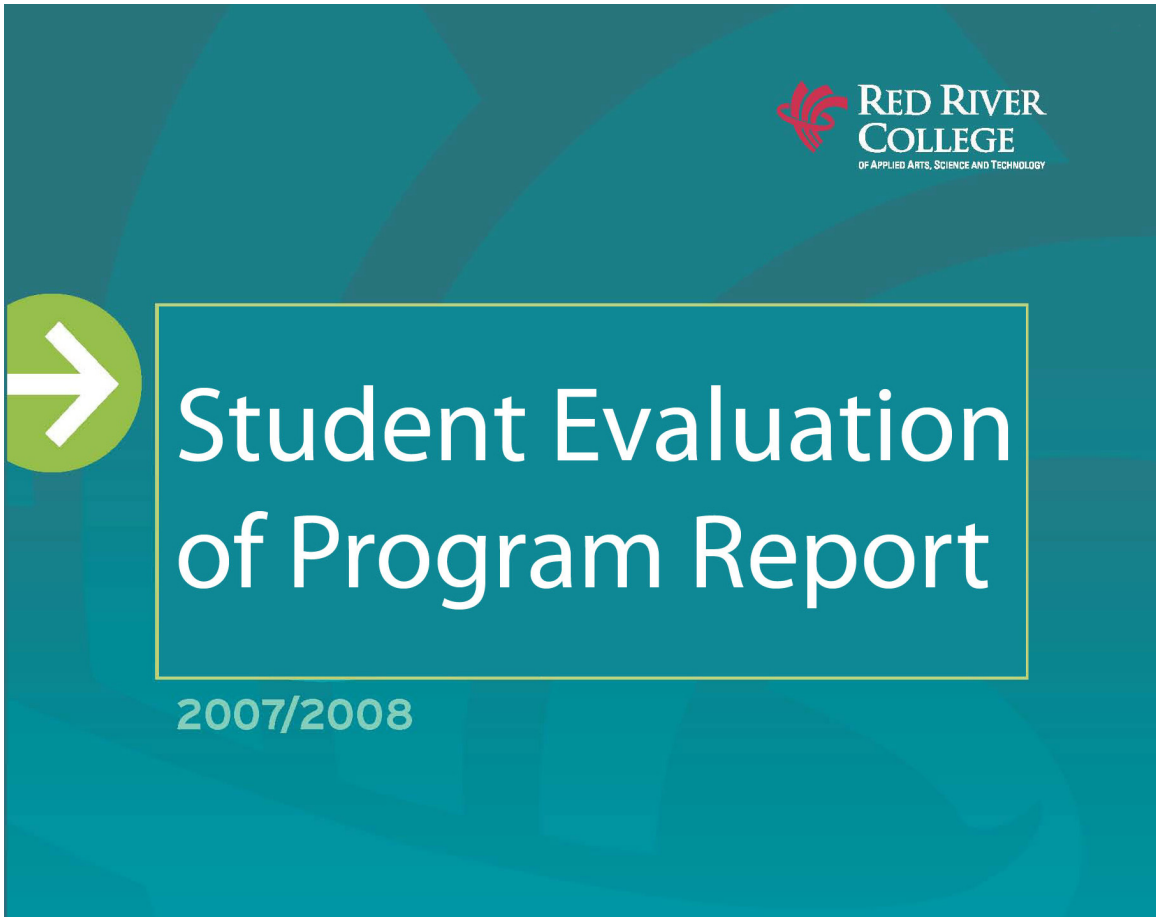
RED RIVER
COLLEGE
OF APPLIED ARTS, SCIENCE AND TECHNOLOGY
Student Evaluation of Program Report
2007/2008

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Cook

*Regular Programs*
3D Computer Graphics
Aviation Management
Business Administration
Business Administration - Laptop
Business Administration Integrated
Commerce/Industry Sales & Marketing

*Regular Programs continued*
Computer Accounting Technician
Creative Communications
Culinary Arts
Graphic Design
Graphic Design - Advanced
Health Information Management
Hotel and Restaurant Management
Professional Baking
Tourism Management

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*Apprenticeship Programs*
Bricklayer
Carpenter
Common Core Electrical
Landscape Technician
Plumber
Power Electrician
Refrigeration & Air Conditioning Mechanic
Sheet Metal Worker
Sprinkler System Installer
Steamfitter

*Regular Programs*
Architectural/Engineering Technology
Building Design CAD Technology

*Regular Programs continued*
Carpentry and Woodworking
Electrical
Electronic and Network Technician
Environmental Protection Technology
Geographic Information Systems (GIS) Technology
Geomatics Technology
Greenspace Management
Municipal Engineering Technology
Network Technology (CCNA) Certificate
Piping Trades
Refrigeration & Air Conditioning
Structural Engineering Technology

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English for Nursing Purposes
English for Professional Purposes
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*Continuing Studies Full-time Programs*
Applied Counselling
Cardiology Technician
Health Unit Clerk
Occupational Health & Safety
Office Technician
Para Educator
Photography - Enhanced
Power Engineering - 5th Class
Recreation Facilitator for Older Adults

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*Apprenticeship Programs*
Aircraft Maintenance
Automotive Service Education Program (ASEP)
Boilermaker
Boilermaker - Entry
Crane & Hoisting Operator
Machinist
Motor Vehicle Body Repairer
Motor Vehicle Mechanic
Motor Vehicle Mechanic ASSET
Tool & Die Maker
Transport Trailer Technician
Truck and Transport Mechanic

*Regular Programs continued*
Aircraft Maintenance Engineer
Automotive Technician - Certificate
Automotive Technician - Diploma
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Heavy Duty Equipment Mechanic
Introduction to Aircraft Maintenance
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# Introduction

Every year Red River College surveys students, in all full-time programs, towards the end of their program of study. The annual Student Evaluation of Program Survey (SEPS) is part of Red River College's commitment to understand the attitudes and experiences of college students. The survey questionnaire includes demographic questions and forty-four questions concerning students' experiences with College programs, facilities, and services. The data are used across the College to improve programs, facilities, and services to students. Selected questions from the survey are part of internal Program Validations and are used as key College performance indicators.

