N = 420)	198	24.42	3.34	222	26.28	3.74	1.86	5.37	<.001	418
Females With Disabilities (N = 253)	118	24.93	3.40	135	26.37	3.73	1.44	3.19	0.002	251
Males With Disabilities (N = 167)	80	23.67	3.13	87	26.14	3.78	2.47	4.60	<.001	161
Learning Disabilities (N = 185)	125	23.59	3.12	60	25.44	3.65	1.84	3.56	<.001	183
Other Disabilities (N = 235)	73	25.84	3.25	162	26.59	3.74	0.75	1.48	.141	233
Registered – Learning (N = 161)	125	23.59	3.12	36	25.11	3.66	1.51	2.46	0.015	159
Registered - Other Disability (N = 114)	73	25.84	3.25	41	26.56	4.08	0.72	1.03	0.307	112

Survey responders had higher CRC scores across the sub-groups compared with one exception : graduates with disabilities other than LD/ADD. Although not statistically significant, the direction of the differences were the same as for the other sub-groups compared. Differences across groups ranged from 0.72 – 2.47.

4.3 Summary – Survey Responders and Non-Responders

Graduates who responded to surveys had consistently higher CRC scores than graduates who did not reply across the subgroups that were compared. This pattern of survey responders having higher CRC scores was true for both graduates without disabilities (average difference = 1.23) and graduates with disabilities (average difference = 1.86). The only exception was for the group of graduates with disabilities other than LD/ADD, where there was no difference. The largest differences in CRC scores between responders and non-responders were for males with and without disabilities (Males With Disabilities: M = 2.47; Males Without Disabilities: M = 1.62). Given that one of our hypotheses involved comparing the CRC scores of registered graduates with disabilities (a group consisting of both survey-responders and non-responders) with the scores of unregistered graduates with disabilities (a group consisting of survey responders only), it was important to take this tendency for survey-responders to have higher CRC scores into account. Although the results of the analysis are not shown here, the high school grades (Secondary V averages) were also higher for survey responders.

5 Comparison of CRC Scores of Registered and Unregistered Graduates With Disabilities

(Survey responders only: N = 222)

One of the aims of the study was to determine whether graduates with disabilities who registered for disability related services had CRC scores that differed from those who did not register. However, graduates who did not register for services consisted solely of survey responders, while registered graduates consisted of both survey responders and non-responders. Since it has been shown in the previous analysis that survey responders have higher CRC scores (Tables 11 and 12), any differences in CRC scores between registered and unregistered graduates may simply be due to this ‘survey responder‘effect. Consequently, to account for this effect, CRC scores of survey responders who were registered for services (N = 77) were compared to survey responders who were not registered (N = 145).

5.1 All Graduates With Disabilities – Registered vs Unregistered *(Survey responders only: N = 222)*

In order to determine whether there was a difference in mean CRC scores between graduates who registered with the disability service provider and those who did not register (Service Registration) and whether there was a difference between males and females (Sex), a 2 X 2 ANOVA was conducted (2 Sex X 2 Service Registration). When graduates with all types of disabilities were compared there was no significant main effect for either Sex ($F(1,18) = 0.53$, $p = 0.468$) or Service Registration ($F(1, 218) = 1.82$, $p = 0.179$), and no significant interaction between the variables ($F(1, 218) = 1.15$, $p = 0.28$) (Table 13).

5.2 Graduate CRC Scores By Disability Type and Service Registration *(Survey responders only: N =222)*

To evaluate whether the mean CRC scores of graduates with disabilities who registered or did not register with the service provider differed by disability group, the mean CRC’s of the different groups were compared using ANOVA. Graduates were assigned to two Disability Groups – those with learning disabilities (LD/ADD) and those with disabilities other than learning (Other Disabilities). Graduates also were assigned to two groups depending on whether or not they were registered for services (Service Registration). Since CRC scores of males and females differ, the effect of sex was taken into consideration as well.

Table 13 Comparison of CRC Scores – Graduates With Disabilities Who Registered for Disability Services and Those Who Did Not Register *(Survey responders only: N = 222)*

	Sex	N	Mean	SD
With Disabilities - Registered	F	46	26.27	3.87
	M	31	25.30	4.02
	Total	**77**	**25.88**	**3.93**
With Disabilities - Unregistered	F	89	26.42	3.68
	M	56	26.60	3.59
	Total	**145**	**26.49**	**3.63**
Total Registered + Unregistered	F	135	26.37	3.73
	M	87	26.14	3.78
	Total	**222**	**26.28**	**3.74**

A 2 X 2 X 2 ANOVA (2 Sex X 2 Disability Group X 2 Service Registration) was then carried out. The comparison showed that there were no significant main effects for any of the independent variables (Sex, Service Registration, Disability Group) and no significant interactions between the variables. The F values and associated probabilities for the test are shown in Table 14.The means and standard deviations are shown in Table15.

Table 14 Tests of Between-Subjects Effects *(Dependent Variable: CRC)*

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	89.844(a)	7	12.835	.914	.497
Intercept	95843.871	1	95843.871	6821.527	.000
Learn1_Other2	33.788	1	33.788	2.405	.122
Sex	1.590	1	1.590	.113	.737
Reg_123	12.400	1	12.400	.883	.349
Learn1_Other2 * Sex	.025	1	.025	.002	.967
Learn1_Other2 * Reg_123	8.637	1	8.637	.615	.434
Sex * Reg_123	15.532	1	15.532	1.105	.294
Learn1_Other2 * Sex * Reg_123	7.441	1	7.441	.530	.468
Error	3006.744	214	14.050		
Total	156390.458	222			
Corrected Total	3096.589	221			

R Squared = .029 (Adjusted R Squared = -.003)

Table 15 Effect of Service Registration on CRC Scores of Graduates by Disability Group
(Survey responders only; N = 222)

Disability Group	Sex	Service Registration	N	Mean	SD
LD/ADD	F	Registered	20	25.71	3.61
		Not Registered	17	25.68	3.63
		Total Females	**37**	**25.69**	**3.57**
	M	Registered	16	24.35	3.70
		Not Registered	7	26.56	3.94
		Total Males	**23**	25.02	3.83
		Registered	36	25.11	3.66
		Not Registered	24	25.93	3.66
Total LD/ADD Disability		**Total F + M**	**60**	**25.44**	**3.65**
Other Disabilities (Excluding LD/ADD)	F	Registered	26	26.70	4.08
		Not Registered	72	26.59	3.69
		Total Females	**98**	**26.62**	**3.78**
	M	Registered	15	26.31	4.22
		Not Registered	49	26.61	3.59
		Total Males	**64**	**26.54**	**3.71**
	Total	Registered	41	26.56	4.08
		Not Registered	121	26.60	3.63
Total Other Disability (Excluding LD/ADD)		**Total F + M**	**162**	**26.59**	**3.74**
LD/ADD + Other Disabilities	F	Registered	46	26.27	3.87
		Not Registered	89	26.42	3.68
		Total Females	**135**	**26.37**	**3.73**
	M	Registered	31	25.30	4.02
		Not Registered	56	26.60	3.59
		Total Males	**87**	**26.14**	**3.78**
		Registered	77	25.88	3.93
		Not Registered	145	26.49	3.63
Total LD/ADD + Other Disabilities		**Total F + M**	**222**	**26.28**	**3.74**

It is interesting to note the difference in CRC scores between graduates with LD/ADD who registered and those who did not register for services. A one-way ANOVA indicated that there was a significant difference between registered and unregistered graduates, with the CRC's of registered graduates actually being lower ($F(1, 183) = 7.48$, $p = .007$). This is contrary to one of our initial hypotheses i.e., that the CRC's of registered graduates with LD/ADD would be higher than those of unregistered LD/ADD graduates. However, the earlier analysis showed that this difference is accounted for by the 'survey responder' effect, i.e., the tendency of survey responders to have higher CRC scores, and disappeared when only registered survey responders with LD/ADD were compared to unregistered responders. In this case there was no difference between two groups.

5.3 Summary – CRC Scores of Graduates With Disabilities – Registered and Not Registered

The data did not support two of our hypotheses which were: 1) Graduates who register to receive disability related services have CRC scores that exceed those of graduates with disabilities who do not register for services and 2) Graduates with LD/ADD who register to receive disability services have higher CRC scores than graduates with LDD/ADD who do not register.

When the survey responder effect was taken into consideration, there was no significant difference between the mean CRC scores of graduates who registered with the disability service provider and those who did not register. This was true of graduates with LD/ADD as well as of graduates with disabilities other than LD/ADD.

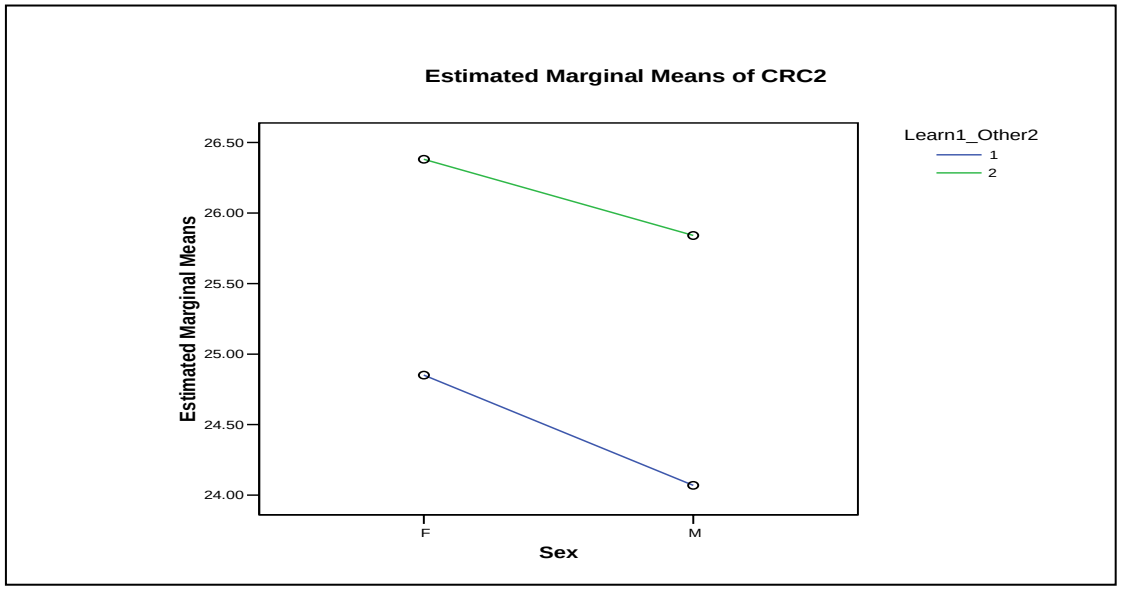
6 Differences in CRC Scores by Disability Type

6.1 Effect of Disability Type – All Graduates With Disabilities *(N = 420)*

This analysis was designed to test the hypotheses that CRC scores differ according to the nature of the disability i.e., that graduates with LD/ADD have mean CRC scores that are lower than graduates with other types of disabilities.

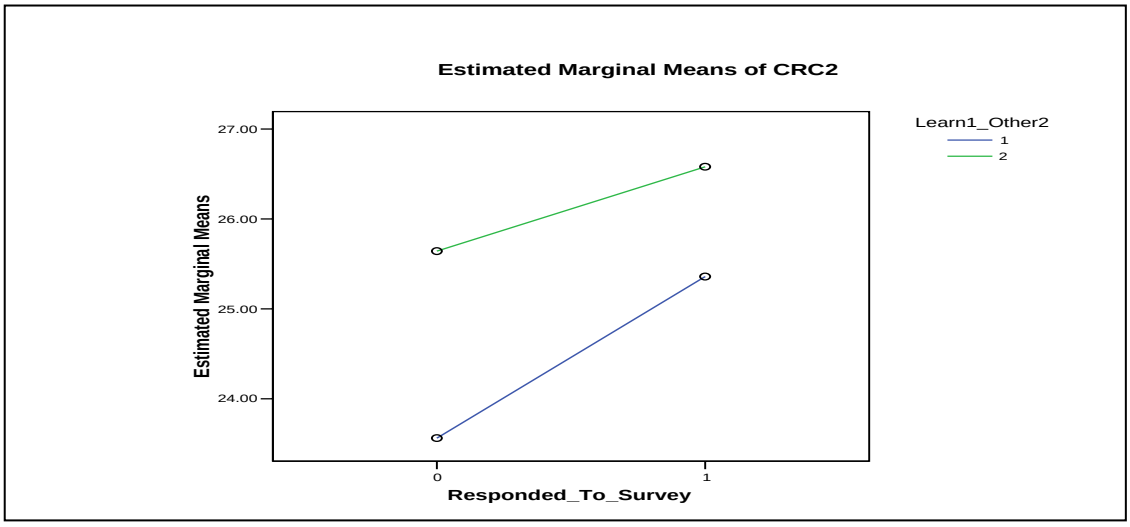
For this analysis graduates with disabilities (N = 420) were assigned to two disability groupings: LD/ADD (N = 185) and Other Disabilities (excluding LD/ADD) (N = 235). As CRC scores of survey responders and non-responders and males and females tended to differ, these factors were also taken into account. A three-way ANOVA (2 Sex X 2 Disability Group X 2 Survey Responder) indicated that there were significant main effects for Disability Group ($F(1, 412) = 18.71$, $p < 0.001$) and Survey Responder ($F(1, 412) = 12.85$, $p < 0.001$) but not Sex ($F(1, 412) = 3.00$, $p = 0.084$). There were no interaction effects. Graduates with LD/ADD had lower CRC scores than graduates with other disabilities (Figure 1) and survey responders had lower CRC scores than non-responders (Figure 2).

Figure 1 – CRC Scores of Graduates With LD/ADD (N = 185) Compared to Graduates With Other Disabilities (N = 235) by Sex *(Total N = 420; LD/ADD is represented by the lower line on the graph)*



Females **Males**

Figure 2 – CRC Scores of Graduates With LD/ADD (N = 185) Compared to Graduates With Other Disabilities (N = 235) by Response Categories (*Total N = 420; LD/ADD is represented by the lower line on the graph; Survey responders are on the right, non-responders are on the left)*

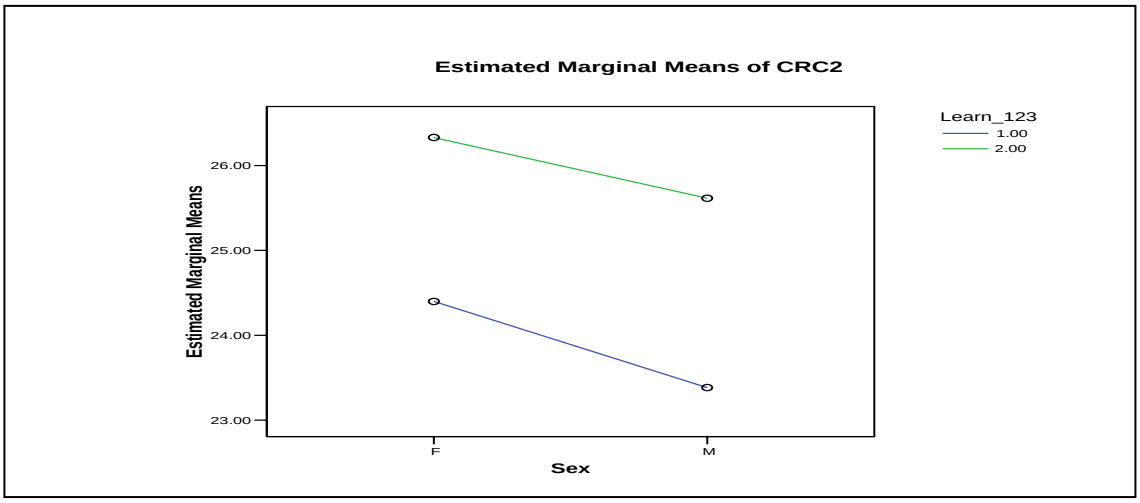


Non-Responders **Responders**

6.2 Registered Graduates With Disabilities – Graduates With LD/ADD and Other Disabilities *(N = 275)*

In order to determine whether registered graduates with LD/ADD had lower CRC scores compared to registered graduates in the Other Disabilities grouping, a two-way ANOVA (2 Sex X 2 Disability Group) was undertaken. There was a significant main effect for Disability Group ($F(1, 271) = 23.09$, $p < 0.001$) and Sex ($F(1, 271) = 3.99$, $p = 0.047$. Registered graduates with LD/ADD had lower CRC scores than graduates in the Other Disabilities group, and this was true for both males and females. In addition, males (M = 24.50) had lower mean CRC's than females (M = 25.36). Figure 3 displays the results graphically.

Figure 3 Differences in CRC Scores by Disability Group and Gender – Registered Graduates Only *(N = 275; The LD/ADD line is the lower line on the graph; F = Female; M = Male)*



Females **Male**

6.3 Unregistered Graduates With Disabilities *(N = 145)*

When the same comparison was undertaken for unregistered graduates with disabilities (N = 145), there were no main effects for either Sex ($F(1,141) = 0.26$, $p = 0.612$) or Disability Group ($F(1, 141) = 0.30$, $p = 0.587$). However, the number of unregistered graduates with LD/ADD was small (Males N = 7; F: N = 17).

6.4 Summary - Comparisons by Disability Type

Our hypothesis that CRC scores of graduates with LD/ADD are lower than those of graduates with other disabilities generally held. Graduates with LD/ADD had lower CRC scores compared to graduates in the Other Disabilities classification, regardless of whether they were male or female, and regardless of whether they were survey responders or non-responders. However, when only unregistered graduates (i.e., the survey responders with disabilities who did not register for services) were compared, graduates with LD/ADD who self-reported their disability had CRC scores that did not differ significantly from those of graduates with other disabilities who self-reported.

7 Comparison of CRC Scores of Graduates With and Without Disabilities by Sex

Our hypotheses regarding sex differences was that the CRC scores of males would be lower than those of females a) regardless of whether or not they had a disability b) regardless of the type of disability and if they had an impairment, c) regardless of whether they were registered for services. The following analyses test these hypotheses.

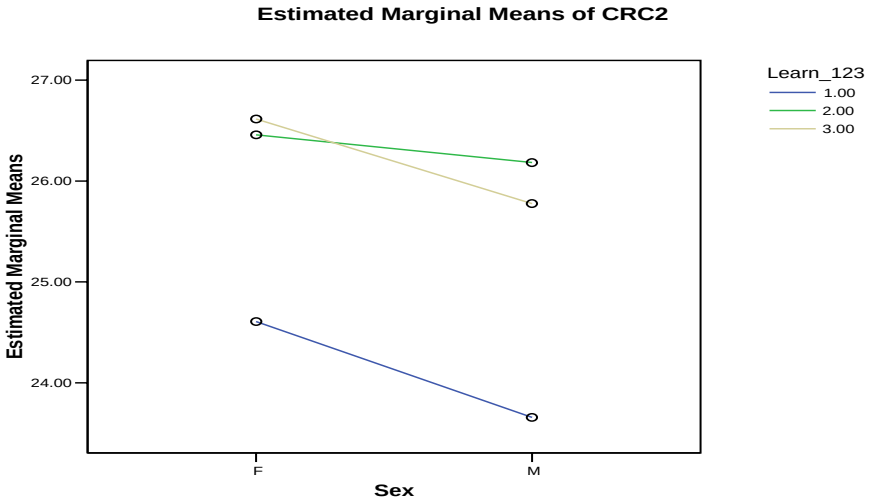
7.1 Sex Difference in CRC Scores *(N = 9406)*

To test our hypotheses regarding sex, graduates were assigned to three groups depending on their disability status: 1) LD/ADD, 2) Other Disabilities and 3) No Disabilities. To examine differences in mean CRC scores by sex and disability status a 2 X 3 ANOVA (2 Sex X 3 Disability Group) was undertaken with CRC as the dependent variable. There was a significant main effect for Sex ($F (1, 9400) = 8.00$, $p = 0.005$) and Disability Group ($F (2, 9400) = 29.3$, $p < 0.001$) and no interaction effects ($F (2, 9400) = 8.77$, $p = 0.510$). Post hoc tests (Tukey) revealed that graduates with LD/ADD had lower CRC scores than either the Other Disabilities or No Disabilities groupings. However, the CRC scores of graduates in the Other Disabilities and No Disabilities categories did not differ significantly. Males had lower CRC scores than females (Table 16) regardless of the Disability Group. Figure 4 graphically displays the outcome of the analysis.

Table 16 Comparison of CRC Scores by Disability Group and Sex *(N = 9406)*

Sex	Disability Group	N	M	SD
Females	LD/ADD	104	24.61	3.44
	Other Disability	149	26.46	3.60
	No Disability	5619	26.61	3.55
	Total	**5872**	**26.57**	**3.56**
Males	LD/ADD	81	23.66	3.30
	Other Disability	86	26.18	3.63
	No Disability	3367	25.78	3.71
	Total	**3534**	**25.74**	**3.72**
F + M	LD/ADD	185	24.19	3.40
	Other Disability	235	26.36	3.60
	No Disability	8986	26.30	3.64
	Total	**9406**	**26.26**	**3.64**

Figure 4 CRC Scores of Graduates With and Without Disabilities by Disability Group and Sex **(***N = 9406; LD/ADD is the lowest line on the graph. No Disabilities is the line with the highest point on the graph*)

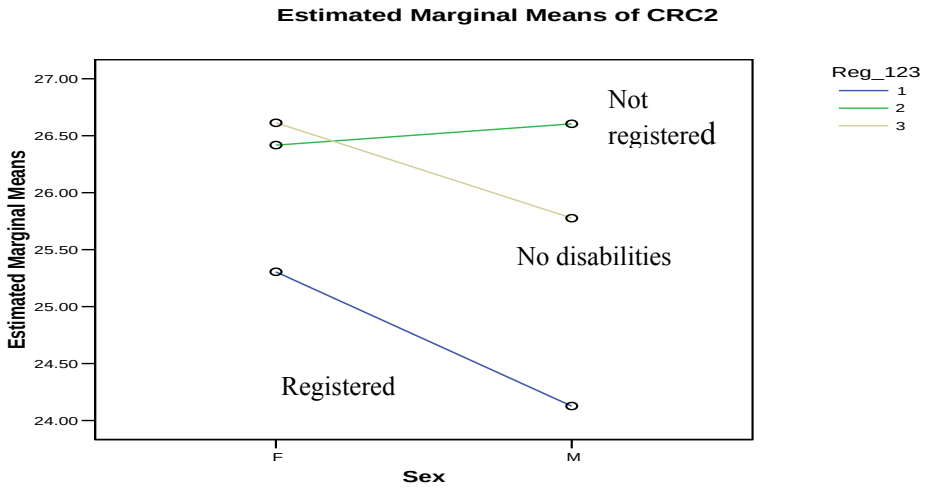


Females **Males**

7.2 Sex Differences in CRC by Registration Status

Our earlier analysis indicated that males registered for disability related services had lower CRC scores than registered females, and this was true for both the LD/ADD and Other Disability groups (Figure 3). However, the analysis also showed that for unregistered graduates with disabilities, there was no significant main effect for Sex. Males with disabilities who were not registered for disability services had CRC scores equivalent to those of unregistered Females with disabilities (Figure 5).

Figure 5 Comparison of Mean CRC's of Registered and Unregistered Graduates With Disabilities and Graduates Without Disabilities by Sex *(N = 9406; The nearly horizontal line is for unregistered graduates, the lowest line is for graduates who were registered, the middle line (parallel to the lowest line) represents graduates without disabilities*



Females **Males**

7.3 Sample Source and Gender Differences in CRC Scores of Graduates With and Without Disabilities – Survey Responders vs Non-Responders

It is interesting to compare the differences between survey responders (N = 3181) and non-responders (N = 6225) by Sex and Disability Group. The large non-responder group had a pattern that reflected that of the overall sample (described in Section 7.1), with main effects for Sex ($F(1, 6219) = 6.88$, $p = 0.009$) and Disability Group ($F(2, 6219) = 24.34$, $p < 0.001$) and no interaction effect ($F(2, 6219) = 0.01$, $p = 0.987$) (Figure 6). However, although there was a significant main effect for Disability Group for responders ($F(2, 3175) = 7.29$, $p = 0.001$, the main effect for Sex ($F(1, 3175) = 0.342$) was not significant. This is shown graphically in Figure 7. Consequently, conclusions drawn from the survey sample with respect to differences in CRC scores of males and females would differ from conclusions drawn from the statistics of the larger population (Table 17).

7.4 Summary – Comparison of Male and Female Graduates With and Without Disabilities

Generally our hypothesis concerning the lower CRC scores of males relative to females held. Males tended to have lower CRC scores compared to females and this was true of both graduates with and without disabilities. If the graduate had a disability, the lower CRC scores of males relative to females also held true within the LD/ADD and Other Disabilities groupings for registered graduates. However, CRC's of male and female non-registered graduates with disabilities (i.e., the survey responders with disabilities who did not register for disability services) showed no difference between the mean CRC scores of males and females. In addition, if conclusions were drawn from the survey responder group alone, one would have concluded that there was no statistically significant difference between males and females, in contradiction to the conclusion drawn for the entire sample.

Table 17 CRC Scores of Survey Responders (N = 3181) and Non-Responders (N = 6225) by Sex and Disability Group

		Non-Responders			Responders		
Sex	**Disability Status**	**N**	**M**	**SD**	**N**	**M**	**SD**
Females	Learning Disability	67	24.01	3.24	37	25.69	3.57
	Other Disability	51	26.14	3.25	98	26.62	3.78
	No Disability	3676	26.28	3.48	1943	27.24	3.60
	Total Females	**3794**	***26.24**	**3.49**	**2078**	**#27.19**	**3.61**
Males	Learning Disability	58	23.12	2.93	23	25.02	3.83
	Other Disability	22	25.14	3.22	64	26.54	3.71
	No Disability	2351	25.29	3.59	1016	26.91	3.74
	Total Males	**2431**	***25.23**	**3.59**	**1103**	**#26.85**	**3.75**
Total	Learning Disability	125	23.59	3.12	60	25.44	3.65
	Other Disability	73	25.84	3.25	162	26.59	3.74
	No Disability	6027	25.89	3.56	2959	27.13	3.65
	Total F + M	**6225**	**25.85**	**3.56**	**3181**	**27.07**	**3.67**

*Difference in mean CRC between males and females: * the difference in the two scores was significantly different; # the difference in the two scores was not significantly different.*

Figure 6 Comparison of CRC Scores of Survey Non-Responders By Sex and Disability Group *(N = 6225; 1 = LD/ADD 2 = Other Disabilities, 3 = No Disabilities)*

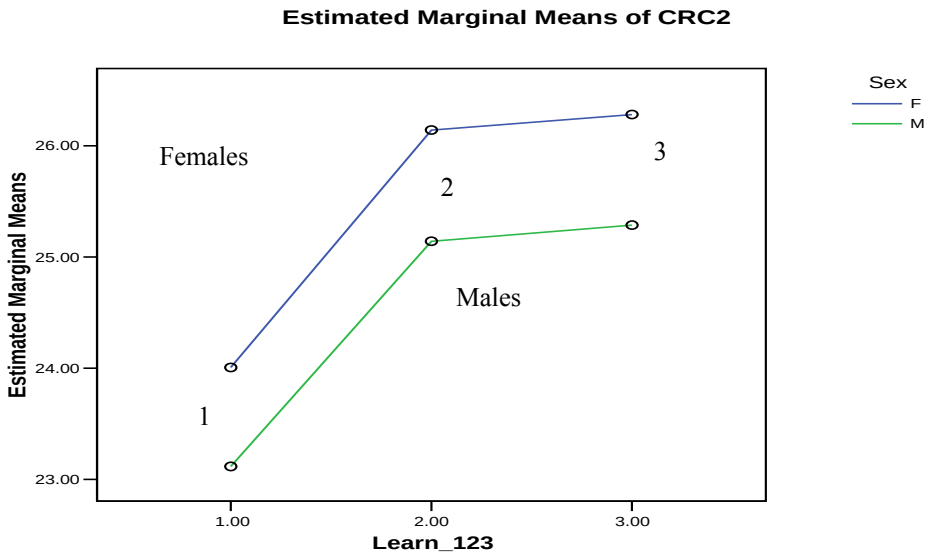
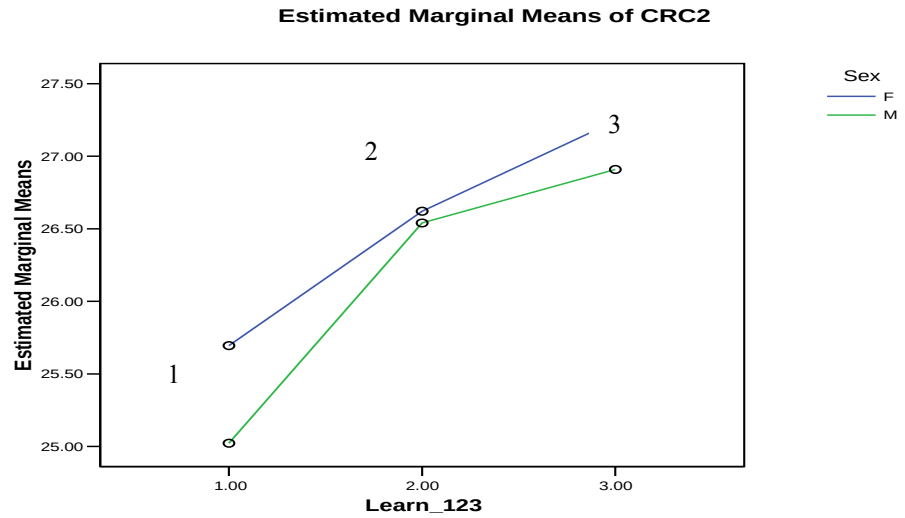


Figure 7 Comparison of Survey Responders by Sex and Disability Group *(N = 3181*; *1 = LD/ADD 2= Other Disabilities, 3 = No Disabilities. The upper line represents females and the lower line represents males)*



8 Relationship Between High School Grades (Secondary V Averages) and CRC Scores of Graduates

An analysis was undertaken in order to evaluate the relationship between high school grades (Secondary V averages) and CRC scores. For this comparison only graduates with Secondary V averages of 60 and above were included. A Secondary V average of 60 is the normal requirement for entry into cegep. Some graduates did not have a Secondary V average associated with their record as their admission to the College was based on other criteria. Using this filter reduced the sample size from N = 9406 to N = 8426.

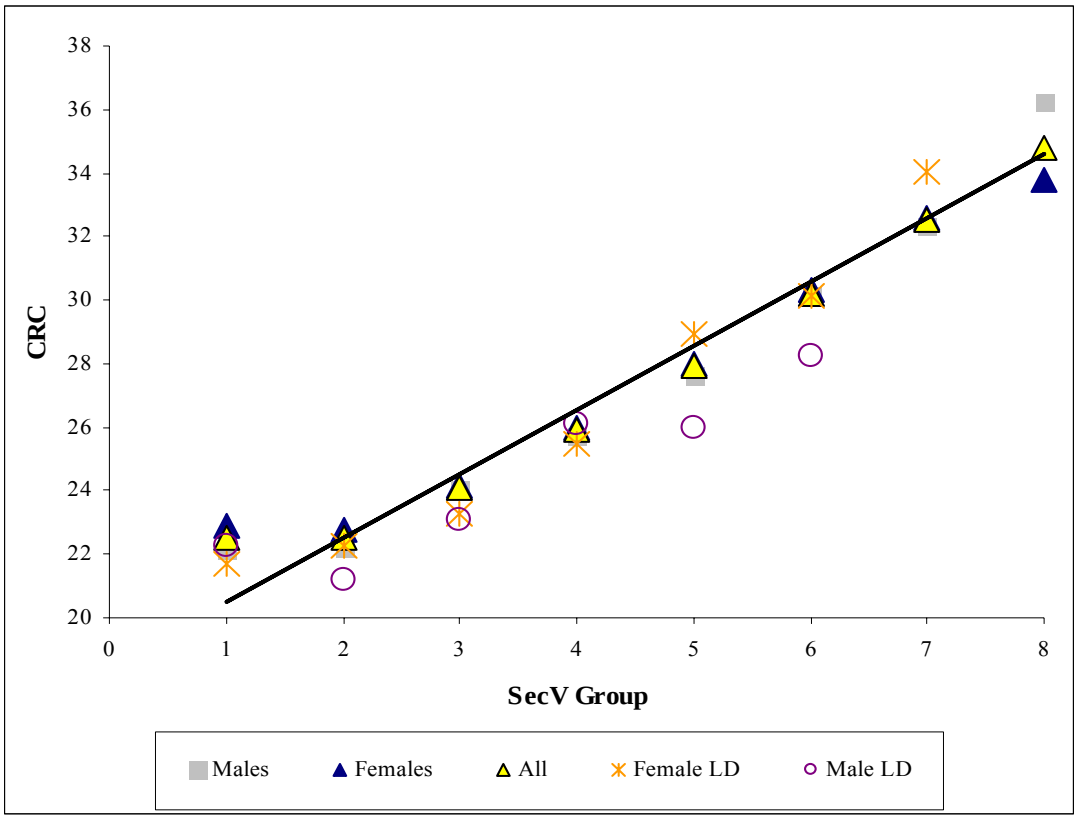
8.1 Regression Model – Secondary V Average and CRC

A linear regression was undertaken using CRC as the dependent and Secondary V average as the independent variable. The two variables were linearly related, with a correlation coefficient of R=0.73 ($F(1, 8422) = 9456.87$, $p < 0.001$). Approximately 52% ($R^2 = .73 \times .73$) of the variability in the CRC was accounted for by its linear relationship with Secondary V average. The strength of this relationship can be best seen by grouping Secondary V averages into 8 clusters, with each cluster ranging across five Secondary V average points (Table 18), and plotting the average CRC scores of graduates whose high school averages fell within these groupings. Figure 8 illustrates the linear relationship between the two variables using this method.

Table 18 Average CRC Score for Secondary V Average Groups (N = 8426)

Sec V Cluster	SecV Range	SecV Average	CRC Average
1	60-64.9	63.1	22.5
2	65-69.9	67.9	22.5
3	70-74.9	72.7	24.1
4	75-79.9	77.4	25.9
5	80-84.9	82.2	27.9
6	85-89.9	87.1	30.2
7	90-94.9	91.7	32.5
8	95-99.9	96.0	34.8

Figure 8 Relationship Between the Secondary V Average and CRC Score



8.2 Secondary V Average and CRC - Graduates With and Without Disabilities

A two-way ANOVA including only graduates with Secondary V averages at or above 60 (2 Sex X 3 Disability Group) yielded similar results to the whole sample comparison, with main effects for Sex ($F(1, 8420) = 9.55$, $p = 0.002$) and Disability Group ($F(2, 8420) = 30.66$, $p < 0.001$) and no interaction effects ($F(2, 8420) = 0.84$, $p = 0.433$). There was a significant difference in CRC scores between graduates with LD/ADD and the other two groups, but no differences between graduates with Other Disabilities and No Disabilities.

A two-way analysis of covariance (ANCOVA) was then conducted (2 Sex X 3 Disability Group) with the CRC score as the dependent variable and the Secondary V average as the covariate. The independent variables were Sex (Females, Males) and Disability Group (LD/ADD, Other Disabilities, No Disabilities). A preliminary analysis to test for homogeneity of regression slopes showed that the relationship between the Secondary V average and CRC score did not differ as a function of the dependent variables Sex or Disability Group. A variance ratio of 1.1 indicated it was safe to assume equality of variance (Field, 2005).

Consistent with the previous analysis, the ANCOVA showed that there was a significant difference in means for Disability Group ($F(2, 8419) = 4.59$, $p = 0.010$). However contrary to the previous analysis, there was no significant difference in the CRC scores of males and females ($1, 8419) = 0.55$, $p = 0.458$). The post-hoc comparison (using Sidac adjustment for multiple groups) indicated, as in the previous analysis, that graduates with LD/ADD had lower CRC scores than either of the other two groups, and graduates with Other Disabilities did not differ from graduates in the No Disabilities group. There were no significant interaction effects.

These results indicate that for equivalent Secondary V averages, male and female CRC scores do not differ. One can conclude from this that more male graduates had Secondary V averages in the lower end of the range, thus accounting for the differences in mean CRC scores unadjusted for the Secondary V average. In order to illustrate this, Secondary V averages were clustered into 5 point ranges (as shown in Table 18) and the percentage of graduates falling in each of the ranges was plotted (Figure 9). The distribution of the Secondary V averages of males compared to females indicates that 40% of males had Sec V averages below 75 (i.e., falling within clusters 1-3) compared to 31% of females.

On the other hand, even when adjusted for Secondary V averages, the differences between graduates with LD/ADD and the other two groups (Other Disability, No Disability) persisted, although the differences in the adjusted means compared to the actual means narrowed (Table 19). This again suggests that a greater proportion of graduates with LD/ADD have Secondary V averages in the lower end of the range. Figure 10 shows that 65% of graduates with LD/ADD had Secondary V averages below 75 compared to 41% of graduates with Other Disabilities, and 34% of graduates with No Disabilities. Moreover, 73% of male graduates with LD/ADD had Secondary V averages below 75 compared to 58% of females with LD/ADD.

For the equivalent Secondary V averages, graduates with LD/ADD achieved somewhat lower CRC scores than either of the other two groups. Overall, the differences in adjusted means generally averaged less than 1, but were higher for males than for females (Table 20). The underperformance of males with LD/ADD relative to Secondary V average can be seen in Figure 8.