This report presents the results of the 2007-08 SEPS in a mode that allows for a broad overview of findings and that facilitates wide distribution. The report opens with an outline of the College aggregate results, including a summary of student ratings of key aspects of the College and the characteristics of respondents by major program type, that is, Apprenticeship, Regular Program, and Continuing Studies. Primarily, the report summarizes student attitudes by School and by Program. In order to summarize the findings, the data was first reduced through factor analysis. This statistical technique allows the information contained in a large number of questions to be summarized in a smaller set of factors. The main applications of factor analytic techniques are: (1) to reduce the number of variables and (2) to detect structure in the relationships between variables, that is to classify variables into categories.

The forty-four questions on the SEPS can be summarized in eight dimensions:

- Program Quality
- Quality of Orientation
- Quality of familiarization to College Policies
- Quality of welcoming, inclusive College Environment
- Quality of Instruction
- Quality of Program Resources
- Quality of College Facilities
- Quality of College Services

Students' assessments of the College are presented along these dimensions in a four-point scale from one to four, with one indicating strong dissatisfaction and four, strong satisfaction throughout the report.

The College encourages comments about this Report. Questions concerning the methodology of this study should be directed to Ashley Blackman, Director of Research and Planning at 204.632.2091 or ablackman@rrc.mb.ca.

Ashley Blackman
Director, Research and Planning

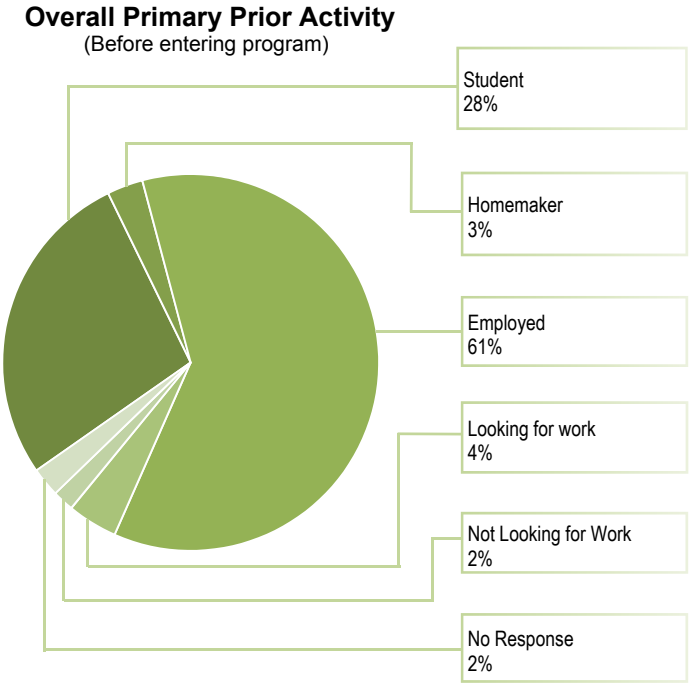
# Report Highlights

Red River College's Student Evaluation of Program survey of 2007/2008 students shows that students express overall high levels of satisfaction with their education.

The main prior activity of students was being employed (61%) followed by being a student [either high school, college or university] (28%) and looking for work (4%).

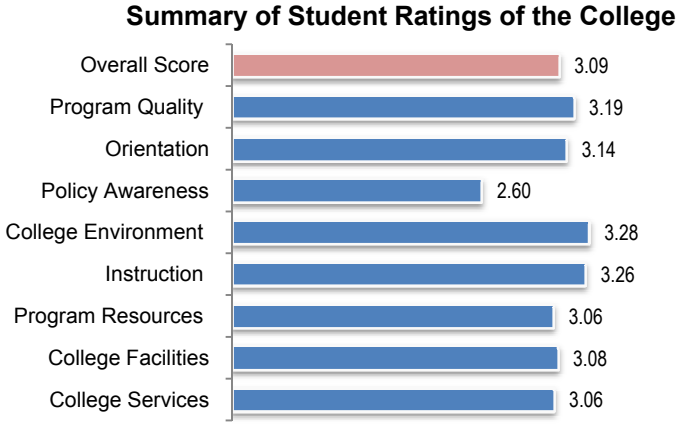
Of all the students who expressed an opinion, 87 percent were satisfied with their education, 88 percent would recommend their program to others, and 87 percent were satisfied with instruction.

Students gave overall ratings higher than 3.0 to College Environment (3.28), Instruction (3.26), Program Quality (3.19), Orientation (3.14), College Facilities (3.08), College Services (3.06), and Program Resources (3.06). Policy Awareness at (2.60) was above the mid-point.

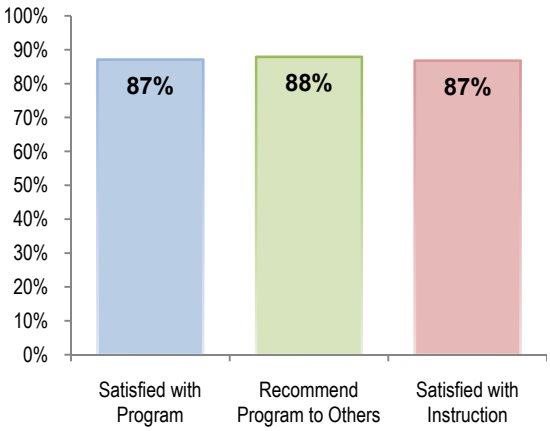



| Achievement | # Programs Surveyed | Surveys Received |
|---|---|---|
| Advanced Diploma | 7 | 51 |
| Apprenticeship | 24 | 588 |
| Certificate | 35 | 787 |
| Diploma | 38 | 896 |
| External | 2 | 35 |
| No Award | 3 | 36 |
| **Total** | **109** | **2393** |

**Note:** Throughout the report, percentages may vary due to rounding.

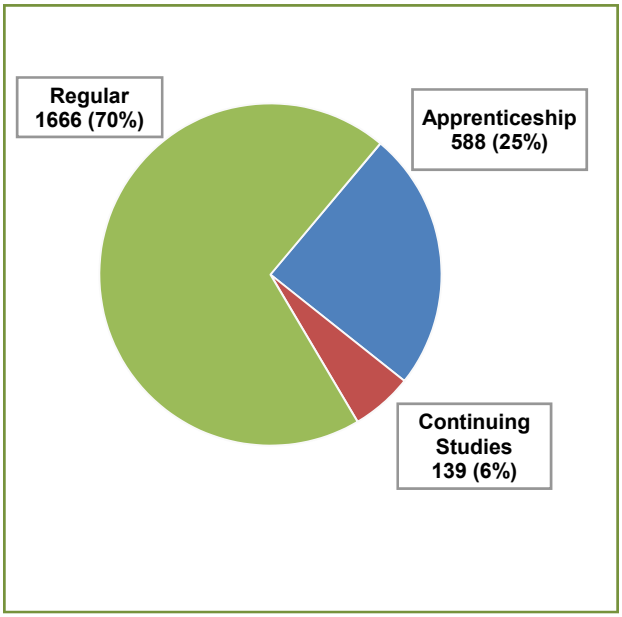



*Student assessments are presented in a four point scale from 1 to 4, with 1 indicating strong dissatisfaction and 4 indicating strong satisfaction*

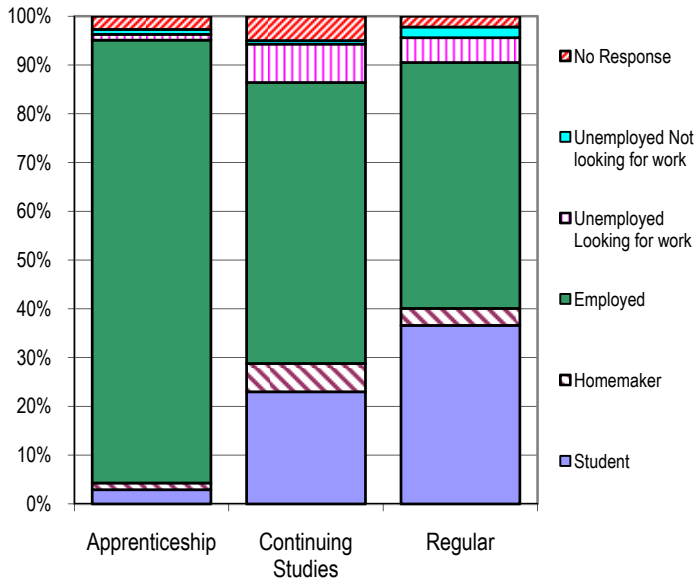



*(of those expressing an opinion)*

## Surveys Received




## Primary Prior Activity by Program Type




Prior activity of students varied by program type. By far, most Apprenticeship students were working. Most Continuing Studies students were employed as well. More Regular program students were previously in school than students in the other program types.

# Survey Process

Red River College surveys its students about their program on an annual basis. Students are asked to indicate their level of satisfaction with the education received.

The analyzed data from the completed and returned surveys are presented in this report for each program. Data are also presented for each Academic School.

### Scope of the Survey

Students from certificate, diploma and advanced diploma programs, as well as from apprenticeship, no award and programs delivered in partnership with external agencies are surveyed during the last term of the program. Students of contract programs are generally not surveyed. A total of 2,393 students participated in the survey.

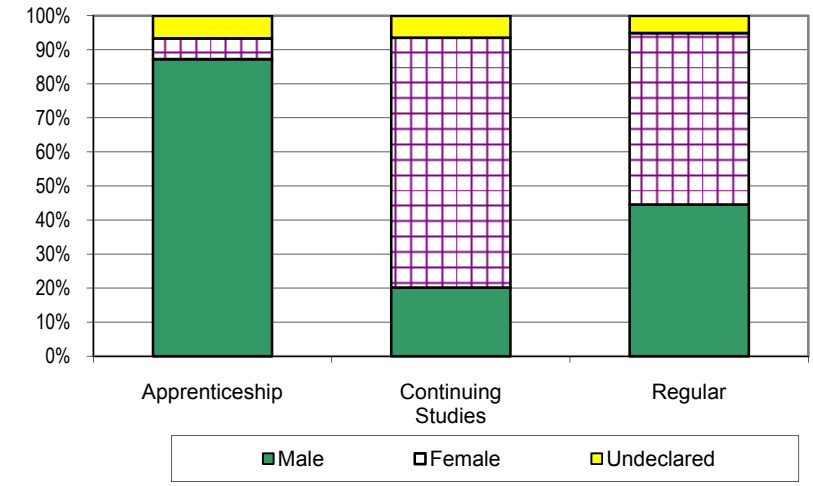
### Methodology

The survey is conducted annually during the last term of each program. To ensure anonymity, class time is allocated without the instructor being present. A student volunteer collects survey materials from each student and seals them in a return envelope.

### Response Rates

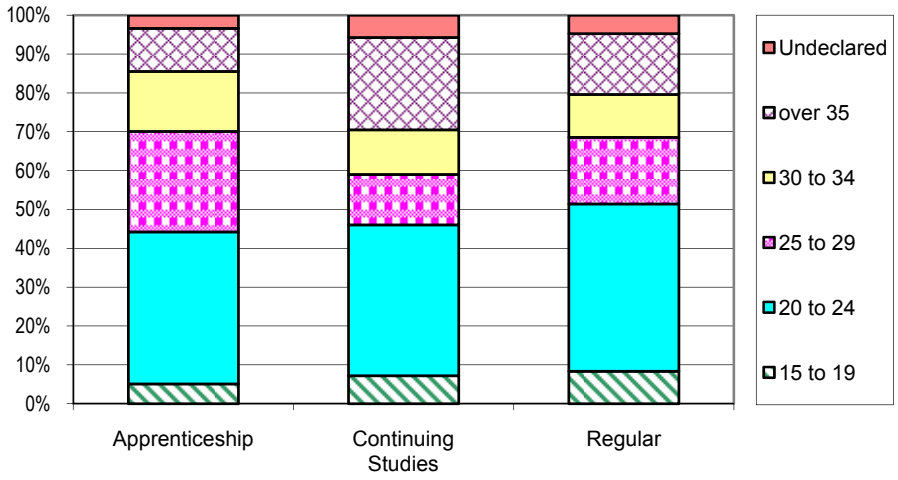
All program students who were in class were surveyed, and a proportion of this population responded. The results in this report are based on those respondents. The survey methodology and fielding process does not allow for the calculation of response rates, although, anecdotally, most students in class respond. The number of students responding to the survey is identified in this report for each program.