Table 19 Adjusted and Unadjusted Mean CRC Scores of Graduates by Sex and Disability Group (*N = 8426*; *Includes only Secondary V averages >= 60)*

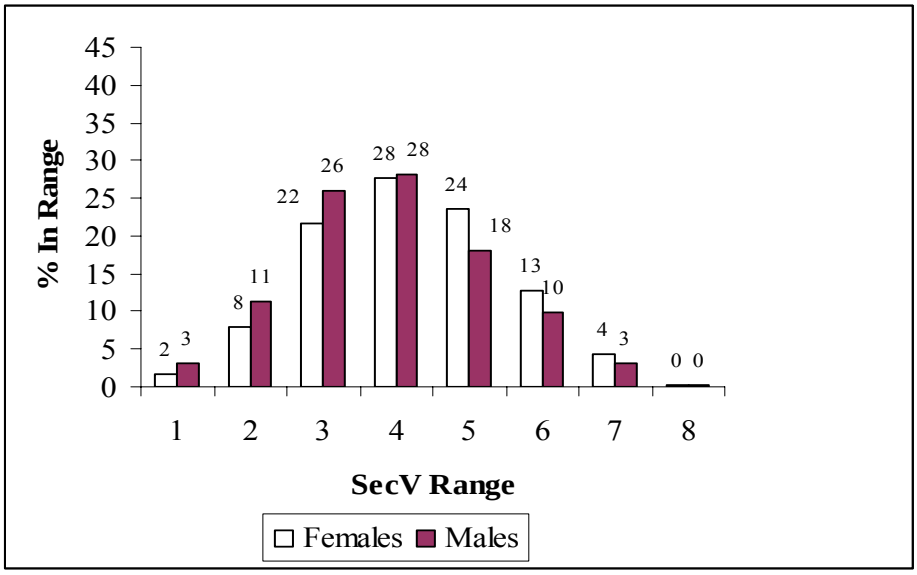
Sex	Disability Group	N	Un adjusted Mean CRC	SD	Adjusted Mean CRC
Females	LD/ADD	99	24.69	3.42	26.09(a)
	Other	139	26.32	3.63	26.39(a)
	No Disabilities	5003	26.68	3.55	26.42(a)
	Total	**5241**	**26.63**	**3.55**	**26.30(a)**
Males	LD/ADD	75	23.47	3.16	25.54(a)
	Other	78	26.04	3.54	26.80(a)
	No Disabilities	3032	25.85	3.71	26.16(a)
	Total	**3185**	**25.80**	**3.71**	**26.17(a)**
F + M	LD/ADD	174	24.16	3.36	25.81(a)
	Other	217	26.22	3.59	26.60(a)
	No Disabilities	8035	26.37	3.63	26.29(a)
Total	**Total**	**8426**	**26.32**	**3.64**	**26.23(a)**

Covariate appearing in the model evaluated at: SecV = 77.92.

Table 20 Differences in Adjusted and Unadjusted Means CRC's of Graduates With Learning Disabilities Compared to the Other Disability and No Disability Groups (*Adjusted mean is the estimated marginal mean evaluated at a Secondary V Average = 77.92)*

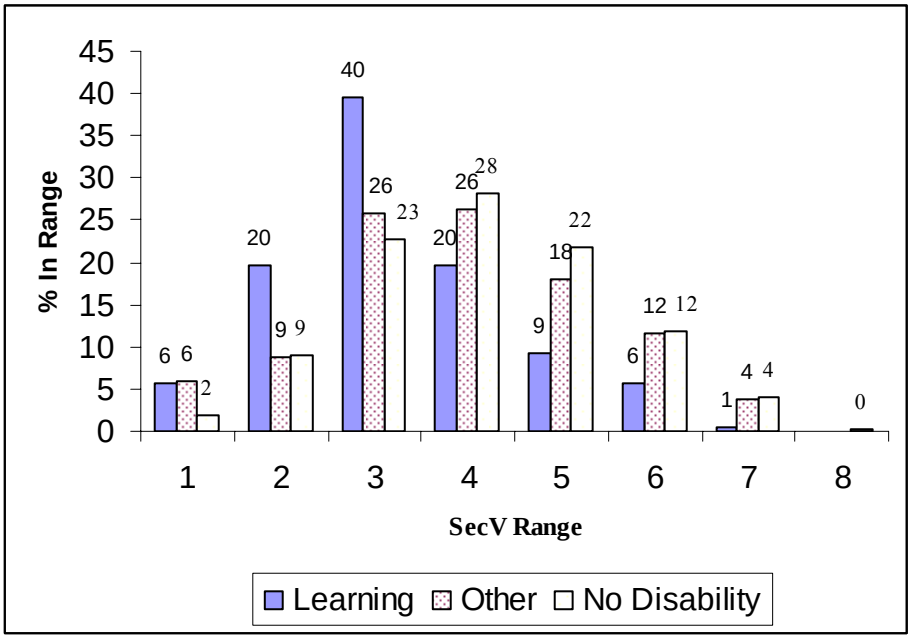
Group	Compared to:	Un-adjusted Difference	Adjusted Difference
Females LD/DD	Other Disability	-1.63	-0.30
	No Disability	-1.99	-0.33
Males LD/ADD	Other Disability	-2.57	-1.26
	No Disability	-2.38	-0.62
LD/ADD Total	Other Disability	-2.06	-0.78
	No Disability	-2.20	-0.47

Figure 9 Secondary V Average Distribution of Male and Female Graduates *(N = 8426)*



Sec V Cluster	SecV Range
1	60-64.9
2	65-69.9
3	70-74.9
4	75-79.9
5	80-84.9
6	85-89.9
7	90-94.9
8	95-99.9

Figure 10 Distribution of Secondary V Averages of Graduates by Disability Group *(N = 8426)*



One of the reasons why graduates with LD/ADD had lower CRC scores could be attributed to the fact that they entered cegep with lower high school grades compared to other graduates with and without disabilities. Our regression model showed that for every 5 point increase in Secondary V average there was a 1.9 point gain in CRC score. Sixty-five percent of graduates with LD/ADD had Secondary V averages below 75 compared to 41% of graduates with other disabilities and 34% of graduates with no disabilities (Figure 10). The figure was particularly high for males with LD/ADD (73%). Moreover, 26% of graduates with LD/ADD (Males = 31%) entered with averages under 70 compared to 11% – 15% for the other two groups. Table 21 shows the distribution of high school averages for the three groups, and the expected CRC scores for graduates falling in each of the Secondary V average ranges. Figure 11 shows the distribution of CRC scores actually achieved by graduates in the different disability groupings.

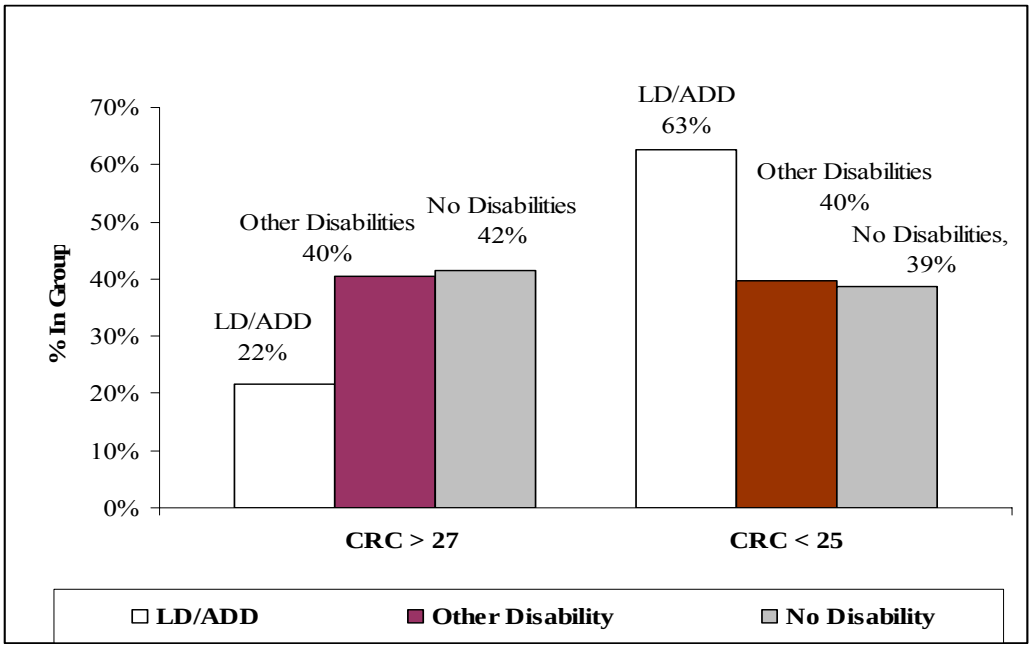
Table 21 Expected CRC Scores for Different Ranges of the Secondary V Average Based on a Linear Regression Model

			% In SecV Group		
SecV Range	**Average Group SecV**	**Average Group CRC**	**LD/ADD**	**Other Disabilities**	**No Disabilities**
60-64.9	**63**	**22.51**	6%	6%	2%
65-69.9	**68**	**22.51**	20%	9%	9%
70-74.9	**73**	**24.12**	40%	26%	23%
75-79.9	**77**	**25.89**	20%	26%	28%
80-84.9	**82**	**27.88**	9%	18%	22%
85-89.9	**87**	**30.24**	6%	12%	12%
90-94.9	**92**	**32.51**	1%	4%	4%
95-99.9	**96**	**34.76**	0	0	0.2%
Total			100%	100%	100%
% CRC Above 27			**16%**	**33%**	**38%**

8.3 Summary – CRC Scores and Secondary V Averages

Although male graduates had lower CRC scores compared to female graduates, when the means were adjusted for equivalent Secondary V averages there was no significant difference in CRC scores between the two groups. The overall difference is accounted for by the fact that more male graduates have Secondary V averages in the lower end of the range. On the other hand the significant difference in mean CRC scores between graduates with LD/ADD and graduates with other disabilities and those with no disabilities persisted, even when adjusted for the Secondary V average, although the differences in the adjusted means were smaller and restricted to males. Thus, male graduates with LD/ADD obtained lower CRC scores compared to other graduates with equivalent Secondary V averages. Overall, 65% of graduates with LD/ADD entered college with Secondary V averages below 75, compared to 34% of graduates without disabilities, and 41% of graduates with disabilities other than LD/ADD. The figure was particularly high for males with LD/ADD (73%) compared to females with LD/ADD (58%).

Figure 11 Distribution of CRC Scores in the Different Disability Groupings



Part ll CEGEP EXPERIENCE AND CRC SCORES

9 Cegep Experience and CRC Scores

One of our hypotheses was that graduates who perceive factors in their personal, cegep and community environment as making their studies more difficult, have lower CRC scores than those who experience these factors as making their studies easier. This analysis is designed to answer the following question: Is the extent to which graduates perceive difficulties with certain aspects of their studies related to their college success, as measured by their CRC scores? Our previous work (Fichten, Jorgensen, Havel & Barile, 2006), using the Cegep Experience Questionnaire, examined whether there was a difference among registered and non-registered graduates with disabilities, and graduates without disabilities in their perceptions of the degree of difficulty they experienced during their cegep studies as measured by an index of difficulty (IDF). The survey consisted of items that related to graduates' personal, cegep and community environments. The study found that registered graduates with disabilities had higher or more facilitative IDF means than the group without disabilities. Unregistered graduates with disabilities had the lowest IDF means.

9.1 Method and Sample Description – Cegep Experience and CRC Scores

The Cegep Experience Questionnaire (CEQ) was administered with the Graduate Destinations Survey to the College's graduates in both 2004 and 2005, and this was the source of data used for the calculation of the index of difficulty measure (IDF) used in the present study. Because this analysis consists of the 2004 and 2005 CEQ survey respondents, it eliminates the need to account for the survey responder effect with respect to CRC scores identified in Part 1 of the study. This reduced the sample size to N = 1070, consisting of 30 registered graduates with disabilities, 74 unregistered graduates with disabilities and 966 graduates without disabilities.

9.2 Comparison of the 2004 and 2005 Cegep Experience Questionnaires

In using the data for the two survey years combined, the following differences between the 2004 and 2005 CEQ surveys should be noted. In 2005 the CEQ consisted of 32 items, including 7 items that related specifically to graduates with disabilities. The items were split into three broad categories – Personal Factors (9 including 1 specifically related to disability), Cegep Environment (14 including 1 related specifically to disability) and Government and Community Supports and Services) (9 including 4 specifically related to disability). However, items relating to 'Accessibility of Classrooms' and to the 'Accessibility of Labs' on the 2004 survey, were combined as a single item on the 2005 survey (Accessibility of Building Facilities (e.g., doorways classrooms/labs)). For this analysis, these two items listed separately on the 2004 survey, were averaged for comparison with the 2005 survey. On the 2005 survey 'Course Load' was listed as 'Number of Courses Taken'. In addition, two items (Course Schedules, Training in Computer Technologies On-Campus) that appeared on the 2005 survey were not included on the 2004 survey and, therefore, are excluded from consideration. The 2004 survey used a six point scale (Major, Medium Minor Facilitator or Obstacle), while the 2005 survey used a simpler to understand 6 point scale (Easier and Harder).

A description of the sample included in the analysis, and the corresponding CRC scores of the different disability groups is shown in Table 22. A copy of the survey items used in this study is provided in Appendix 1.

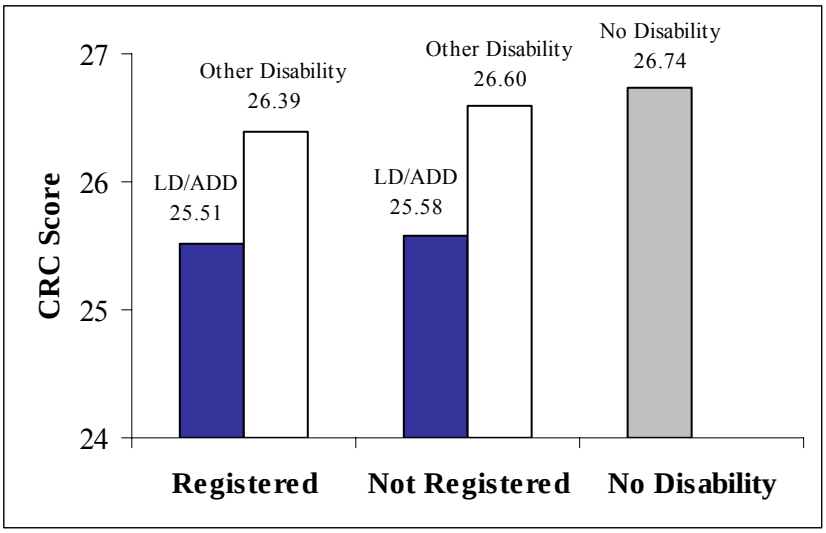
Table 22 Graduate Sample Composition and Average CRC Scores of Graduates Responding to the Cegep Experience Questionnaire *(N = 1070)*

Registration Status	Disability Group	Sex		Total	CRC	
		F	M	F + M	Mean	SD
Registered	LD/ADD	9	8	17	25.51	3.61
	Other	10	3	13	26.39	4.79
Total Registered		**19**	**11**	**30**	**25.89**	**4.11**
Unregistered	LD/ADD	10	2	12	25.58	2.86
	Other	41	21	62	26.60	3.78
Total Unregistered		**51**	**23**	**74**	**26.43**	**3.65**
Total No Disability	No Disability	**633**	**333**	**966**	**26.74**	**3.55**
Grand Total		**703**	**367**	**1070**	**26.69**	**3.58**

9.3 Comparison of CRC by Disability Group and Registration Status

The characteristics of the subgroup of CEQ survey responders included in the IDF analysis were examined to determine whether the sample shared similar CRC characteristics with the wider sample of survey responders analysed earlier (see Section 7.4). Graduates were assigned to 2 groups according to their Disability Status (LD/ADD, Other Disabilities) and to 2 groups according to whether or not they were registered with the disability service provider (Service Registration: Registered with Disabilities, Not Registered With Disabilities). A two-way ANOVA (2 Service Registration X 2 Disability Group) showed no CRC main effect for either Disability Group $F(1, 104) = 1.07$, $p = 0.304$) or Registration Status $F(1, 104) = 0.022$, $p = 0.881$). A one-way ANOVA carried out to compare the mean CRC's of graduates with LD/ADD, Other Disabilities and No Disabilities showed no significant differences in CRC scores ($F(2, 1067) = 6.44$, $p = .194$). The means and standard deviations are shown in Table 22. Figure 12 shows the results graphically.

Figure 12 Comparison of Mean CRC Scores by Disability Group and Service Registration *(N = 1070)*



Our conclusion regarding Service Registration is consistent with our earlier analysis of survey responders (Section 5.3). There was no significant difference between the mean CRC scores of graduates who registered and those who did not register with the disability service provider, and this was true of both graduates with LD/ADD (Registered: M = 25.51, Unregistered: M = 25.58) and graduates with disabilities other than LD/ADD (Registered: M = 26.39, Unregistered: M = 26.60).

However, this analysis also showed no difference between graduates with LD/ADD and the Other Disabilities and the No Disabilities groups. This contradicts our earlier finding with respect to survey responders (that included not only the Graduate Destinations Survey but other surveys as well) which showed that graduates with LD/ADD had lower CRC scores when compared to graduates with Other Disabilities and those with No Disabilities, with no difference between the latter two groups. However, Figure 12 shows that the CRC scores of the LD/ADD group in this comparison are, in fact, lower than for the other two groups despite the lack of statistical significance. The difference in mean CRC's between graduates with LD/ADD and the other two groups was of a similar order of magnitude to that of the larger sample of survey responders. The similarity of the data between the larger and smaller survey samples, in terms of both the absolute means and inter-group differences, is shown in Table 23. The lack of statistical significance may, therefore, be attributed to the lack of power due to small sample sizes. This again emphasizes the problem of using survey data to draw conclusions about the entire population, especially when sample sizes are limited as is often the case for persons with disabilities.

A one-way ANOVA comparing males and females also showed no difference in mean CRC scores ($F(1,1068) = 2.54$, $p = .125$). This finding is consistent with the more extensive analysis that included all survey responders (See Section 7.4). Consequently, the sample of graduates used in the CEQ comparisons shared similar characteristics to that of all survey responders examined earlier.

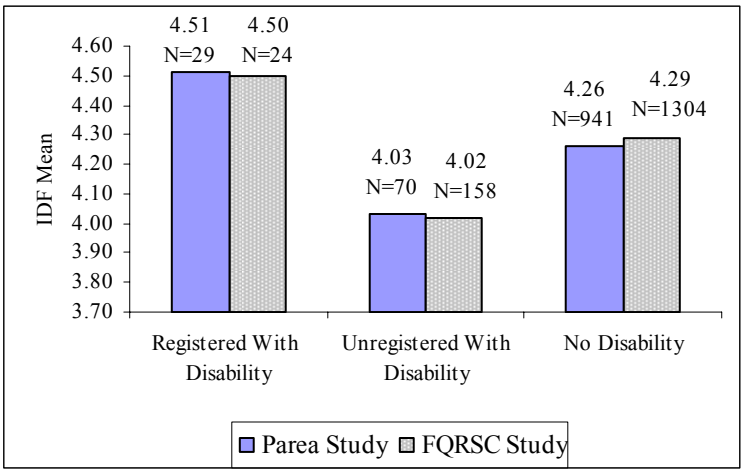
Table 23 Comparison to the CRC Scores by Disability Group, Comparing the CEQ Sample to a Larger Sample of Survey Responders and All Graduates *(N = 9406)*

Data Source	LD/ADD (a)	Other Disability (b)	No Disability (c)	LD/ADD – Other (d = a-b)	LD/ADD - No Disability (e = a – c)
CEQ Sample - Survey Responders	25.53	26.56	26.74	-1.03	-1.21
N = 1070	29	75	966		
Larger Sample - Survey Responders	25.44	26.59	27.13	-1.15	-1.69
N = 3181	60	162	2959		
All Graduates	24.19	26.36	26.30	-2.17	-2.11
N = 9406	185	235	8986		

9.4 Calculating the Index of Difficulty

In order to compare students with and without disabilities, the IDF was calculated excluding the disability specific items. The number of responses to the Community Supports and Services items was lower than for the other two groups of items, and a factor analysis suggested there was some loading of these items with either the personal or cegep subgroups. For this reason, and in order not to substantially reduce the number of participants included in the analysis, the IDF was calculated using the items on the Personal and Cegep Environment subscales. Once items that did not appear on both surveys were excluded, 19 items remained that were used in calculating an IDF score. Only graduates who answered 10 or more items had their scores averaged for inclusion in the IDF comparisons. This reduced the sample from 1070 to 1040. A comparison of the IDF scores in this analysis, and those that resulted from the recalculation of the original data, showed remarkable consistency, as can be seen from Figure 13. The present study included data from one English cegep for two survey years (N = 1040), whereas the original FQRSC study included data from the 2005 survey only, but for three cegeps (2 French and 1 English; N = 1486) (Fichten, Jorgensen, Havel & Barile, 2006).

Figure 13 Comparisons of the IDF Means of Current PAREA and Previous FQRSC Study



10 Graduate Cegep Experiences and Service Registration

10.1 Service Registration and Index of Difficulty (IDF)

The IDF average for the different disability groupings is shown in Table 24. High IDF averages indicate graduates found aspects of their cegep experience easier or more facilitative. In order to determine whether there was a difference in the IDF average among registered and unregistered graduates with and without disabilities, a one-way ANOVA was undertaken. Graduates were assigned to three groups depending on their Registration Status: 1) Registered With Disabilities, 2) Not Registered With Disabilities and 3) No Disabilities. The test showed a main effect for Registration Status ($F(1, 1037) = 7.49$, $p = .001$). Post hoc tests (Dunnett) showed that graduates who were registered for disability related services had IDF averages that were more facilitative (i.e., they experienced aspects of their cegep experience as easier) compared to graduates with disabilities who did not register, and graduates without disabilities. Graduates with disabilities who did not register for services had IDF scores that were significantly lower than those of either of the other two groups. The IDF means comparing the different groups are graphically displayed in Figure 13.

10.2 CEQ Variables - Differences in Means Between Registered and Unregistered Graduates

As a number of variables make up the IDF, the means of each of the CEQ variables were compared for registered and unregistered graduates in order to determine the areas that contributed to the higher IDF mean for registered graduates. Table 25 lists eleven CEQ variables that showed statistically significant differences in item scores between registered and unregistered graduates. Eight were included in the IDF average and the remaining three were not. Two were items specifically targeted toward graduates with disabilities.

Table 24 Comparison of Index of Difficulty and CRC Scores by Disability Group
(N = 1040)

Registration Status	Disability Group	CRC			IDF	
		N	Mean	SD	Mean	SD
Registered With Disabilities	LD/ADD	16	25.16	3.41	4.52	0.49
	Other	13	26.39	4.79	4.50	0.44
Total Registered		**29**	**25.71**	**4.06**	**4.51**	**0.46**
Unregistered With Disabilities	LD/ADD	11	25.58	3.00	3.99	0.67
	Other	59	26.65	3.79	4.03	0.79
Total Unregistered		**70**	**26.48**	**3.68**	**4.03**	**0.77**
Total No Disability	No Disability	**941**	**26.77**	**3.56**	**4.26**	**0.61**
Grand Total		**1040**	**26.72**	**3.58**	**4.25**	**0.62**

We also compared the responses of registered graduates with disabilities to unregistered graduates with disabilities and graduates without disabilities on the 'Willingness of Professors to Adapt Courses to My Needs' item. This was done in order to determine if graduates with disabilities found that professors made their college studies relatively easier. The results are shown in (Table 26). There was a significant difference in the means between registered (M = 4.89) and unregistered graduates with disabilities (4.21) and graduates without disabilities (4.00), with registered graduates having the most positive experiences. Moreover, registered graduates with LD/ADD (M = 4.67) did not haven less positive experiences than registered graduates with other disabilities (M = 5.15), as the difference in the means was not statistically significant.

11 CRC Scores – Relationship to Index of Difficulty (IDF)

To examine whether graduates with less facilitating IDF scores had CRC's that were lower than those of graduates with more facilitating scores, graduates were assigned to two IDF Groups: Low (IDF range 0 to 3.5) and High (IDF range >3.5 to 6). This resulted in N = 115 graduates who fell in the Low grouping and N = 925 graduates who fell in the High grouping. Since only 1 of the 29 (or 3.4%) of registered graduates with disabilities fell in the Low IDF range, it was not possible to do a meaningful comparison for registered graduates with disabilities for High and Low IDF groups (Figure 14). Therefore, graduates were assigned to two groups (Graduates With Disabilities, Graduates Without Disabilities) and a two-way ANOVA (2 Disability Group X 2 IDF Group) was undertaken to compare the mean CRC's of all graduates with and without disabilities. The test showed a significant main effect for IDF Group and no significant interaction effect. The mean CRC scores of those in the Low IDF range were lower than the mean CRC's of those in the High IDF range ($F(1, 1036) = 8.29$, $p < 0.004$), and this was true for both graduates with and without disabilities. Therefore, graduates who perceived aspects of their cegep experience as harder had, on average, lower CRC scores. The average difference was 1.53 CRC points (Table 27). The pattern of higher CRC scores for the higher IDF group also held when only unregistered graduates with disabilities and graduates with no disabilities were compared ($F(1, 1007) = 12.66$, $p < .001$). The means and differences in CRC scores for the Low and High IDF groupings are shown in Table 27.

Figure 14 Proportion of Graduates With Low IDF Scores (<= 3.5) by Service Registration *(N = 1040; Registered With Disabilities; Unregistered With Disabilities; No Disabilities)*

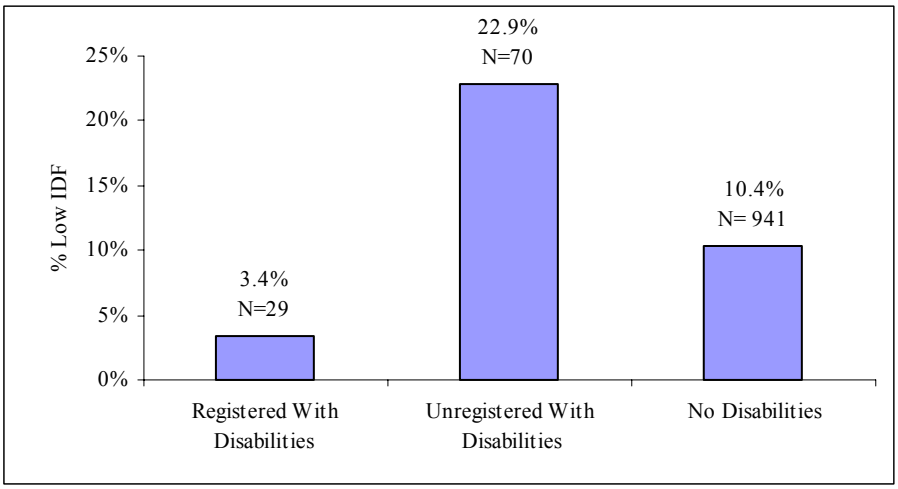


Table 25 Graduates With Disabilities – Eleven Items Showing Statistically Significant Differences Between Registered and Unregistered Graduates With Disabilities

		Registered			Un - registered							
	Item Description	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**	**Diff**	**t**	**df**	**Sig.**	**Total N**
	CRC	30	25.89	4.11	74	26.43	3.65	-0.54	0.66	102.0	0.509	104
	SecV	29	75.77	6.47	73	76.46	8.71	-0.69	0.39	100.0	0.701	102
Q13	Family	28	4.61	1.31	62	3.66	1.70	0.95	2.61	88.0	0.011	90
Q15	Level of personal motivation	28	5.04	1.10	69	4.32	1.59	0.72	2.53	71.2	0.013	97
Q16	Study habits	29	4.62	1.27	69	3.86	1.62	0.77	2.51	66.8	0.015	98
Q17	Previous educational experience	27	5.11	0.93	66	4.45	1.45	0.66	2.59	73.8	0.011	93
Q24	Attitudes of non-teaching staff	28	4.75	1.35	64	3.75	1.50	1.00	3.03	90.0	0.003	92
Q26	Availability of computers on-campus	26	5.08	0.93	68	4.28	1.62	0.80	2.97	77.3	0.004	94
Q30	Willingness of professors to adapt courses to my needs	28	4.89	0.83	62	4.21	1.26	0.68	2.63	88.0	0.010	90
Q33	*Availability of disability related services at cegep	24	5.54	0.78	20	4.05	1.54	1.49	4.16	42.0	0.000	44
Q35	Private tutoring	8	5.63	0.52	23	4.35	1.40	1.28	3.70	28.7	0.001	31
Q38	Computer technologies training off-campus	3	5.33	0.58	19	3.26	1.66	2.07	2.10	20.0	0.049	22
Q39	*Disability related support services off campus	5	4.80	0.84	13	3.08	1.66	1.72	2.19	16.0	0.044	18

***Q33 & Q39 Disability specific items.*

Table 26 Mean Scores of Graduates With Disabilities for the CEQ Item 'Willingness of Professors to Adapt Courses to My Needs'

	Registered			Unregistered		
	N	**Item Mean**	**CRC**	**N**	**Item Mean**	**CRC**
LDD/ADD	15	4.67	25.01	10	3.90	25.48
Other Disabilities	13	5.15	26.39	52	4.27	26.39
Total With Disabilities	**28**	**4.89**	**25.65**	**62**	**4.21**	**26.24**

Graduates without disabilities who responded to the question had a mean CRC of 26.60 (N = 804) and a mean item score of 4.00

Table 27 Relationship Between Index of Difficulty and Mean CRC Scores

	IDF Group	N	Mean CRC	SD	Diff
With Disabilities	Low IDF	17	25.08	3.36	
	High IDF	82	26.50	3.85	
	Total	**99**	**26.25**	**3.79**	**1.42**
Without Disabilities	Low IDF	98	25.41	3.60	
	High IDF	843	26.93	3.52	
	Total	**941**	**26.77**	**3.56**	**1.52**
Total With and Without Disabilities	Low IDF	115	25.36	3.56	
	High IDF	925	26.89	3.55	
	Total	**1040**	**26.72**	**3.58**	**1.53**
Unregistered With Disabilities	Low IDF	16	24.70	3.08	
	High IDF	54	27.01	3.70	
	Total	70	**26.48**	**3.68**	**2.30**
Registered With Disabilities	*Low IDF	*1*	*31.09*	**na**	
	High IDF	28	**25.52**	**3.99**	
	Total	29	**25.71**	**4.06**	**na**
Registered With LD/ADD	*Low IDF	*1*	*31.09*	**na**	
	High IDF	15	**24.76**	**3.12**	
	Total	**16**	**25.51**	**3.61**	**na**
Registered With Other Disabilities	Low IDF	0	**na**	**na**	
	High IDF	13	**26.39**	**4.79**	
	Total	**13**	**26.39**	**4.79**	**na**

* *Only 1 graduate in this grouping.*

The fact that only one of twenty-nine registered graduates with disabilities, or 3.4%, had an IDF in the Low range (<=3.5) is interesting. This compares with 22.9% of unregistered graduates with disabilities and 10.4% of graduates without disabilities. A Chi square test showed this to be a significant difference in the proportions of graduates falling within the Low IDF grouping ($\chi^2(2, N = 1040) = 12.01$, $p = .002$). Graduates who registered for disability services tended to have higher IDF means and a higher proportion of graduates who reported that their cegep experience was easier (Figure 14). However, this did not necessarily translate into better CRC scores, as the CRC scores of registered graduates (M= 25.71) did not differ significantly from those of graduates with disabilities who did not register for services (M = 26.48) ($F(1, 102) = .808$, $p= 0.509$) (Table 24).

12 Cegep Experience Variables Related to Higher CRC Scores

This section examines variables that are correlated with the CRC. One of the variables examined was the Secondary V average. When this variable was used in the analysis, only graduates with a Secondary V average above 60 were included in the sample. A Secondary V average of 60 is

considered a pass, and is the normal requirement for entry into cegep. Some graduates were admitted on the basis of other criteria and did not have a Secondary V average recorded. This filter reduced the sample size to N = 967 (868 graduates without disabilities, 99 graduates with disabilities).

12.1 Correlation of the CRC With the Index of Difficulty

As seen from the previous analysis, there is a tendency for those with higher IDF scores to have higher CRC scores. A regression of IDF against CRC shows that there is a correlation between the two variables. The correlation coefficient for all graduates was R = 0.17 with an R^2 of .028 (N = 1040). Only a small proportion of the variability in the model (2.8%) was accounted for by the IDF. This correlation, although small, was significant ($F(1, 1039) = 29.78$, $p < 0.001$). Table 28 shows the model outcomes for all graduates as well as graduates with and without disabilities. As can be seen from the table the R and R^2 values were similar for all groups. However, the ANOVA for graduates with disabilities was not statistically significant at $p < .05$.

Table 28 Correlation of the CRC Score With the IDF (Linear Regression Model)

	N	F	df 1,2	p	R	R Square	Adjusted R Square
Graduates With Disabilities	99	2.72	1, 97	.102	.165	.027	.017
Graduates Without Disabilities	941	26.48	1, 939	<.001	.166	.027	.026
Total	**1040**	**29.78**	**1, 039**	**<.001**	**.168**	**.028**	**.027**

12.2 CRC and CEQ Variable Correlations – All Graduates

However, the IDF is an average of the scores of nineteen variables, some of which may have stronger relationships to the CRC than others. The CEQ variables were initially screened to isolate those that were most important in contributing to the correlation between the CRC and IDF. Two approaches were used. First each of the 19 CEQ variables was analysed independently for differences in CRC score between high and low values on each CEQ variable. Variables not included in the original 19 used to calculate the IDF were also included in this analysis. CEQ variable scores in the range of 1 - 3 were considered low, and those within the range of 4 - 6 were considered high. The mean CRC scores for low and high values of each variable were compared using independent t tests.

The nine variables in Table 29 showed statistically significant differences in the mean CRC's for low and high values of the variables (the complete list is shown in Appendix 2). One variable that was not included in the original IDF calculation also showed a significant difference in the CRC score (Availability of Computers Off-Campus).

In addition, the Pearson zero order correlations with the CRC score were examined for all thirty CEQ variables. Significant correlations were found for the same nine variables for which there were significant differences in means for high and low values of the variables. The p values for those CEQ variables that showed statistically significant correlations with the CRC are shown in Table 30.

Table 29 All Graduates - Differences in Mean CRC Scores Between Low and High CEQ Item Scores - For All Items Showing a Statistically Significant Differences *(Low CEQ item scores are in the range 1 – 3 (Harder) and High CEQ item scores are in the range 4 – 6 (Easier). Items highlighted (*) also showed significant differences in means for graduates with disabilities)*

		Low			High				t test comparison				
Item	**Item Description**	**N**	**Mean CRC**	**SD**	**N**	**Mean CRC**	**SD**	**Diff**	**t**	**df**	**p**	**% Low**	**Total N**
Q11	Financial Situation	459	26.18	3.48	413	27.05	3.62	**0.87**	3.61	870	<.001	52.6%	872
Q13	Family	242	25.96	3.56	700	26.99	3.57	**1.03**	3.87	940	<.001	25.7%	942
Q15	Level of personal motivation	227	25.36	3.33	809	27.11	3.56	**1.75**	6.64	1034	<.001	21.9%	1036
*Q16	Study habits	349	25.56	3.33	690	27.32	3.56	**1.76**	7.69	1037	<.001	33.6%	1039
Q17	Previous educational experience	161	25.81	3.46	831	27.00	3.56	**1.20**	3.92	1037	<.001	16.2%	992
Q20	Level of difficulty of courses	555	26.49	3.51	467	26.97	3.66	**0.48**	2.13	1020	.033	54.3%	1022
*Q23	Attitudes of professors	343	25.95	3.40	689	27.13	3.61	**1.18**	5.05	1030	<.001	33.2%	1032
Q30	Willingness of professors to adapt courses to my needs	277	25.96	3.38	617	26.80	3.61	**0.84**	3.29	892	0.001	31.0%	894
*Q37	Availability of computers off-campus	130	25.40	3.21	512	26.83	3.52	**1.43**	4.22	640	<.001	20.2%	642

12.3 CRC and CEQ Variable Correlations – Graduates With Disabilities

Graduates with disabilities also showed significant differences in CRC scores for high and low values of the variables highlighted in Table 31. Three of the four variables showing significant differences for graduates with disabilities (Study Habits, Attitudes of Professors, Availability of Computers Off-Campus) were common to the list for all graduates. A fourth variable, specific to graduates with disabilities, also showed a difference (Disability Related Support Services Off-Campus).

The 'Level of Personal Motivation' significantly correlated with the CRC score, but the difference in CRC means between high and low values of the variable was not significant. Variables showing significant correlations with the CRC for graduates with disabilities are shown in Table 31. A complete listing of differences in the means for high and low values of all variables for graduates with disabilities can be found in Appendix 3.

Although only 18 graduates with disabilities replied to the 'Disability Related Support Services Off-Campus' item, the scores on this variable showed a statistically significant correlation with the CRC score. The average difference between low and high values of the variable was 2.33. The relationship between the two variables is illustrated in Figure 15.