## Gender of Respondents



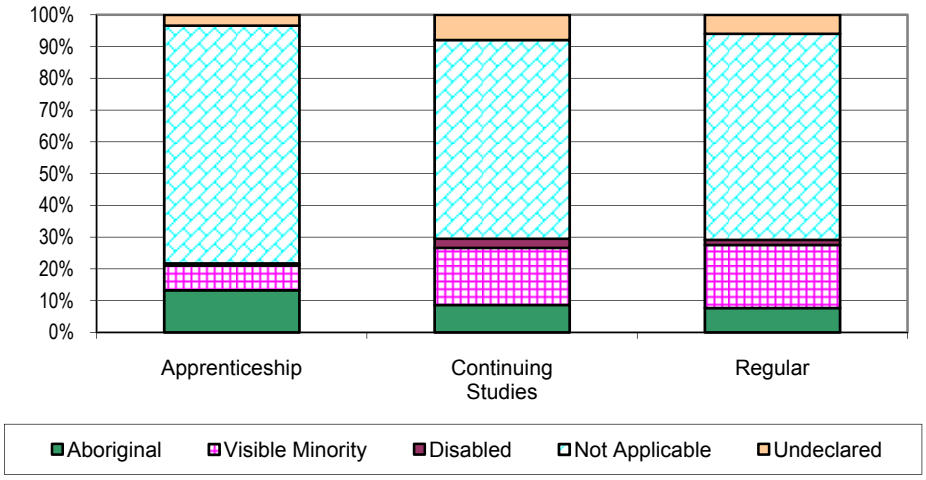

There was a significant difference in gender by program type. Apprenticeship students were by far male, Continuing Studies students were primarily female and Regular students were more evenly distributed.

## Age of Respondents




There was a variation in the age structure by program type. Sixty-five percent of Apprenticeship students and 60 percent of Regular students were 20 to 29 years of age. Continuing Studies students had the highest percent in the over 35 age group.

## Designation of Respondents




The proportion of Aboriginal people, visible minorities, and people with disabilities varied by program type, with Apprenticeship programs having a smaller proportion than Continuing Studies or Regular programs.

# School of Business & Applied Arts

**Number of Respondents in this School: 614**

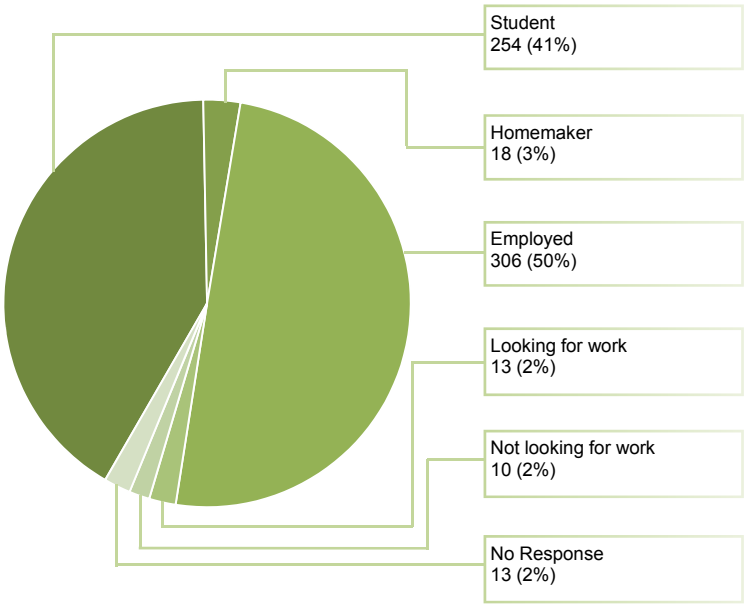
**Programs in this report:**

*Apprenticeship Programs*:
Cook

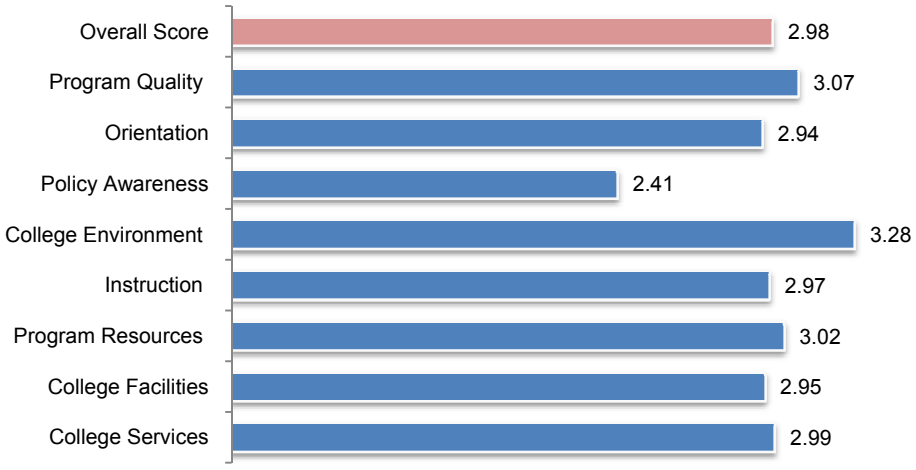
*Regular Programs*:
3D Computer Graphics
Aviation Management
Business Administration
Business Administration - Laptop
Business Administration Integrated
Commerce/Industry Sales & Marketing
Computer Accounting Technician
Creative Communications
Culinary Arts
Deaf Studies
Digital MultiMedia Technology
Graphic Design
Graphic Design - Advanced
Health Information Technologist
Hotel and Restaurant Management
Professional Baking
Tourism Management

*Programs with less than 5 respondents are not illustrated in this report, but are included in the School statistics.*

**Primary Prior Activity**
(Before entering program)



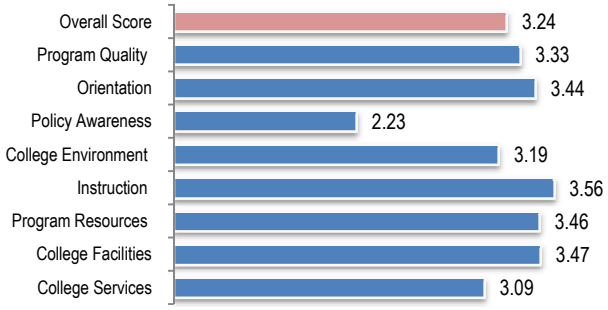

**Summary of Student School Ratings**




***Note:*** *Student assessments are presented in a four-point scale from 1 to 4, with 1 indicating strong dissatisfaction and 4 indicating strong satisfaction*

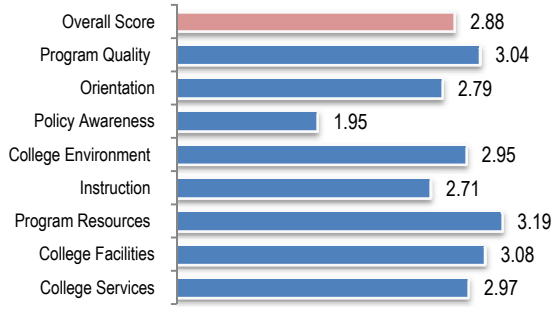
## (Apprenticeship) Cook

Apprenticeship Program
Respondents: 8



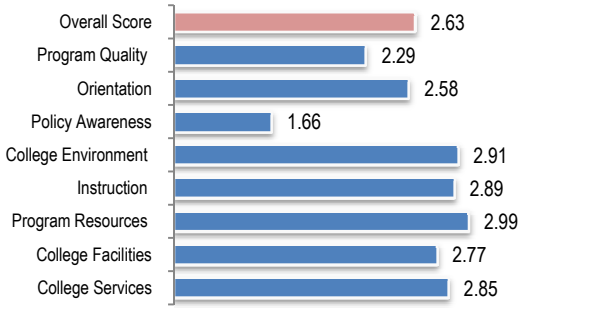

## 3D Computer Graphics

One-Year Advanced Diploma Program
Respondents: 15



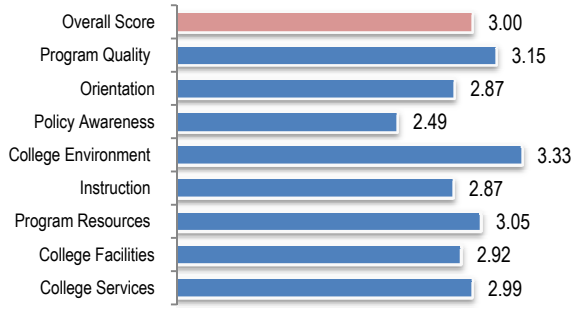

## Aviation Management

Two-Year Diploma Program
Respondents: 6



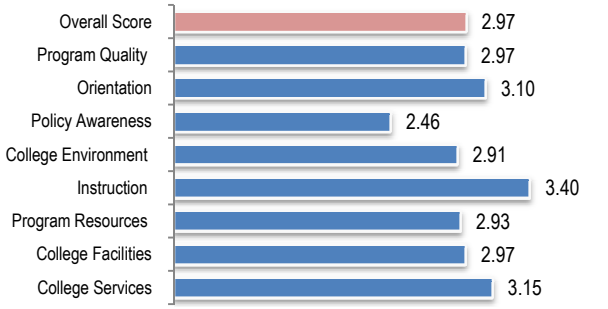

## Business Administration

Two-Year Diploma Program
Respondents: 278



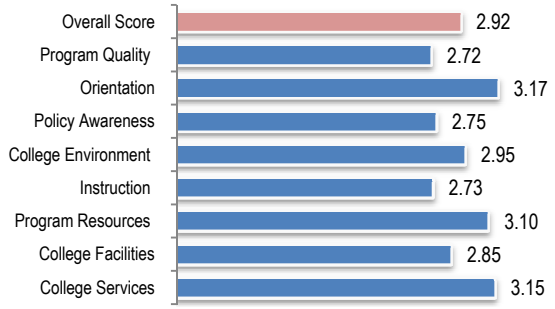

## Business Administration - Laptop

Two-Year Diploma Program
Respondents: 5



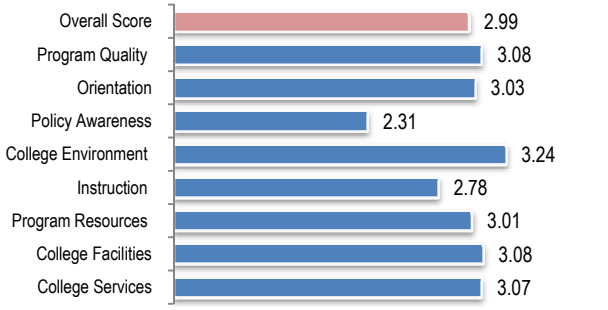

## Business Administration Integrated

Two-Year Diploma Program
Respondents: 12



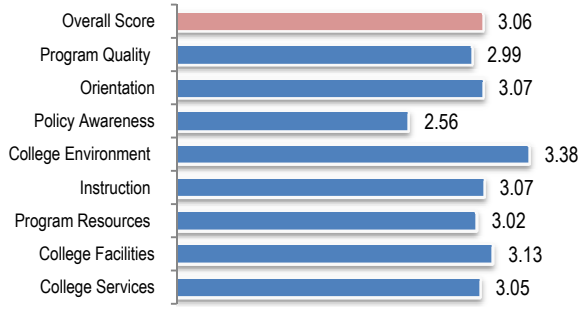

## Commerce/Industry Sales & Marketing

One-Year Certificate Program
Respondents: 33



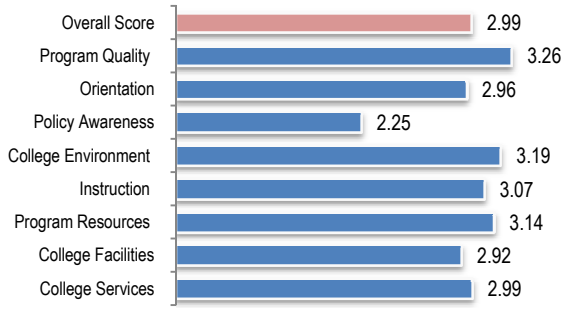

## Computer Accounting Technician

One-Year Certificate Program
Respondents: 15



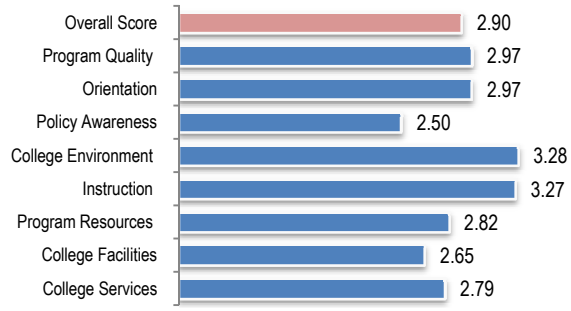
## Creative Communications

Two-Year Diploma Program
Respondents: 57



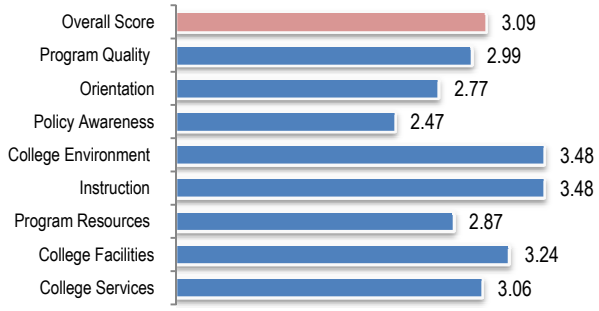