Table 30 All Graduates - CEQ Items With Statistically Significant Correlations with the CRC

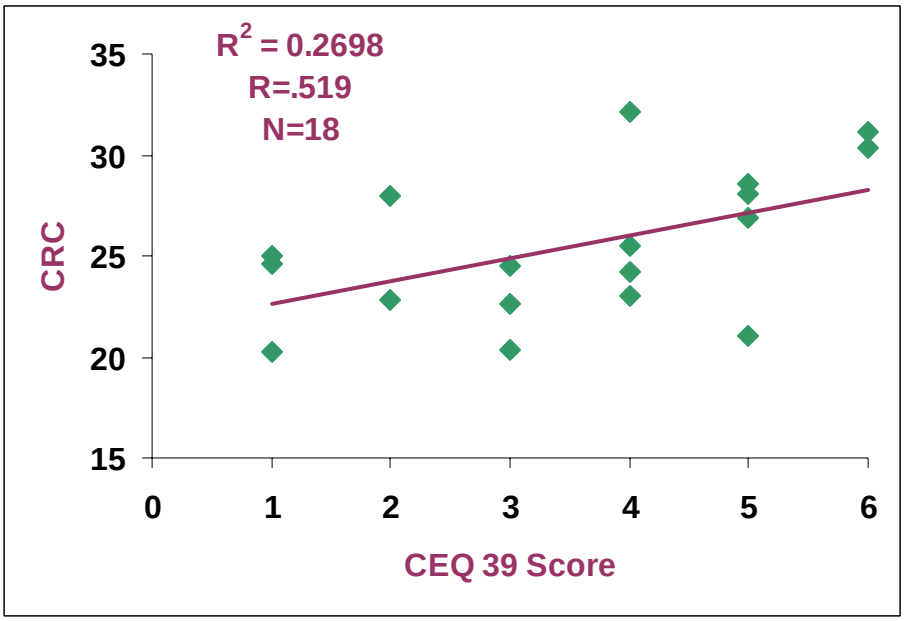
Item No	CEQ Item Description	N	*Correl-ation	Sig of Correlation p <=.05	**Diff CRC	Sig of Diff in CRC
16	#Study habits	1039	.276	<.001	1.76	<.001
15	#Level of personal motivation	1036	.229	<.001	1.75	<.001
37	Availability of computers off-campus	642	.193	<.001	1.43	<.001
17	Previous educational experience	992	.173	<.001	1.20	<.001
23	Attitudes of professors	1032	.163	<.001	1.18	<.001
11	Financial situation	872	.145	<.001	0.87	<.001
13	Family	942	.136	<.001	1.03	<.001
20	Level of difficulty of courses	1022	.106	.<.001	0.48	.033
30	Willingness of professors to adapt courses to my needs	894	.068	.021	0.84	.001

** Sorted from highest to lowest correlations with CRC. (**The difference in CRC score between the high and low values of the variable). # Also correlated with CRC for graduates with disabilities.*

Table 31 Graduates With Disabilities - CEQ Variables Showing Either a Significant Correlation with the CRC Score or Significant Differences in CRC Score Between High (>=4) and Low (<=3) Values of the CEQ Variable

Item No	CEQ Item Description	N	Correl-ation	Sig of Correlation With CRC p <=.05	Difference CRC	Sig of Diff in CRC
	Items Showing Correlation to CRC					
39	Disability Related Support Services Off-Campus	18	.519	.027	2.33	.033
16	Study habits	98	.296	.003	2.68	.001
15	Level of Personal motivation	97	.229	.024	1.72	.065
	Items Showing Significant Differences Between High & Low Values of the Variable					
16	Study habits	98	.296	.003	2.68	.001
23	Attitudes of Professors	99	.178	.078	1.80	.035
37	Availability of Computers Off-Campus	57	.245	.066	2.44	.018

Figure 15 Relationship Between Disability Related Support Services Off-Campus (CEQ Item 39) and CRC Score



12.4 Regression Model – CRC and CEQ Variables

Many of the variables that were correlated with the CRC score were also correlated with each other. For example, there was a .638 correlation between 'Study Habits' and 'Level of Personal Motivation' and a .542 correlation between 'Attitudes of Professors' and 'Willingness of Professors to Adapt Courses…'.

In order to highlight those variables that had the strongest relationship to the CRC, all nine were entered into a linear regression model using stepwise entry (with pairwise exclusion of missing values). Using the stepwise method, only three of the variables were entered into the model, and each of the three variables had coefficients that contributed significantly to the linear relationship. The variables entered were 'Availability of Computers Off-Campus', 'Study Habits' and 'Attitudes of Professors'. This resulted in a significant ANOVA ($F(3, 557) = 26.0$, $p < .001$). The multiple correlation coefficient was $R = 0.350$ and $R^2 = .123$ (adjusted = .118). The model coefficients are shown in (Table 32). Consequently, 11% - 12% of the variability in CRC score can be accounted for by just three variables. From the magnitude of the t statistic, 'Study Habits' had the greatest impact followed by 'Computers Off-Campus' and 'Attitudes of Professors'. The model predicts that if each of the three variables rises by one unit, then the CRC score increases by 1.34. When the model was run using stepwise entry and listwise exclusion of missing values, the sample size was reduced to N = 458. However, the same three variables were entered and the R value was comparable (R = .342) to that obtained using pairwise exclusion (.350).

When the model was run for graduates with disabilities (using pairwise exclusion of missing values), only the Study Habits variable was entered. This resulted in a significant ANOVA ($F(1, 50) = 4.81$, $p = .033$). The multiple correlation coefficient was $R = .296$ and the $R^2 = .088$ (adjusted = .070). The model coefficients are shown in Table 32. When the model was run using stepwise entry and listwise exclusion of missing values, the sample size was reduced to N = 40. However, the same variable was entered (Study Habits) and the R value was comparable (R = .317) to that obtained using pairwise exclusion (.296).

Table 32 Stepwise Regression Results *(Pairwise exclusion; N = 642 to N = 1070 for all graduates; N = 57 to N = 104 for graduates with disabilities)*

Model		N	Unstandardized Coefficients		Standardized Coefficien	t	Sig.
			B	Std. Error	Beta		
All Graduates	Constant	561	20.937	0.697		30.06	<.000
	Q16 Study Habits		0.621	0.097	0.257	6.41	<.000
	Q37 - Availability of Computers Off-Campus		0.433	0.099	0.175	4.39	<.000
	Q33 - Attitudes of Professors		0.288	0.105	0.110	2.74	0.006
Graduates With Disabilities	Constant	52	23.347	1.428		16.35	<.001
	Q16 Study Habits		.718	0.327	0.296	2.19	.033

In order to better visualize the relationship between each of the three variables and the CRC score, the CRC was averaged for each of the CEQ scale values (1 - 6) (Table 33). Figure 16 shows the linear relationship between the mean CRC and the scale value that becomes evident once some of 'noise' is removed. The relationship between values on the 'Study Habits' scale and the CRC mean for graduates with disabilities is also shown in Figure 16.

12.5 Relationship Between the Secondary V Average and the CEQ Variables

As was discussed in our earlier analysis, there is a significant correlation between the Secondary V average and the CRC score. Consequently, it can be surmised that some of the CEQ variables will also be correlated with the Secondary V average. Only graduates with a Secondary V average at or above 60 were included in the following analysis, thus reducing the sample size to N = 967. The correlation between each CEQ variable and the Secondary V average was determined. Nine variables showed statistically significant correlations with the high school average (Table 34). Of these seven were common to those variables correlated with the CRC. Consequently, many factors that were related to higher scores at cegep were also related to better high school grades.

When the nine variables correlated with the Secondary V average were entered into a regression model using stepwise entry (and pairwise exclusion of missing values), only two variables were entered (Previous Educational Experience, Computers Off-Campus). The ANOVA was significant ($F(2, 179) = 4.85$, $p = .009$) and both coefficients had significant t values (Table 35). The multiple correlation coefficient was $R = .227$ and $R^2 = .051$. Thus the correlation of the Secondary V average with the CEQ variable scores was somewhat lower than with the CRC score and accounted for 5.1% of the variability in the linear relationship between the CEQ variables and the Secondary V average.

Table 33 Mean CRC Scores for CEQ Scale Values *(Q 16 = Study Habits; Q23 = Attitudes of Professors; Q37 = Availability of Computers Off-Campus)*

CEQ Scale Value	Mean CRC	N
Q16		
1	25.00	64
2	25.49	101
3	25.80	184
4	26.47	197
5	27.28	283
6	28.19	210
Total	**26.73**	**1039**
Q37		
1	24.89	30
2	25.01	30
3	25.78	70
4	26.52	108
5	26.31	142
6	27.24	262
Total	**26.54**	**642**
Q23		
1	24.81	55
2	25.84	88
3	26.31	200
4	27.07	261
5	27.12	279
6	27.26	149
Total	**26.74**	**1032**

Figure 16 All Graduates - Average CRC Score and CEQ Item Score (*Q 16 = Study Habits; Q23 = Attitudes of Professors; Q37 = Availability of Computers Off-Campus; WD = With Disabilities)*

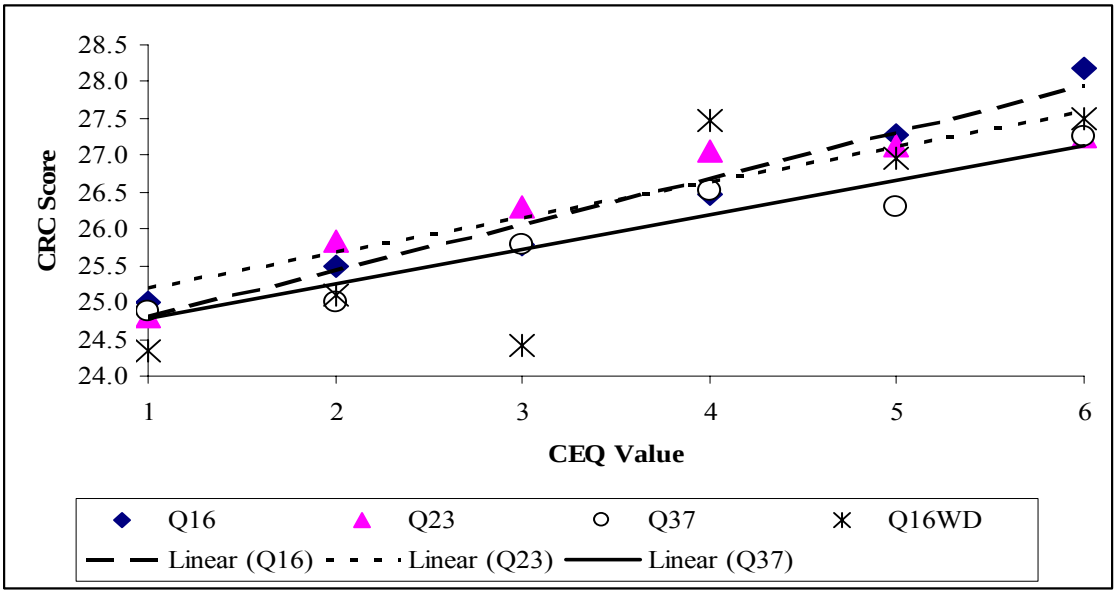


Table 34 CEQ Variables Showing Statistically Significant Correlations with the Secondary V Average (** Items also showing a correlation to the CRC score)*

Item No	CEQ Item Description	N	Correlation	Sig of Correlation With SecV
*Q11	Financial Situation	782	.137	<.001
*Q13	Family	850	.080	.020
*Q15	Level of Personal Motivation	938	.072	.028
*Q16	Study Habits	940	.108	.001
*Q17	Previous Educational Experience	899	.169	<.001
*Q23	Attitudes of Professors	933	.088	.007
Q34	Availability of Financial Aid	236	.130	.046
Q36	Public Transport	872	.089	.008
*Q37	Availability of Computers Off-Campus	576	.163	<.001

Table 35 Model Coefficients for Stepwise Entry of the CEQ Variables That Were Correlated With the High School Average

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	70.95	2.39		29.69	<.001
Q17 Previous Educational Experience	0.86	0.40	0.158	2.17	.031
Q37 Computers Off-Campus	0.71	0.34	0.151	2.07	.041

13 Relationship Between the CRC, Secondary V Average and CEQ Variable Scores

13.1 All Graduates – Relationship Between CRC, Secondary V Average and CEQ Variable Scores

In order to determine the impact of the CEQ variables on the CRC scores once the correlation with the Secondary V average was partialled out, hierarchal regression was undertaken entering the Secondary V average first, followed by stepwise entry of the 9 variables that were identified as having either a correlation with the CRC, or a statistically significant difference in the CRC between high and low values of the variable. This resulted in a significant ANOVA ($F(5, 497) = 127.7$, $p < .001$). The multiple correlation coefficient was $R = .75$ with an $R^2 = .562$ (adjusted = .558). The Secondary V average and four CEQ variables were entered into the model (Study Habits, Attitudes of Professors, Computers Off Campus, Level of Personal Motivation) and all had significant coefficients. The coefficients and the associated t values are shown in Table 36.

One thing that is clear from this analysis is that the Secondary V average had by far the strongest relationship with the CRC score, accounting for about 51.0 % of the total variability of 56.2%. The four CEQ variables accounted for the remaining 5.2%. 'Study Habits' accounted for 3.6%, followed by 'Attitudes of Professors' (0.7%), 'Computers Off-Campus' (0.5%) and 'Level of Personal Motivation' (0.4%). The contribution of each of the variables in the model is shown in Table 37.

Table 36 Hierarchal Regression, Secondary V Average and CEQ Variables – All Graduates

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	-4.958	1.272		-3.897	0.000
SecV	0.358	0.016	0.676	22.318	0.000
Q16	0.312	0.092	0.131	3.380	0.001
Q23	0.175	0.080	0.067	2.192	0.029
Q37	0.182	0.075	0.074	2.430	0.015
Q15	0.197	0.096	0.080	2.047	0.041

Table 37 Contribution of CEQ Variables to the Changes in R^2 – All Graduates

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1 Secondary V	0.714	0.510	0.509	2.491	0.510	521.810	1	501	0.000
2 Study Habits	0.739	0.546	0.544	2.401	0.036	39.191	1	500	0.000
3 Attitudes of Professors	0.744	0.553	0.550	2.384	0.007	8.147	1	499	0.004
4 Computers Off - Campus	0.747	0.559	0.555	2.372	0.005	6.179	1	498	0.013
5 Level of Personal Motivation	0.750	0.562	0.558	2.364	0.004	4.191	1	497	0.041

13.2 Graduates With Disabilities - Relationship Between the CRC Score, Secondary V Average and CEQ Variable Scores

The hierarchal regression was repeated for graduates with disabilities**,** with the Secondary V average entered first. The nine CEQ variables were entered next using stepwise entry. Only the Secondary V average and one CEQ variable (Level of Personal Motivation) were entered. This resulted in a significant ANOVA ($F(2, 46) = 37.36$, $p < .001$). The multiple correlation coefficient was $R = .74$ with an $R^2 = .619$ (adjusted = .602). The coefficients and the associated t values are shown in Table 38.

For graduates with disabilities the linear relationship between 'Level of Personal Motivation' and CRC accounted for 7.7% of the variability in CRC score, once the Secondary V average was partialled out. The Secondary V average accounted for 54.2% of the variability (Table 39).

Table 38 Hierarchal Regression - Secondary V Average and CEQ Variables – Graduates With Disabilities

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-6.150	3.758		-1.637	0.109
Secondary V Average	0.381	0.046	0.754	8.266	0.000
Level of Personal Motivation	0.682	0.224	0.278	3.046	0.004

Table 39 Contribution of CEQ Variables to the Changes in R^2 – Graduates With Disabilities

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1 Secondary V Average	0.736	0.542	0.532	2.519	0.542	55.635	1	47	0.000
2 Level of Personal Motivation	0.787	0.619	0.602	2.323	0.077	9.278	1	46	0.004

14 Predictive Value of the CEQ Variables

A discriminate function analysis was undertaken to allow us to determine how effectively graduates could be classified into two groups (High or Low CRC score) using the Secondary V average and the four CEQ variables identified as making a significant contribution to the regression model. The CRC scores were classified as High if they were above 26, and scores equal to or lower than 26 were considered Low. A CRC score of 26 was chosen as the cut-off as this is the average score required for entry into the university to which most of the graduates in this study apply. Approximately 42.3% (409) of graduates fell in the Low group and 57.7% (558) in the High group (N = 967). Three scenarios were considered as part of the analysis: 1) only the four CEQ variables were entered; 2) only the Secondary V average was entered; 3) all five variables were entered. Because of its strong correlation with the Secondary V average, it was anticipated that this variable would be the most effective predictor of whether a graduate obtained a High or Low CRC score, and that the CEQ items would result in an incremental improvement in the ability to predict the outcome.

14.1 Scenario 1 - All Graduates - CEQ Variables

The four CEQ variables (Study Habits, Attitudes of Professors, Computers Off-Campus, Level of Personal Motivation) were entered into a discriminant function analysis using step-wise entry. The overall Wilks' lambda was significant, $\Lambda = 0.93$, χ^2 (4, N = 563) = 39.53, $p < .001$, indicating that the predictors were able to differentiate between the High and Low CRC groups. The correlation and standardized coefficients are shown in Table 40.

'Level of Personal Motivation' had the strongest correlation with the function. By squaring the canonical correlation we obtain an eta squared of 0.062 (.261 * .261 = .068) indicating that 6.8% of the variability in the function can be accounted for by the four variables.

Table 40 Correlation and Standardized Coefficients – CEQ Variables

Item	CEQ Item	Correlation Coefficients	Standardized Coefficients
15	Level of Personal Motivation	.70	.38
16	Study Habits	.67	.40
23	Attitudes of Professors	.50	.33
37	Computers Off-Campus	.57	.53

When we tried to predict membership of the High and Low CRC groups we were able to classify 62.9% (or 61.3% using the leave one out technique) of the sample correctly. However, it can be seen from Table 41 that the percentage of the High CRC group classified correctly (78.0%) exceeded that of the Low CRC group, where only 43.8% were classified correctly. In order to take into account chance agreement we calculated a kappa coefficient and obtained a value of .23. Although the result was statistically significant ($p < .001$), this is a low value and indicates that the variables, at best, are weak predictors. As Table 41 shows they do not predict membership of the Low CRC group very well.

Table 41 All Graduates Classification of Cases Using Four CEQ Variables (*Study Habits, Attitudes of Professors, Computers Off-Campus, Level of Personal Motivation; N = 563; Includes only cases where the Secondary V average >= 60)*

			Low CRC (<=26)	High CRC (<26)	Total	% Classified Correctly
Original	Count	**Low**	109	140	249	
		High	69	245	314	
	%	**Low**	43.8	56.2	100	
		High	22.0	78.0	100	**62.9%**
Cross Validated	Count	**Low**	102	147	249	
		High	71	243	314	
	%	**Low**	41.0	59.0	100	
		High	22.6	77.4	100	**61.3%**

14.2 Scenario 2 - All Graduates – Classification of Cases Using the Secondary V Average

When the Secondary V average was entered into a discriminant function analysis, the overall Wilks' lambda was significant, $\Lambda = 0.68$, χ^2 (1, N = 967) = 369.64, $p < .001$, indicating that the Secondary V average was able to differentiate between the High and Low CRC groups. By squaring the canonical correlation we obtained an eta squared of 0.318 (.564 X .564 = .318) indicating that 31.8% of the variability in the function was accounted for by the Secondary V average.

When we tried to predict membership of the High and Low CRC groups we were able to classify 77.2% of the sample correctly (76.8% using the leave one out technique). From Table 42 it can be seen that the percentage of the High CRC group classified correctly (82.1 %) exceeded that of the Low CRC group, where only 70.7% were classified correctly. In order to take into account chance

agreement we calculated a kappa coefficient and obtained a value of .53 indicating that the Secondary V was a moderately effective predictor of whether the graduate obtained a CRC score above or below 26.