## Culinary Arts

Two-Year Diploma Program
Respondents: 33



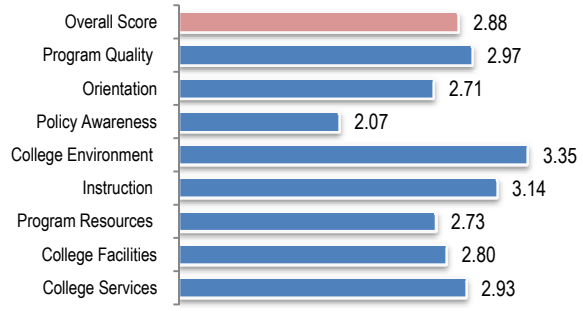

## Deaf Studies

One-Year Certificate Program
Respondents: 13



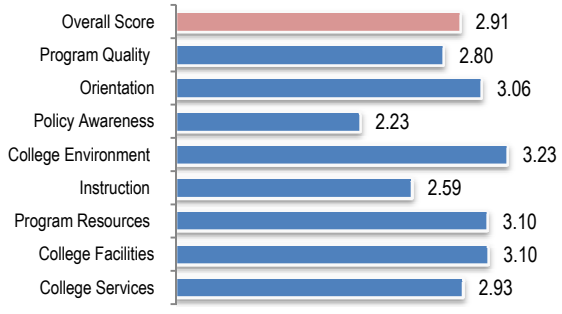

## Digital MultiMedia Technology

Two-Year Diploma Program
Respondents: 28



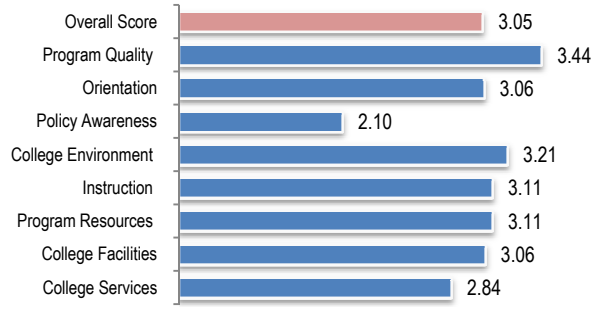

## Graphic Design

Two-Year Diploma Program
Respondents: 35



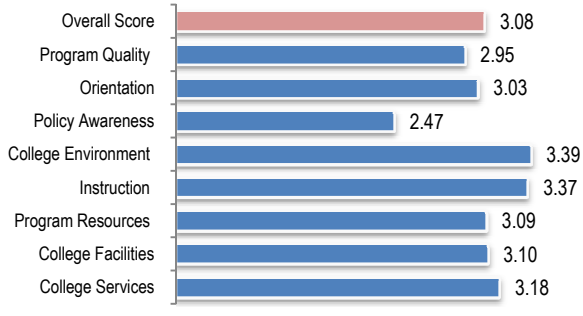

## Graphic Design - Advanced

One-Year Advanced Diploma Program
Respondents: 9



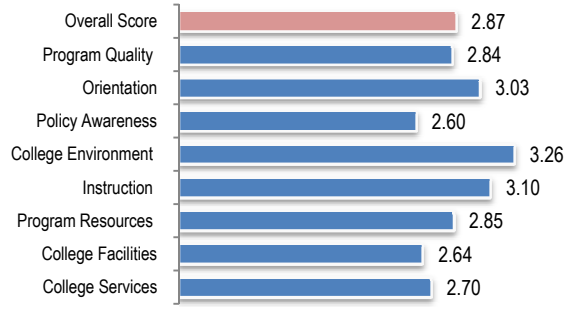

## Health Information Management

Two-Year Diploma Program
Respondents: 15



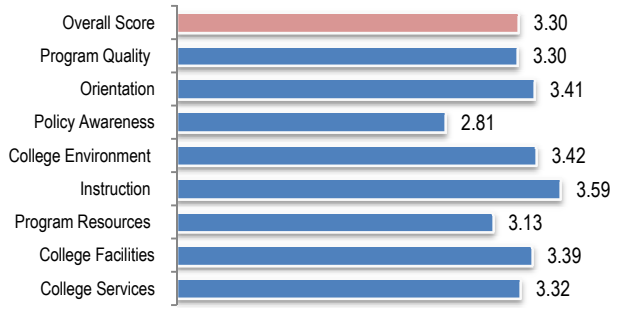

## Hotel & Restaurant Management

Two-Year Diploma Program
Respondents: 19



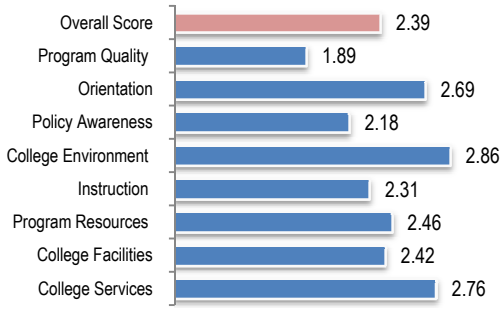
## Professional Baking

One-Year Certificate Program
Respondents: 17




## Tourism Management

Two-Year Diploma Program
Respondents: 8



# School of Construction and Engineering Technologies

**Number of Respondents in this School: 527**

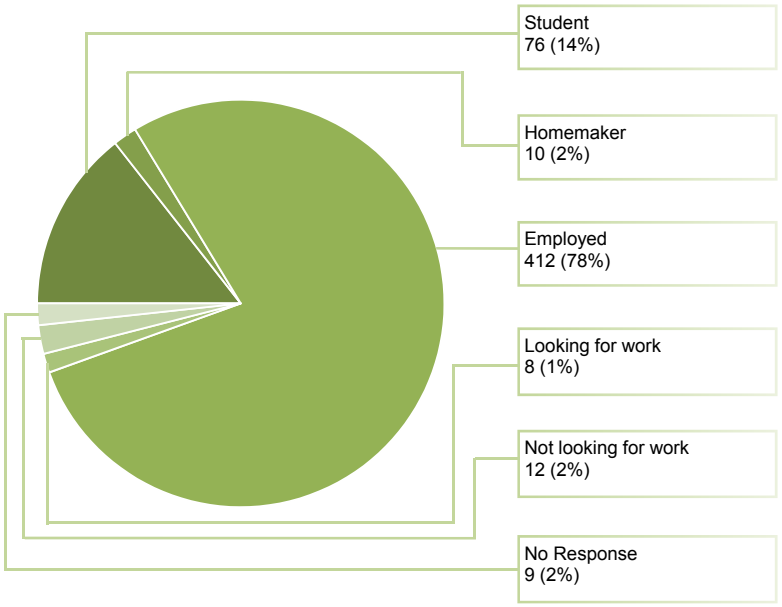
**Programs in this report:**

*Apprenticeship Programs*:
Bricklayer
Carpenter
Common Core Electrical
Landscape Technician
Plumber
Power Electrician
Refrigeration & Air-conditioning Mechanic
Sheet Metal Worker
Sprinkler System Installer
Steamfitter

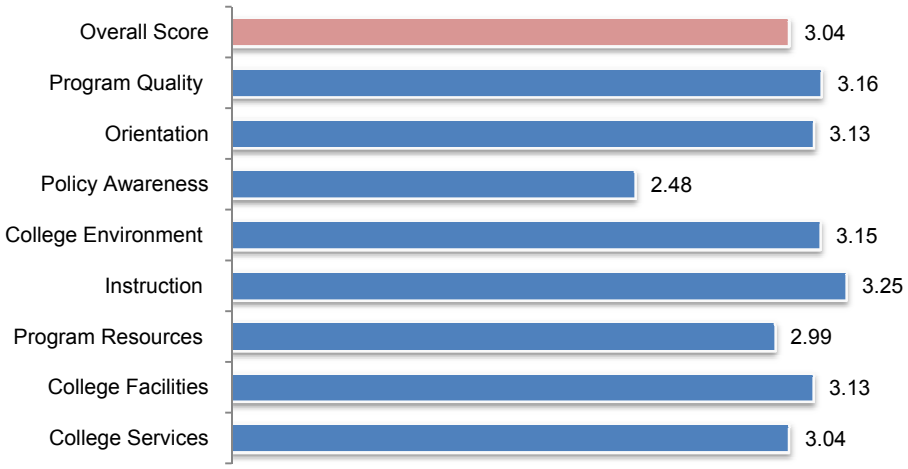
*Regular Programs*:
Architectural/Engineering Technology
Building Design CAD Technology
Carpentry and Woodworking
Electrical
Electronic and Network Technician
Environmental Protection Technology
Geographic Information Systems Technology
Geomatics Technology
Greenspace Management
Municipal Engineering Technology
Network Technology (CCNA) Certificate
Piping Trades
Refrigeration and Air Conditioning
Structural Engineering Technology

*Programs with less than 5 respondents are not illustrated in this report, but are included in the School statistics.*

**Primary Prior Activity**
(Before entering program)



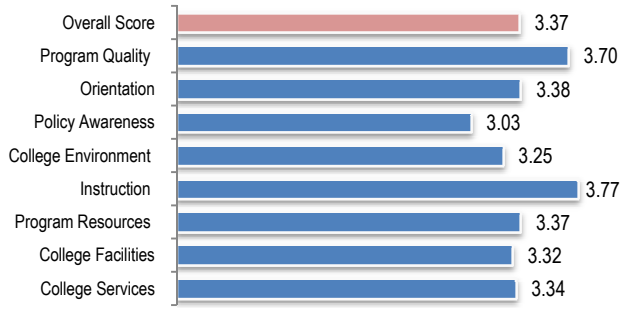

**Summary of Student School Ratings**




***Note:*** *Student assessments are presented in a four-point scale from 1 to 4, with 1 indicating strong dissatisfaction and 4 indicating strong satisfaction*