Table 42 All Graduates – Classification of Cases Using the Secondary V Average Only *(N = 967; Includes only cases where Sec V >= 60)*

		Group	Low CRC (<=26)	High CRC (>26)	Total	% Classified Correctly
Original	Count	Low	289	120	409	
		High	100	458	558	
	%	Low	70.7%	29.3%	100%	
		High	17.9%	82.1%	100%	**77.2%**
Cross-validated	Count	Low	289	120	409	
		High	104	454	558	
	%	Low	70.7%	29.3%	100%	
		High	18.6%	81.4%	100%	**76.8%**

14.3 Scenario 3 – All Graduates - CEQ Variables and Secondary V Average

In this scenario, the five variables (Secondary V average, Study Habits, Attitudes of Professors, Computers Off-Campus, Level of Personal Motivation) were entered into the discriminate analysis using stepwise entry. Only the Secondary V average and Level of Personal Motivation were entered. The Wilks' lambda was significant ($\Lambda = 0.70$, χ^2 (2, N = 563) = 203.7, $p < .001$). The correlation coefficients and standardized coefficients are shown in Table 43. By squaring the canonical correlation we obtained an eta squared of .305 (.552 X .552 = .305), indicating that 30.5% of the variability in the function was accounted for by the two variables entered. As expected, the Secondary V average had the strongest correlation with the function.

Table 43 Correlation and Standardized Coefficients – CEQ Variables and Secondary V Average

CEQ Item	Correlation Coefficients	Standardized Coefficients
SecV	0.95	0.96
Q15 Level of Personal Motivation	0.29	0.31
Q16 Study Habits (a)	0.20	
Q37 Computers Off –Campus (a)	0.07	
Q23 Attitudes of Professors (a)	0.10	

(a) Variable not used in the analysis.

When we tried to predict membership of the High and Low CRC groups we were able to classify 76.5% of the sample correctly (76.3% using the leave one out technique). From Table 44 it can be seen that, once again, the percentage of the High CRC group classified correctly (81.1 %) exceeded that of the Low CRC group (70.2%). In order to take into account chance agreement we calculated a kappa coefficient and obtained a value of .52 indicating that the variables were moderately effective predictors.

However, nothing is gained in predictive ability by entering the CEQ variables as, overall, the Secondary V average alone can be expected to classify 76.8% of the sample correctly, compared to 76.3% when the CEQ variables are entered as well.

Table 44 All Graduates – Classification of Cases Using the Secondary V Average and CEQ Variables. *(N=938; Includes only cases where Sec V >= 60; SecV + CEQ variables 15,16,23, 37; Variables 16,23,37 failed entry criteria in stepwise model)*

		Group	Low CRC (<=26)	High CRC (>26)	Total	% Classified Correctly
Original	Count	Low	276	117	393	
		High	103	442	545	
	%	Low	70.2	29.8	100	
		High	18.9	81.1	100	**76.5%**
Cross Validated	Count	Low	274	119	393	
		High	103	442	545	
	%	Low	69.7	30.3	100	
		High	18.9	81.1	100	**76.3%**

Since the CEQ variables did not significantly increase the ability to predict whether a graduate had a High or Low CRC score, the analysis was repeated using the whole sample, not only graduates who responded to the CEQ. This was done in order to compare the results to those obtained using the smaller sample of survey responders. Only those with a Secondary V equal to or above 60 were included (N = 8426).

Table 45 All Graduates - Classification of Cases Using Secondary V Average *(N = 8426; Includes only cases where the Secondary V average >= 60)*

N = 8426		Group	Low CRC (<=26)	High CRC (> 26)	Total	% Classified Correctly
Original	Count	**Low**	3183	912	4095	
		High	1043	3288	4331	
	%	**Low**	77.7	22.3	100	
		High	24.1	75.9	100	**76.8%**
Cross-validated	Count	**Low**	3160	935	4095	
		High	1043	3288	4331	
	%	**Low**	77.2	22.8	100	
		High	24.1	75.9	100	**76.5%**

The Wilks' lambda was significant ($\Lambda = 0.659$, χ^2 (1, N = 8426) = 3515.5, p < .001). The canonical correlation was .584 with eta squared of .341 and 76.8% of cases were classified correctly overall. The kappa coefficient was .536. In the larger sample the ability to classify both High and Low CRC scores was similar. The results obtained for the larger sample show that the percentage of the Low group classified correctly (77.7%) was higher than for the CEQ sample (70.7%). The percentage of the High group classified correctly was somewhat lower (75.9% compared to 82.1%). The larger sample did not have the survey bias of the CEQ sample, where the average CRC was higher due to the tendency of those with higher CRC's to respond to surveys.

14.4 Graduates With Disabilities - Discriminant Analysis Using CEQ Variables

A discriminant analysis was also undertaken for graduates with disabilities. When the four CEQ variables were entered (Level of Personal Motivation, Study Habits, Attitude of Professors, Computers Off-Campus) none of the variables qualified for entry. However, the sample size was relatively small (N = 55) due to the low number of graduates who provided responses for the 'Computers Off-Campus' variable. When this variable was removed, 'Study Habits' was entered and the Wilks' lambda was significant ($\Lambda = .937$, χ^2 (1, N = 94) = 6.07, p = .014). The canonical correlation was .251. Overall, 57.1% of cases were classified correctly (Table 46). However, the kappa coefficient was .143 (p = .157), a non-significant value indicating no better than chance prediction.

Table 46 Graduates With Disabilities - Classification of Cases Using CEQ Variables (*N = 96; Includes only cases where the Secondary V average >= 60)*

		Group	Low CRC (<=26)	High CRC (>26)	Total	% Classified Correctly
Original	Count	**Low**	28	21	49	
		High	21	28	49	
	%	**Low**	57.1	42.9	100	
		High	42.9	57.1	100	57.1%
Cross-validated	Count	**Low**	28	21	49	
		High	21	28	49	
	%	**Low**	57.1	42.9	100	
		High	42.9	57.1	100	57.1%

14.5 Graduates With Disabilities - Discriminant Analysis Using Secondary V Average Only

A discriminant analysis was undertaken for graduates with disabilities using the Secondary V average alone. This resulted in a significant Wilks' lambda ($\Lambda = .699$, χ^2 (1, N = 99) = 34.53, p = < .001). The canonical correlation was .548 and eta squared was .300 or 30.0%. Overall 73.7 % of cases were classified correctly (Table 47). The kappa coefficient was .474 (p<.001) and indicated that the Secondary V average was a moderately good predictor of whether a graduate with a disability would obtain a High or Low CRC score.

14.6 Graduates With Disabilities - Discriminant Analysis Using the Secondary V Average and CEQ Variables

The CEQ variables (Study Habits, Attitudes of Professors, Level of Personal Motivation) and the Secondary V average were entered into the model using stepwise entry. The 'Computers Off-

Campus' variable was omitted because of the low number of responses. Only the Secondary V average and Level of Personal Motivation were entered. The Wilks' lambda was significant (Λ = 0.64, χ^2 (2, N = 94) = 40.71, p < .001).

The correlation coefficients and standardized coefficients are shown in Table 48. By squaring the canonical correlation we obtained an eta squared of .364 (.603 X .603 = .364) indicating that 36.4% of the variability in the function was accounted for by the two variables entered. As expected, the Secondary V average had the strongest correlation with the function.

Table 47 Graduates With Disabilities - Classification Table Using the Secondary V Average Alone *(N = 99; Includes only cases where the Secondary V average >= 60)*

		Group	Low CRC (<=26)	High CRC (>26)	Total	% Classified Correctly
Original	Count	**Low**	39	12	51	
		High	14	34	48	
	%	**Low**	76.5	23.5	100	
		High	29.2	70.8	100	73.7%
Cross-validated	Count	**Low**	39	12	51	
		High	14	34	48	
	%	**Low**	76.5	23.5	100	
		High	29.2	70.8	100	73.7%

Table 48 Graduates With Disabilities – Correlations and Standardized Coefficients

CEQ Item	Correlation Coefficients	Standardized Coefficients
SecV	0.91	0.99
Q15 Level of Personal Motivation	0.24	0.43
Q16 Study Habits(a)	0.28	
Q23 Attitudes of Professors (a)	0.27	

(a) This variable not used in the analysis.

Overall, 76.6% of cases were classified correctly, and the predicted number of cases for both the High (75.6%) and Low (77.6%) groups were similar. This compares to 73.7% using the Secondary V average alone. The kappa coefficient was .492 (p < .001), indicating moderately good prediction. However, the CEQ variables did not add greatly to predictive ability over that attained using the Secondary V average alone.

14.7 Graduates With Disabilities Discriminant Analysis – Secondary V Average on Larger Sample

The discriminant analysis was repeated including all graduates with disabilities, not only those who responded to the CEQ. This provided a larger sample of N = 391. When the Secondary V average was entered, the Wilks' lambda was significant (Λ = .643, χ^2 (1, N = 391) = 171.55, p = <.001). The canonical correlation was .597 and eta squared was .356. When using the larger sample, 79.0% of cases were classified correctly. 87.5% of the Low group were correctly classified compared to 65.6%

of the High group. The kappa coefficient was .545, indicating moderate predictive ability. As can be seen from this analysis, the inclusion of the CEQ variables did not result in improvement in the predictive ability of the model.

Table 49 Secondary V Average Only (>=60) - Graduates With Disabilities *(N = 391; Includes only cases where the Secondary V average >= 60;)*

		Group	Low CRC (<=26)	High CRC (>26)	Total	% Classified Correctly
Original	Count	**Low**	210	30	240	
		High	52	99	151	
	%	**Low**	87.5	12.5	100	
		High	34.4	65.6	100	79.0%
Cross-validated	Count	**Low**	210	30	240	
		High	52	99	151	
	%	**Low**	87.5	12.5	100	
		High	34.4	65.6	100	79.0%

14.8 Graduates With Disabilities – Excluding Learning Disabilities

A discriminant analysis was undertaken for graduates with disabilities excluding learning disabilities. When 'Study Habits' was entered into a discriminant analysis, the overall Wilks' lambda was significant ($\Lambda = .94$, χ^2 (1, N = 69) = 3.86, p = .049). Using 'Study Habits' alone 58% of cases were classified correctly. However, when both the Secondary V average and Study Habits variables were used in the analysis, only the Secondary V average was entered. The Wilks' lambda for the Secondary V average alone was significant ($\Lambda = .59$, χ^2 (1, N = 72) = 36.87, p <.001). This resulted in 79.2% of cases classified correctly (79.2 % cross validated) (Table 50). In this model a higher percentage of those falling in the Low classification (86.8%) were correctly classified compared to the High classification (70.6%).

Table 50 Graduates With Disabilities, Excluding Learning Disabilities - Classification Table Using Secondary V Average Only *(N = 391; Includes only cases where Secondary V average >= 60)*

		Group	Low CRC (<=26)	High CRC (>26)	Total	% Classified Correctly
Original	Count	**Low**	33	5	38	
		High	10	24	34	
	%	**Low**	86.8	13.2	100	
		High	29.4	70.6	100	79.2%
Cross-validated	Count	**Low**	33	5	38	
		High	10	24	34	
	%	**Low**	86.8	13.2	100	
		High	29.4	70.6	100	79.2%

15 Variables Associated With Under and Overachievement

We compared graduates who were correctly classified in the high CRC group (i.e., their CRC scores were consistent with their Secondary V averages and their CEQ variable scores: N = 439) with the graduates who had lower CRC scores than the model predicated (i.e., they underachieved given their high school average and CEQ variable scores: N = 101).

Conversely, we compared graduates who were correctly classified in the Low CRC group (i.e., those in the Low group whose CRC scores were consistent with their Secondary V average and CEQ variable scores: N = 279) with graduates whose CRC scores were higher than the regression model predicted (N = 107). This represents the group that overachieved. Differences in CEQ item means between correctly classified and misclassified graduates were compared using independent sample t tests.

15.1 Factors Associated With Underachievement

From Table 51 it can be seen that there is a difference in the mean Secondary V averages between the correctly classified (83.4) and misclassified (79.2) groups, a difference of 4.8 points. The regression model predicted that with a Secondary V average of 79.2 (and with the associated variable scores), the CRC for the misclassified group would be 27.12. The average CRC for the misclassified group was 24.15, lower than predicted by the model. The regression model predicted a CRC of 29.01 for the correctly classified group, and the average value for the group was in fact 29.63.

Table 51 All Graduates - Factors Associated With Underachievement *(Predicted with high CRC scores but had lower scores than expected from the Secondary V average and CEQ variable means – underachievement; Correctly classified cases = 439; Misclassified cases = 101; Total N = 540*)

	Classified Correctly N = 439		**Misclassified N = 101**		**Test Results**			
CEQ Item	**N**	**Mean**	**N**	**Mean**	**Diff-erence**	**t**	**df**	**p**
Secondary V Average	**439**	**83.4**	**101**	**79.2**	**4.28**	**12.11**	**249.6**	**<.001**
CRC Score Actual **CRC Predicted**	**439** **439**	**29.63** ***(28.91)***	**101** **101**	**24.15** ***(27.10)***	**2.31**	**33.04**	**294.6**	**<.001**
Q11 Financial Situation	352	4.12	91	3.63	-0.49	2.89	441.0	<.001
Q15 Level of Personal Motivation	436	4.86	106	4.49	-0.37	2.40	143.5	.018
Q31 Accessibility of Building Facilities (e.g., doorways classrooms/labs etc)	384	4.63	103	4.85	+0.23	2.08	485.0	.038
Q37 Availability of Computers Off-Campus	243	5.04	77	4.45	-0.58	3.12	117.62	.001

**Coefficients for regression model used to predict CRC scores are those shown in Table 36.*

The means on the CEQ items were then compared for the two groups to isolate differences that may have been related to the underachievement of the misclassified group. It was not possible to perform a MANOVA on the variables due to the reduction in the sample size that resulted when all variables

were entered. So, as a first step, the means for the CEQ variables were screened by comparing them separately using independent sample t tests in order to identify variables that showed statistically significant differences between the two groups. The variables that showed significant differences were then compared using MANOVA to correct for errors introduced by multiple comparisons, and to ensure the variables remained statistically significant. The four variables identified (Financial Situation, Level of Personal Motivation, Availability of Computers Off-Campus, Accessibility of Building Facilities (e.g., doorways classrooms/labs) showed a statistically significant MANOVA (Wilks' $\Lambda = 0.90$, $F(4, 242) = 6.83$, $p < .001$).

The differences in CRC scores, Secondary V averages and CEQ item means for those variables showing significant differences for the high achieving group (CRC > 26) and the group that had lower CRC scores than would have been expected given their Secondary V average (under-achievers) are shown in Table 51. It appears that the underperformers may have experienced more financial difficulties, had less access to computers off-campus and had lower levels of personal motivation, as their mean scores on these items were lower than for the correctly classified group. Having less access to computers off-campus these graduates may have had to use the computer labs on campus more than other graduates, thus accounting for higher scores on the 'Accessibility of Building Facilities (e.g., doorways classrooms/labs' variable.

15.2 Factors Associated With Overachievement.

Table 52 compares the correctly classified group with CRC scores that were <=26 to those who had higher CRC scores than the model predicted. From the table it can be seen that there is a difference in the mean Secondary V average of the correctly classified (71.7) and misclassified (73.0) groups, a difference of 1.3 points. The regression model predicted that with a Secondary V average of 73.0 (and with the associated variable scores), the CRC would be 24.72. The average CRC for the misclassified group was 27.61, higher than was predicted. The regression model predicted a CRC of 24.07 for the correctly classified group, and the average value for the group was in fact 23.09.

Table 52 All Graduates – Factors Associated With Overachievement *(Predicted with low CRC scores but had higher scores than expected from the Secondary V average and CEQ variable means – overachievement; Correctly classified cases = 279; Misclassified cases N= 107; Total N = 386)*

	Classified Correctly N = 279		**Misclassified N = 107**		**Test Results**			
CEQ Item	**N**	**Mean**	**N**	**Mean**	**Diff-erence**	**t**	**df**	**p**
Secondary V Average	**279**	**71.7**	**101**	**73.0**	**1.3**	**2.90**	**378.0**	**.004**
CRC Score Actual	**279**	**23.09**	**101**	**27.61**	**4.52**	**25.52**	**255.1**	**<.001**
***CRC Predicted**		***(24.07)***		***(24.72)***				
Private Tutoring	82	4.05	25	4.64	0.59	1.97	105	.052

***Coefficients for regression model used to predict CRC scores are those shown in Table 36.**

The means of the CEQ items were then compared for the two groups in order to examine differences that may be related to the overachievement of the misclassified group. As was the case in the previous analysis, the means were compared for the two groups using independent t tests. The only CEQ variable showing a significant difference in the mean CEQ score was 'Private Tutoring'. Graduates who were misclassified (overachieved) reported higher scores on this variable (4.65)

compared to the correctly classified group (4.05), although the difference was only marginally significant with p = .052, and relatively few graduates responded to the item (Table 52).

When the analysis was repeated for graduates with disabilities, the only variable showing a significant difference was 'Attitudes of Fellow Students'. Graduates with disabilities who had higher scores on this variable (M = 4.75 vs M = 3.81) achieved a higher CRC than would have been predicted from the model.

15.3 Summary – Cegep Experience and CRC

Our hypothesis that graduates who perceived that aspects of their studies were more difficult (as measured by an overall index of difficulty (IDF) on the CEQ questionnaire) would have lower CRC scores than those with more facilitative scores was supported. There was a small but significant correlation between the IDF and the CRC scores of graduates. Graduates whose IDF scores were low had lower CRC scores than graduates whose IDF scores were high. Closer examination of the variables from which the IDF was calculated showed that eight variables, when considered independently, and one variable not included in the original IDF calculation, had a positive correlation with the CRC, and showed a significantly different mean CRC scores when graduates with high and low CEQ variable scores were compared. Differences in CRC scores for these nine variables between those with higher, more facilitative variable scores (>=4) and those with lower, less facilitative scores (<=3) ranged between 0.50 and 1.73, with 'Study Habits' having the largest difference.

When all nine variables were entered stepwise into a regression model, the model highlighted that three variables accounted for 11% - 12% of the variability in CRC scores, with 'Study Habits' having the strongest effect, followed by 'Availability of Computers Off-Campus' and 'Attitudes of Professors'. The coefficients of the model predict that if each of the three variables rises by one unit, then the CRC score increases by 1.34 units.

The Secondary V average had a significant correlation with the CRC score (R = .73). When the Secondary V average was entered into a regression model with all nine CEQ variables that showed either a significant correlation with the CRC, or differences in high and low values of the variable, it was found that most of the variability in the CRC score was related to the Secondary V average (51.0%), and only a relatively small amount (5.2%) to the CEQ variables (Level of Personal Motivation, Study Habits, Attitudes of Professors, Availability of Computers Off-Campus).

When a discriminate function analysis was used to examine the extent to which the Secondary V average and the four CEQ variables were able to predict whether a graduate had a Low (<=26) or High (>26) CRC score, it was found that the four CEQ variables alone might be expected to classify 62.9% of cases correctly overall, but were a poor predictor of the Low CRC group. 'Level of Motivation' had the strongest correlation with the function.

The Secondary V average alone was a moderately good predictor and could be expected to classify 76.8% of the cases correctly overall, but was better at classifying the high CRC group (81.4%) at the CRC cut-off value chosen.

When the Secondary V average and CEQ variables were both used, only the Secondary V average and 'Level of Personal Motivation' contributed significantly to the discriminate function. However, nothing was gained in predictive ability when the CEQ variables were entered, with 76.5% of cases classified correctly compared to 77.2% for Secondary V average alone.

Underachievers were defined as those graduates who had lower CRC scores than might have been predicted from their Secondary V average and CEQ variable scores. Four of the CEQ variables differed between the underachievers identified by the discriminant function classification and the correctly classified high achievers. The variables were 'Financial Situation', 'Level of Personal Motivation', 'Availability of Computers Off-Campus', where the scores were lower for the misclassified group, and 'Accessibility of Building Facilities (e.g., doorways classrooms/labs)' where the score was higher.

Overachievers were defined as those graduates who had higher CRC scores than the regression model predicted given their Secondary V average and CEQ variable scores. This group was compared to those who had similarly low Secondary V averages and were correctly classified in the Low CRC group (CRC < 26). With the exception of 'Private Tutoring', which was marginally significant, and higher for the overachieving group, there were no significant differences in the CEQ item means between the overachievers and the correctly classified graduates. The two groups had similar Secondary V averages and CEQ response profiles, and the higher CRC score of the over achieving group could not be associated convincingly with any of the CEQ variables.

A hierarchal regression analysis was also carried out for graduates with disabilities, using the Secondary V and CEQ variables. Only the Secondary V average and the 'Level of Personal Motivation' variables were entered and had significant coefficients. The Secondary V accounted for 54.2% and 'Level of Personal Motivation' 7.7% of the variability in the CRC score. A discriminant function analysis resulted in 76.6% of correctly classified cases compared to 73.7% using the Secondary V average alone. None of the CEQ variables were entered. With the larger sample using only the Secondary V average, 79.0% of graduates with disabilities were classified correctly. As was the case with graduates without disabilities, little was gained in predictive ability by incorporating the CEQ variables.

16 Discussion

The 'Survey Responder Effect' - The Example of College Students with Disabilities

In the process of analyzing the research results we encountered a serious confound: graduates who completed at least one of our surveys, whether they had a disability or not, had higher high school leaving grades and higher standardized college exit scores (CRC's) than graduates who did not complete any of our surveys. This 'survey responder effect' has important methodological and conceptual implications for studies of college students and graduates in general, and for students and graduates with disabilities in particular.

Much of the literature on college students and graduates with disabilities is typically based on individuals who register for disability related services at their school. This is because the research is conducted either by campus based disability service providers or because these individuals are asked to help with participant recruitment. Based on the data from the present study, our findings suggest that approximately 9% of graduates at the College had a disability and that 70% of them did not register for disability related services. Consequently, obtaining data through the service provider for research studies excludes the majority of students with disabilities.

A second source of information used in disability research is based on the self-reports of students. A number of large scale American freshman studies on disability have been based on self-reports by students or graduates (e.g., Henderson, 1995; 1999). However, there are a number of methodological problems associated with obtaining accurate information through self-reports. Some of these are discussed by Rietchlin and MacKenzie (2004) in relation to the variable disability rates reported on Canadian surveys.

In the present study, we combined data from both sources: self-reports on surveys conducted at the College during the study period and from data collected by the College's Services for Students with Disabilities relating to those who registered for the services provided by the office. This allowed us to test hypotheses concerning graduates who registered for disability related services at the College and those who did not. However, our study clearly shows that these different modes of identifying students for inclusion in a disability research study can lead to contradictory conclusions. For example, if we had used survey data alone, we would have concluded that there was no difference between the CRC scores of male and female graduates. However, when the larger sample including survey non-responders was examined, the comparison showed there was in fact a difference. This difference in outcomes could be attributed to a 'survey responder effect.' Consistent with the findings of others (Woosley, 2005), our study showed that survey responders had, on average, higher grades than non-responders. Therefore, the fact that only a subgroup of males and females with higher CRC scores replied to the surveys, tended to equalize the difference in scores between males and females.

In addition, based on data obtained by identifying graduates with disabilities using both survey self-reports and information held on the College's database maintained by the office of Services for Students with Disabilities for those who did not self-report, we might have concluded that graduates with disabilities who registered for disability related services had lower CRC scores than those who did not register. However, when only survey responders who registered for services were compared with those who self-reported on surveys but did not register, there was no difference in the CRC scores between registered and unregistered graduates with disabilities. This again could be attributed to the 'survey responder' effect, since unregistered graduates consisted solely of survey responders who had higher CRC scores that were associated with this group. This complicates any attempt to compare the academic success of graduates who register for disability related services with graduates with disabilities who do not register.

On the other hand, when using only a limited set of survey data (from the CEQ), one might have concluded that there were no differences in CRC scores among graduates with LD/ADD, graduates with other disabilities and graduates without disabilities. However, the larger sample of all graduates showed that graduates with LD/ADD had significantly lower CRC scores than graduates with other disabilities. The discrepancy, in this case, could be attributed to the small number of graduates with learning disabilities identified by the survey.

These outcomes highlight the discrepancies that arise when samples are obtained from student self-reports as opposed to samples obtained from the service provider. These findings reinforce the importance of obtaining high response rates when survey data are used to extrapolate findings to the wider population for two reasons 1) differences in the characteristics of responders and non-responders can lead to incorrect inferences about the characteristics of the population from which the survey sample is drawn, as is shown by the examples cited in this study and 2) small sample sizes, as is often the case for students with disabilities, can mask real differences between groups unless effect sizes are large.

CRC Scores of Graduates With and Without Disabilities

Our hypothesis that graduates with LD/ADD have lower CRC scores compared to graduates with other disabilities was supported. This was true of both males and females. In a previous study we examined the average grades of students with disabilities in their first semester at cegep (Jorgensen, Fichten, Havel, et al, 2005, 2003). The study showed that students with LD/ADD had lower grades than students with other disabilities. Our current findings are consistent with these results. However,

our previous study also showed that students with LD/ADD had grades that did not differ significantly from those of students without disabilities, and that students with disabilities other than LD/ADD had grades that were higher than those of non-disabled students. The present findings show that CRC scores of graduates with disabilities other than LD/ADD did not differ from those of graduates without disabilities, while CRC's of students with LD/ADD were significantly lower than the scores of the other two groups.

The differences between the present results and those of our previous study may be accounted for by a number of factors. In the previous study the grade averages used were not standardized, while the CRC score used in the present investigation is a standardized score. So it may be that graduates with LD/ADD undertake easier courses. Also the previous study consisted of students in their first semester and the present study compares graduates who have successfully completed all levels of study and, therefore, more difficult material. It has been shown that, generally, students with learning disabilities demonstrate lower academic achievement than their non-disabled peers as the course material becomes more complex (Deshler, Schumaker, Lenz, et al., 2001).

It is difficult to compare our findings with those of others because research on the academic success of students and college and university graduates with disabilities is sparse. Moreover, the reporting of grade point averages (GPA's) for students with disabilities with and without LD/ADD has resulted in conflicting findings. A study of students with learning disabilities at the Open University of Israel found that although these students experienced academic difficulties, there was no difference between their GPA's and those of non-disabled students (Heiman & Precel, 2003). The study's authors attributed the lack of difference to the effort made by these students to overcome their deficits, the specific supports they received, and the fact that they were older students. Adelman and Vogel (1990) found that the GPA's of students with learning disabilities at the end of each year of study, and when they exited from college were lower than those of a sample on students without learning disabilities. Despite this, students with learning disabilities graduated at the same rate as the comparative group. This is consistent with our previous findings regarding the graduation rates of students with LD/ADD (Jorgensen, Fichten & Havel, et al, 2005, 2003). However, in a later study (Vogel & Adelman, 1992) using a matched sample of 50 – 60 students with and without learning disabilities, found no difference in GPA's at the end of either the freshman, sophomore or senior year. In our study although females with LD/ADD had comparable scores to graduates without disabilities with similar high school averages, males with LD/ADD had lower CRC scores even when their scores were adjusted for high school grade.

The Outcomes Group (1998) examined the grade point averages (GPA's) of former students with and without disabilities from 21 British Columbia public junior/community colleges and institutes. Students were surveyed nine months after they had completed all, or a significant part of their program. The results showed that the GPA's of graduates with and without disabilities were virtually identical, regardless of program of study. Although we did not do a breakdown by program, in our study graduates with a disability other than LD/ADD had virtually identical scores to those of graduates without disabilities once we accounted for the survey responder effect. The Outcomes study also found that women with and without disabilities had higher GPA's compared to men, and this was true regardless of program. This tendency has been shown by others as well (e.g, Reiff, Hastzes, Brammel & Gibbon, 2001). Our study also showed that women graduates had higher college exit scores compared to men, and this was true of graduates with LD/ADD, graduates with disabilities other than LD/ADD and graduates without disabilities.

High School Grades and College Exit CRC Scores – Implications for University Entrance

It has been shown that young people with learning disabilities attend colleges and universities at lower rates than their non-disabled peers (Murray & Wren, 2003). In completing high school, students with learning disabilities face special challenges. Those who do enter college are at a disadvantage from the start of their college careers, due to the large percentage entering with high school grades in the lower end of the range. The lower CRC scores of graduates with LD/ADD in our investigation could be attributed, in part, to the fact that they entered cegep with lower high school grades compared to other graduates with and without disabilities. High school grades proved to be a reasonably good predictor of whether a graduate obtained a competitive CRC score for university entry. Our regression model showed that for every 5 point gain in high school leaving average there was a 1.9 point increase in CRC score. Sixty-five percent of students with LD/ADD had high school leaving averages below 75 compared to 41% of graduates with other disabilities and 34% of graduates without disabilities. The figure was particularly high for males with LD/ADD (73%). Not surprisingly then, our results also show that only 22% of graduates with LD/ADD achieved CRC scores above 27, compared to between 40% and 42% of graduates with other disabilities or graduates without disabilities. On the other hand 63% of gradates with LD/ADD had CRC scores below 25 compared to between 39% and 40% for the other two groups.

Our previous study showed that the graduation rates of students with LD/ADD, graduates with disabilities other than LD/ADD and graduates without disabilities did not differ significantly, although both groups of graduates with disabilities took longer to obtain their diploma (Jorgensen, Fichten & Havel, et al, 2005, 2003). Despite this, a smaller proportion of graduates with LD/ADD obtained university entrance scores in the more competitive range. The fact that so many students with LD/ADD enter college with high school grades in the lower end of the range puts them at a disadvantage in achieving CRC scores that ensure entrance into university. The impact of LD/ADD on the ability to obtain good high school grades carries through to their college studies, and their ability to get competitive college exit scores, as there is a strong correlation between the two variables. Vogel and Adelman (1992) found that the two variables most highly correlated with college exit GPA were the number of regular English courses completed with a grade of C or better and high school GPA. The high school GPA was the variable most closely related to college exit GPA for a matched sample of students without a known learning disability. The correlations with high school grades for non-disabled graduates and graduates with disabilities were $R = .41$ and $R = .48$ respectively. Our study had higher correlations between CRC exit scores and high school grades. These hovered around $R = .70$ for both graduates with and without disabilities. In our study high school leaving grade was also the strongest predictor of graduates' college exit scores.

When we adjusted for high school leaving average, the difference in CRC scores between males with LD/ADD and the other groups persisted. Therefore, even for equivalent high school grades males with LD/ADD in this study did less well than the other groups, although the differences in CRC scores, when adjusted for high school grades, were less pronounced. This suggests that being male and having a learning disability constitutes a ‘double disability’ when it comes to succeeding in college.

In addition, the majority of graduates with LD/ADD in this study were in the pre-university (82.7%) as opposed to the careers sector (17.3%). Career programs train students for direct entry into the workforce following graduation from college, and graduates from these programs generally are able to find employment in a field related to their program without further study. As pre-university programs prepare students for entry into university, graduates from these programs have no specific career training. Graduates from pre-university programs who go on to employment rather than to

university, are less likely to find work related to the field of study of their program (Fichten, Jorgensen, Havel & Barile, 2006).

Whether the present findings are due to poor academic skills or to other factors, the results suggest that many students with learning disabilities, especially males, are likely to have to work very hard to succeed in university.

Impact of Registering for Disability Related Services on CRC Scores

Two of our hypotheses were: 1) graduates with disabilities who register for disability related services have CRC scores that exceed those of graduates with disabilities who do not register for services; and 2) graduates with disabilities who register for services have CRC scores that are equivalent to graduates without disabilities. These hypotheses were not supported by the data.

Our analysis showed that graduates who responded to surveys had higher CRC scores than non-responders whether they had a disability or not. Therefore any differences in CRC scores between registered and unregistered graduates could have been due to this difference, since unregistered graduates consisted of only those who self-reported their disability, while the majority of registered graduates were not survey responders. To eliminate this bias, we compared the CRC scores of survey responders only, and found that there was no difference in CRC scores between registered and unregistered graduates. This was true of both graduates with LD/ADD and graduates with disabilities other than LD/ADD.

The fact that higher CRC scores were not associated with registration for disability related services with the college should not be interpreted as indicating that such services do not result in improved success. Evidence was provided for this contention from our examination of graduates' responses to the College Experiences Questionnaire (CEQ) (Fichten, Jorgensen, Havel, & Barile, 2006), which evaluated obstacles and facilitators related to academic success. The results showed that graduates with disabilities who registered for disability related services perceived aspects of their college experience as easier than those who did not register. This was shown by more facilitating overall IDF (index of difficulty) scores. Registered graduates felt that the following aspects of their cegep experience, included in the IDF score, made their college studies easier relative to unregistered graduates:

- Family
- Level of Personal Motivation
- Study Habits
- Previous Educational Experience
- Attitudes of Non-teaching Staff
- Availability of Computers On Campus
- Willingness of Professors to Adapt Courses to My Needs

In addition, the following CEQ items that were not included in the IDF calculation were also perceived as more facilitating by students registered for disability related services than by those not registered, although relatively few participants responded to the questions:

- Private Tutoring
- Computer Technologies Training Off-Campus

Two disability specific items were also perceived as more facilitating by registered than by unregistered graduates:

- Availability of Disability Related Services at Cegep
- Disability Support Services Off-Campus

These more positive perceptions of registered graduates could be related to a number of services provided to students with disabilities on-campus as they proceed through to graduation. For example, the office of Services for Students with Disabilities oversees a computer lab reserved for the exclusive use of students with disabilities, and this could explain the more positive response to the 'Availability of Computers On Campus' item. The office also allows pre-registration in courses with professors who are sympathetic to students' needs. This could explain the more favorable response to the 'Willingness of Professors...' item. The higher scores on the 'Attitudes of Non-teaching Staff' could be related to positive interactions that registered students had with the administrative staff in the Services office itself, for example.

It is possible that students who registered for services may not have persisted without the support of the office of Services for Students with Disabilities, as the service provider may have eased their transition to college and provided on-going support for them during their studies. Bear, Kotering and Brazil (2006), in their study comparing high school completers and non-completers with learning disabilities suggested that it may not be academic skill per se, but a student's application of skills such as motivation to attend class and complete assigned tasks that are important in determining high school completion. This may be true of college completion as well. Graduates in the present study who registered for disability related services reported higher levels of motivation and more facilitating study habits than unregistered graduates. That motivation is important has been demonstrated in our findings and the findings of others. Registering for disability relates services may help students sustain the level of personal motivation that is required for them to succeed. The study of motivators toward academic success for students with disabilities is an important area of investigation as these may be different from motivators for students without disabilities.

Experience from the 1980s and 1990s has shown that without access to accommodations such as sign language interpreters, accessible facilities and labs and the like it is extremely difficult for students with certain disabilities to succeed (Fichten, Bourdon, Creti, & Martos, 1987; Fichten, Goodrick, Tagalakis, Amsel, & Libman, 1990). In a relatively large sample of college graduates with disabilities we found that those who did not register for disability related services had lower overall index of difficulty scores (IDF) than either graduates with disabilities who registered or graduates without disabilities (Fichten, Jorgensen, Havel & Barile, 2006). Thus graduates with disabilities who did not register for services perceived their college experiences as more difficult overall. In the present study 92.9% of graduates with disabilities responding to the survey claimed the presence of a disability made their studies harder, and 88.6% also claimed that the availability of disability related services on campus made their studies easier. This ranked highest on the list of CEQ items that graduates with disabilities found made their studies easier.

Although it could not be shown that registration for services resulted in higher CRC scores, we do not know the extent to which disability related services contributes to improved retention and graduation rates. Moreover, we were unable to compare the CRC scores of the majority of graduates who registered (the survey non-responders), because of the survey response bias. We, therefore, do not know whether registered graduates who failed to self-report their disability had higher CRC scores than the group in the general graduate population who failed to self-report, as we have no knowledge of this latter group. Our previous work showed that students with disabilities at the College, including those with LD/ADD, graduated at the same rate as students without disabilities although they took longer to do so (Jorgensen, Fichten, Havel et al, 2005, 2003). However, the study

included only graduates who were registered for disability related services. We did not compare the graduation or retention rates of students with disabilities who did not register for services, and this is a topic we hope to examine in future studies.

Cegep Experience and Academic Success – Graduates with Disabilities

When we examined graduate perceptions of their college experiences all graduates in the sample were survey responders. It should be noted that the CRC scores of all groups of graduates compared were higher than for those who did not reply to the CEQ survey.

One of our hypotheses was that graduates who perceive factors in their college experience as harder have lower CRC scores than those who perceive their experiences as easier. Overall we found that there was a small but significant correlation between the CEQ overall index of difficulty (IDF) and the CRC score. Both graduates with and without disabilities who experienced aspects of their cegep experience more positively, as measured by this indicator, had higher CRC scores.

Further examination showed that eight of the CEQ items used in calculating the IDF, and one item that was not included, showed modest but significant positive correlations with the CRC. These included five personal situation items:

- Financial Situation
- Family
- Level of Personal Motivation
- Study Habits
- Previous Educational Experience

and three college environment variables

- Level of Difficulty of Courses
- Attitudes of Professors
- Willingness of Professors to Adapt Courses to My Needs

In addition there was a positive correlation between the CRC score and the item:

- Availability of Computers Off-Campus

The differences in the average CRC scores between those whose scores indicated that the item made their studies easier and those who indicated that the item made their studies more difficult ranged from 0.48 (Level of Difficulty of Courses) to 1.76 (Study Habits). There appears to be a contradiction here, as we previously showed that graduates registered for disability related services had higher overall IDF scores. Because both CRC and IDF scores were shown to be positively correlated, we might have expected registered graduates with disabilities to have higher CRC scores than unregistered graduates with disabilities. However, the number of registered graduates in the sample was relatively small (N = 30) and only one of the CEQ item scores was correlated with the CRC for this group. Moreover, we did not have scores for the majority of graduates who had registered for disability related services because they did not reply to the CEQ survey.

Graduates' Perceptions of Professors

'Attitudes of Professors' and 'Willingness of Professors to Adapt Courses…' were two of the items found to be correlated with the CRC's achieved by graduates. In our previous study, faculty were perceived by both disability service providers and by students and graduates with and without

disabilities as both facilitators and as obstacles to success at college, depending on the circumstances (Fichten, Jorgensen, Havel & Barile, 2006). Cokely (2000) found that students who had more positive perceptions of faculty encouragement had higher academic self-concept and motivation than those students with more negative perceptions. Both academic self-efficacy and achievement motivation were shown to be correlated with the GPA (Robbins, Davis, Huy, Lauver, Langley & Carlstrom, 2004). Duquette (2000) in a study of the experiences of students with disabilities at a Canadian university, found that moral support and accommodations provided by professors were considered by many students as critical factors contributing to their success. Cox and Klas (1996) found that professors' attitudes and lack of understanding of the needs of students with disabilities were seen by students as barriers to their success. For example, professors may refuse to make accommodations for fear of lowering standards or of giving some students an unfair advantage. Although studies have shown that extended time on algebra (Alster, 1997) and reading comprehension (Runyan, 1991) tests improved the scores of students with learning disabilities in post-secondary institutions, there is controversy that centers on extended time on exams as some professors believe providing extra time is unfair to non-disabled students.

In the present study approximately 33% of graduates reported that 'Attitudes of Professors' made their studies more difficult. Although graduates registered to receive disability related services had a more facilitative mean for the item (M = 4.45) than either unregistered graduates (M = 4.03) or graduates without disabilities (M = 4.02), the differences were not significant.

When we compared the responses of registered graduates with disabilities to unregistered graduates with disabilities and those without disabilities on the 'Willingness of Professors to Adapt Courses to My Needs' item, thirty-three percent of graduates without disabilities scored the item as an obstacle (i.e., Item mean < =3). This compares with 24% for unregistered graduates with disabilities. However, none of the registered graduates with disabilities scored this item as an obstacle. There was also a significant difference in the means between registered (M = 4.89) and unregistered graduates with disabilities (M = 4.21) and graduates without disabilities (M = 4.00), with registered graduates having more positive experiences. Moreover, registered graduates with LD/ADD (M = 4.67) did not have less positive experiences than registered graduates with other disabilities (M = 5.15), as the difference in means between the two groups was not statistically significant.

Consequently, graduates with disabilities who registered for services had more positive experiences of professors' willingness to make accommodations than either unregistered graduates with disabilities or graduates without disabilities. They also experienced no greater difficulty with respect to the attitudes of professors. These findings may well be related to the advocacy work undertaken by the office of Services for Students with Disabilities with professors to overcome negative attitudes that either constrain the achievements of students with disabilities or discourage them from continuing their studies.

Murray and Wren (2003) examined academic and attitudinal predictors of college success (as measured by the GPA) of students with learning disabilities. Using regression modeling, the authors found that full-scale IQ and one factor on the Delay Avoidance Construct of the SSHA (Survey of Study Habits and Attitudes) accounted for a significant amount of variability in the GPA. The construct was a measure of the tendency to procrastinate and to avoid studying. The IQ variable accounted for 6% and the study habit construct for 5% of the variability. Teacher approval, another construct on the SSHA, was also correlated with the GPA but it did not enter into the stepwise regression model. In our study both graduates with and without disabilities who had more positive scores on the 'Study Habits' and on the 'Attitudes of Professors' items had higher CRC scores, paralleling the outcomes of the Murray and Wren study. However, this could not be shown to be true

specifically for graduates with LD/ADD, possibly due to the relatively small number in this group who responded to the CEQ. Using forward entry of the nine CEQ variables that were shown to be correlated with the CRC score, only 'Study Habits' was entered for graduates with disabilities, and this accounted for 7.1% of the variability in CRC scores. For graduates without disabilities, 6.8% of the variability was accounted for by the 'Study Habits' variable and the 'Attitudes of Professors' and the 'Availability of Computers Off-Campus' variables also contributed to the linear relationship. However, when the high school leaving grade was partialled out for graduates with disabilities, the only CEQ variable entered was 'Level of Personal Motivation,' accounting for 7.7% of the variability in CRC scores. This variable had a moderately high correlation with the 'Study Habits' variable (R = .68).

Availability of Disability Related Services Off-Campus

Our study showed that those graduates who registered for disability related services at the college found that the availability of disability related services off-campus made their studies easier, and had higher CRC scores than those who did not register. This suggests a role for the disability service provider. Students need to be made aware of community based disability services available and how to access them. However, when Hill (1992) surveyed the disability service providers at 27 Canadian universities to determine the types of services provided to students with special needs, she found that there were problems in identifying these students in order to make them aware of the services available. As was shown earlier, there are many more individuals with disabilities in the student population than those who register to receive disability related services from their school. Students fail to register for a number of reasons, some of which have already been discussed. However, if the disability service providers are to make students aware of community based disability related services, it is important that information reach students with disabilities, whether or not they register for these services.

17 Conclusions and Implications for Research and Practice

The results showed that graduates with LD/ADD had lower standardized college exit scores than non-disabled graduates or graduates with other impairments. They also had poorer high school leaving grades. Male graduates with learning disabilities, in particular, had lower grades than all other groups, an outcome that could not simply be explained by their poorer high school grades. It is possible that students with learning disabilities continue to experience greater academic difficulties with increasing complexity of the learning task (Deshler, Schumaker, Lenz, et al, 2001). It would, therefore, be interesting to replicate the current findings with university graduates' grade point averages. The results also suggest that male students with learning disabilities may be considered a ‘population at risk’ and that more intense efforts to assist them in college need to be made. However, the findings also showed that graduates with disabilities other than LD/ADD and graduates without disabilities achieved CRC scores that were equally competitive for university places.

The findings show that graduates with disabilities who register with the college for disability related services perceive their circumstances, including aspects of the college environment, to be more facilitating of their academic success than do graduates with disabilities who do not register for such services. This suggests that students who currently do not register for such services may benefit from doing so. Thus, the results suggest that publicity campaigns that showcase the benefits of registering may promote the success of students with disabilities.

The support provided by registering with the disability service provider may help students sustain the level of personal motivation that is required for them to succeed. That motivation is important has been demonstrated in our findings and the findings of others (Barbeau, 1994). But motivators for students with disabilities may differ from those for non-disabled students in both type and degree.

Likewise, motivation may differ for male and female students either with or without disabilities. This, too, is an area worthy of further study.

Because the 'Study Habits' variable was correlated with college exit grades, advisors and service providers need to support students' efforts to improve their study habits. For example, students can be assisted with developing scheduling and time management skills that would allow them to meet assignment deadlines.

The availability of disability related services off-campus was also related to higher CRC scores. Therefore, students need to be made aware of the types of community based resources and services available. The disability service providers need to assist students by advising of the availability of such services and facilitating access to them. Graduates with disabilities who do not register with their campus based service provider need to be targeted as well.

As teachers' willingness to accommodate the needs of students was related to graduates' CRC scores, academic advisors need to assist students by providing a forum for them to discuss how instructors can become more sensitive to the needs of students with disabilities. They can also assist students with disabilities to become more aware of the role they themselves can play in achieving this and can help them to develop the self–advocacy skills that would allow them to request and obtain the accommodations they need.

18 Limitations of the Study

It should be noted that all samples of graduates in the present study originate from a single junior/community college with a well established disability services office. This sets limits on the ability to generalize from these findings to other institutions. In addition, sample sizes for many of the college experience comparisons are small, causing difficulties with power. Thus, significant relationships may exist even though these are not apparent from the data. In particular, the sample size for graduates with disabilities who completed the CEQ survey and who registered for disability related services was small. Finding significant relationship was, therefore, more difficult. It would also have been interesting to compare outcomes of graduates with different impairments. Again, because of sample size limitations this was not possible. A further problem was the fact that not all graduates responded to all questions on the CEQ. This resulted in varying sample sizes for the different analyses undertaken.

We considered all graduates with LD/ADD as a homogeneous group when in fact diagnostic criteria vary and different deficits may be present (e.g., difficulties in reading, difficulties in mathematics, differences in cognitive processes). In addition it may be that different subject areas may be associated with different academic challenges. Moreover, our sample of students with learning disabilities may or may not have had attention deficit disorder and/or attention deficit hyperactivity disorder. Although these disorders are often co-morbid, the coexistence of a learning disability and an attention deficit disorder is seen by some experts as especially detrimental to academic success (Wolforth, 2007).

In addition, the study is retrospective in that we are dealing with a successful group of former students who have graduated. Therefore, it is not possible to make inferences from the data about students in general, who may yet abandon their studies, or students with disabilities who did not complete their studies. It is certainly possible that the facilitators and obstacles that influence the retention of students differ from those that are related to standardized grades upon graduation. In future investigations, a longitudinal approach should be employed. Nevertheless, our findings offer

insights into how the academic outcomes and experiences of graduates with disabilities compare to those of graduates without disabilities.

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Appendix 1 CEQ Items Used in Analysis

Item Code	Item Description
	Personal
Q11	Financial situation
Q12	Paid employment
Q13	Family
Q14	Friends
Q15	Level of personal motivation
Q16	Study habits
Q17	Previous educational experience
Q18	Health
Q19	Impact of disability
	Cegep Environment
Q20	Level of difficulty of courses
Q21	Number of courses taken/course load
Q23	Attitudes of professors
Q24	Attitudes of non-teaching staff
Q25	Attitudes of fellow students
Q26	Availability of computers on-campus
Q28	Availability of course materials
Q29	Accessibility of extracurricular activities
Q30	Willingness of professors to adapt courses to my needs
Q31	Accessibility of building facilities (doorways, classrooms/labs etc)
Q32	Accessibility of cegep physical education courses
Q33	Availability of disability related services at cegep
Q34	Availability of financial aid
	Government and Community Supports and Services
Q35	Private tutoring
Q36	Public transport
Q37	Availability of computers off-campus
Q38	Computer technologies training off-campus
Q39	Disability related support services off campus
Q40	Availability of adapted transportation for people with disabilities
Q41	Scheduling conflicts between disability related services
Q42	Availability of physical adaptations at home

Appendix 2 CRC Scores for High and Low CEQ Variable Scores (All Graduates). *Items showing statistically significant differences are highlighted (*).*

		Low (1-3) Harder			High (4-6) Easier									
Item	**Item Description**	**N**	**M**	**SD**	**N**	**M**	**SD**	**Diff**	**t**	**df**	**p**		**Proportion Low**	**Total N**
Q11	**Financial situation**	**459**	**26.18**	**3.48**	**413**	**27.05**	**3.62**	**0.87**	**3.61**	**870**	**0.000**	*	**52.6%**	**872**
Q12	Paid employment	334	26.34	3.55	368	26.45	3.34	0.11	0.41	700	0.684		47.6%	702
Q13	**Family**	**242**	**25.96**	**3.56**	**700**	**26.99**	**3.57**	**1.03**	**3.87**	**940**	**0.000**	*	**25.7%**	**942**
Q14	Friends	184	26.35	3.38	794	26.87	3.63	0.51	1.75	976	0.080		18.8%	978
Q15	**Level of personal motivation**	227	25.36	3.33	809	27.11	3.56	1.75	6.64	1034	0.000	*	21.9%	1036
Q16	**Study habits**	349	25.56	3.33	690	27.32	3.56	1.76	7.69	1037	0.000	*	33.6%	1039
Q17	**Previous educational experience**	161	25.81	3.46	831	27.00	3.56	1.20	3.92	990	0.000	*	16.2%	992
Q18	Health	50	26.56	3.73	691	26.82	3.50	0.26	0.51	739	0.612		6.7%	741
Q19	Impact of disability	52	26.67	3.81	4	23.00	2.17	-3.67	1.89	54	0.064		92.9%	56
Q20	**Level of difficulty of courses**	**555**	**26.49**	**3.51**	**467**	**26.97**	**3.66**	**0.48**	**2.13**	**1020**	**0.033**	*	**54.3%**	**1022**
Q21	Number of courses taken	639	26.73	3.58	375	26.67	3.52	-0.06	0.26	1012	0.792		63.0%	1014
Q23	**Attitudes of professors**	343	25.95	3.40	689	27.13	3.61	1.18	5.05	1030	0.000	*	33.2%	1032
Q24	Attitudes of non-teaching staff	275	26.74	3.53	657	26.64	3.60	-0.10	0.37	930	0.709		29.5%	932
Q25	Attitudes of fellow students	246	26.91	3.60	758	26.69	3.56	-0.22	0.82	1002	0.411		24.5%	1004
Q26	Availability of computers on-campus	148	26.68	3.59	858	26.68	3.58	0.00	0.01	1004	0.991		14.7%	1006
Q28	Availability of course materials	126	26.44	3.79	875	26.67	3.55	0.24	0.69	999	0.490		12.6%	1001
Q29	Accessibility of extracurricular activities	97	26.12	3.28	534	26.62	3.65	0.50	1.25	629	0.211		15.4%	631
Q30	**Willingness of professors to adapt courses to my needs**	**277**	**25.96**	**3.38**	**617**	**26.80**	**3.61**	**0.84**	**3.29**	**892**	**0.001**	*	**31.0%**	**894**
Q31	Accessibility of building facilities (doorways, classrooms/labs etc)	110	25.99	3.50	842	26.62	3.52	0.63	1.77	950	0.077		11.6%	952
Q32	Accessibility of cegep physical education courses	125	26.78	3.73	772	26.59	3.48	-0.19	0.56	895	0.579		13.9%	897
Q33	Availability of disability related services	5	23.50	3.05	39	26.12	3.87	2.61	1.45	42	0.155		11.4%	44
Q34	Availability of financial aid	83	25.80	3.53	207	26.07	3.29	0.27	0.62	288	0.537		28.6%	290
Q35	Private tutoring	49	25.20	2.95	230	26.01	3.21	0.81	1.63	277	0.105		17.6%	279
Q36	Public transport	162	26.30	3.25	806	26.87	3.62	0.57	1.87	966	0.062		16.7%	968
Q37	**Availability of computers off-campus**	**130**	**25.40**	**3.21**	**512**	**26.83**	**3.52**	**1.43**	**4.22**	**640**	**0.000**	*	**20.2%**	**642**
Q38	Computer technologies training off-campus	102	25.66	3.31	163	25.98	3.00	0.31	0.80	263	0.427		38.5%	265
Q39	**Disability related support services off campus**	**8**	**23.53**	**2.59**	**10**	**27.09**	**3.63**	**3.56**	**2.33**	**16**	**0.033**	*	**44.4%**	**18**
Q40	Availability of adapted transportation for people with disabilities	2	22.67	3.32	4	24.10	3.02	1.43	-0.53	4	0.622		33.3%	6
Q41	Scheduling conflicts between disability related services	6	23.71	1.88	5	22.65	3..14	1.05	0 .69	9	0.509		55.5%	11
Q42	Availability of physical adaptations at home	0	na	na	5	22.96	1.85	na	na	na	na		0%	5

Appendix 3 – CRC Scores for High and Low CEQ Variable Scores (Graduates With Disabilities). *Items showing statistically significant differences are highlighted (*).*

		Low (1-3) Harder			High (4-6) Easier									
Item	**Item Description**	**N**	**M**	**SD**	**N**	**M**	**SD**	**Diff**	**t**	**df**	**p**		**Proportion Low**	**Total N**
Q11	Financial situation	42	25.77	3.61	37	26.26	3.96	0.49	0.58	77	0.564		53.2%	79
Q12	Paid employment	32	26.20	3.80	28	24.91	2.94	-1.29	1.45	58	0.152		53.3%	60
Q13	Family	36	26.08	3.90	54	26.55	3.87	0.48	0.57	88	0.571		40.0%	90
Q14	Friends	16	26.74	3.85	75	26.17	3.90	-0.57	0.53	89	0.595		17.6%	91
Q15	Level of personal motivation	21	24.91	3.38	76	26.63	3.82	1.72	1.87	95	0.065		21.6%	97
Q16	**Study habits**	**34**	**24.56**	**2.93**	**64**	**27.24**	**3.86**	**2.68**	**0.54**	**96**	**0.001**	*	**34.7%**	**98**
Q17	Previous educational experience	14	24.83	3.83	79	26.73	3.76	1.90	1.74	91	0.085		15.1%	93
Q18	Health	20	26.97	3.65	47	26.36	3.64	-0.61	0.63	65	0.530		29.9%	67
Q19	Impact of disability	52	26.67	3.81	4	23.00	2.17	-3.67	1.89	54	0.064		92.9%	56
Q20	Level of difficulty of courses	56	26.29	3.81	41	26.27	3.88	-0.02	0.03	95	0.976		57.7%	97
Q21	Number of courses taken	56	26.05	3.63	40	26.76	3.95	0.70	0.90	94	0.371		58.3%	96
Q23	**Attitudes of professors**	**27**	**24.95**	**3.40**	**72**	**26.74**	**3.83**	**1.80**	**2.14**	**97**	**0.035**	*	**27.3%**	**99**
Q24	Attitudes of non-teaching staff	28	25.86	3.70	64	26.09	3.57	0.24	0.29	90	0.774		30.4%	92
Q25	Attitudes of fellow students	25	25.45	3.59	68	26.50	3.79	1.05	1.20	91	0.232		26.9%	93
Q26	Availability of computers on-campus	20	25.25	3.35	74	26.37	3.89	1.12	1.17	92	0.243		21.3%	94
Q28	Availability of course materials	12	26.40	4.09	83	26.03	3.70	-0.37	0.32	93	0.750		12.6%	95
Q29	Accessibility of extracurricular activities	11	24.85	2.68	49	25.62	3.81	0.78	0.64	58	0.525		18.3%	60
Q30	Willingness of professors to adapt courses to my needs	15	24.80	3.10	75	26.31	3.79	1.51	1.45	88	0.150		16.7%	90
Q31	Accessibility of building facilities (doorways, classrooms/labs)	12	25.63	4.14	78	26.17	3.63	0.54	0.47	88	0.639		13.3%	90
Q32	Accessibility of cegep physical education courses	16	25.71	3.80	65	26.18	3.47	0.46	0.47	79	0.640		19.8%	81
Q33	Availability of disability related services	5	23.50	3.05	39	26.12	3.87	2.61	1.45	42	0.155		11.4%	44
Q34	Availability of financial aid	8	24.07	4.45	17	25.35	3.51	1.28	0.78	23	0.442		32.0%	25
Q35	Private tutoring	5	25.53	4.74	26	25.57	3.16	0.05	0.03	29	0.977		16.1%	31
Q36	Public transport	16	26.99	3.07	73	26.31	3.97	-0.68	0.64	87	0.522		18.0%	89
Q37	**Availability of computers off-campus**	**9**	**23.45**	**2.35**	**48**	**26.45**	**3.53**	**3.00**	**2.44**	**55**	**0.018**	*	**15.8%**	**57**
Q38	Computer technologies training off-campus	11	24.60	3.53	11	26.84	3.20	2.23	1.55	20	0.136		50.0%	22
Q39	**Disability related support services off campus**	**8**	**23.53**	**2.59**	**10**	**27.09**	**3.63**	**3.56**	**2.33**	**16**	**0.033**	*	**44.4%**	**18**
Q40	Availability of adapted transportation for people with	2	22.67	3.32	4	24.10	3.02	1.43	0.53	4	0.622		33.3%	6
Q41	Scheduling conflicts between disability related services	6	23.71	1.88	5	22.65	3..14	1.05	0 .69	9	0.509		55.5%	11
Q42	Availability of physical adaptations at home	0	na	na	5	22.96	1.85	na	na	na	na		0%	5