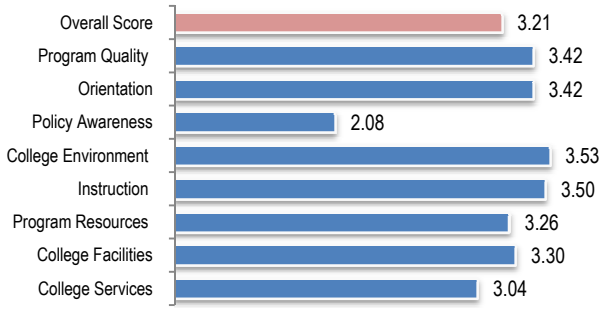
## (Apprenticeship) Bricklayer

Apprenticeship Program
Respondents: 27



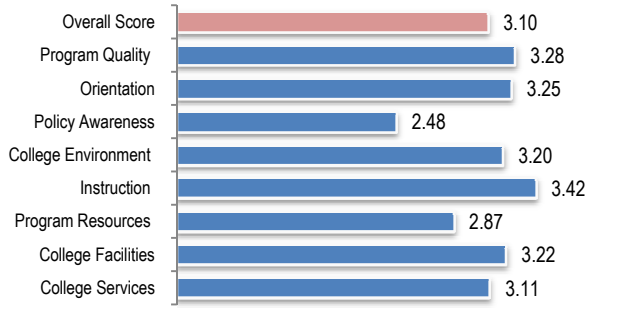

## (Apprenticeship) Cabinetmaker

Apprenticeship Program
Respondents: 6



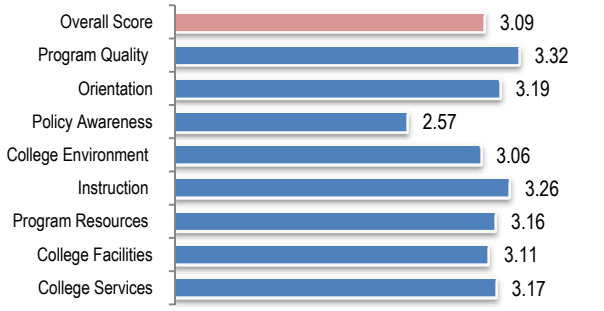

## (Apprenticeship) Carpenter

Apprenticeship Program
Respondents: 56



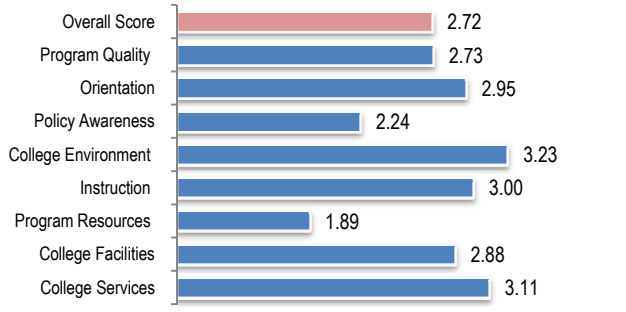

## (Apprenticeship) Common Core Electric

Apprenticeship Program
Respondents: 62



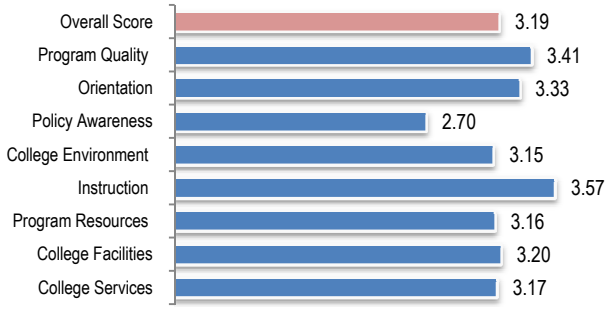

## (Apprenticeship) Landscape Technician

Apprenticeship Program
Respondents: 11



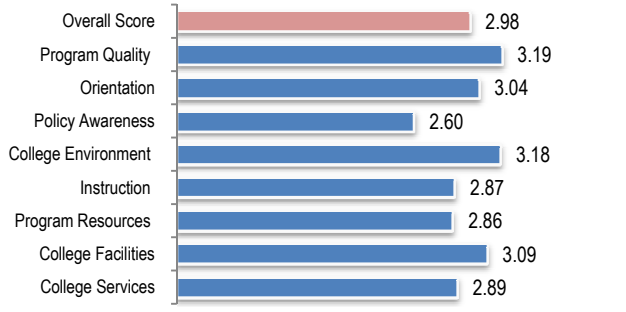

## (Apprenticeship) Plumber

Apprenticeship Program
Respondents: 50



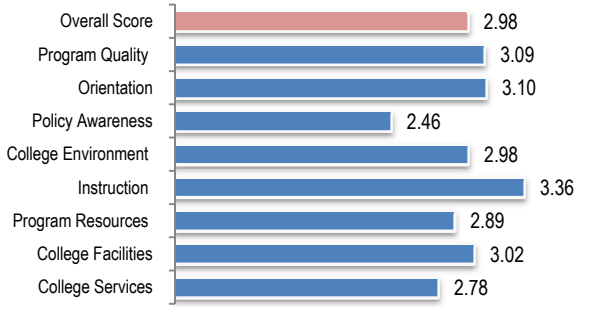

## (Apprenticeship) Power Electrician

Apprenticeship Program
Respondents: 28



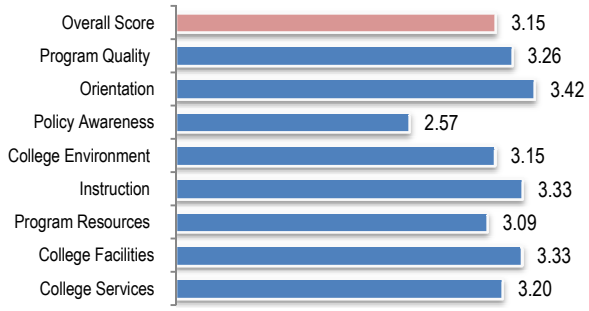

## (Apprenticeship) Refrigeration & Air-Conditioning

Apprenticeship Program
Respondents: 41



## (Apprenticeship) Sheet Metal Worker

Apprenticeship Program
Respondents: 30

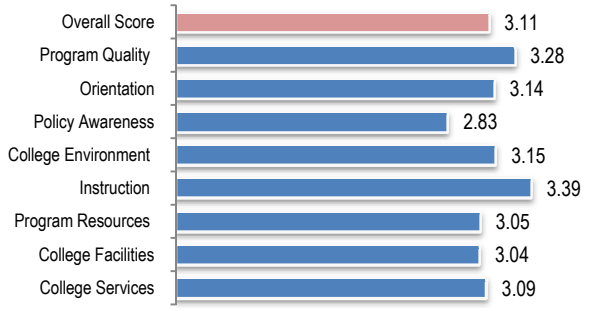



## (Apprenticeship) Sprinkler System Installer

Apprenticeship Program
Respondents: 15

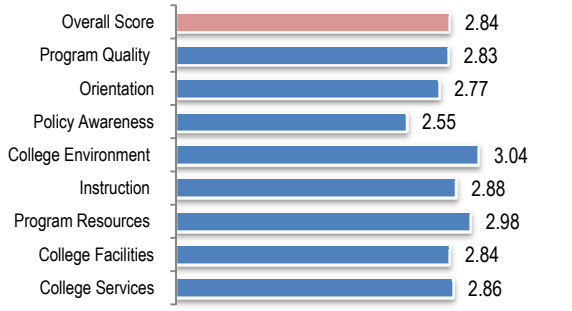
## (Apprenticeship) Steamfitter

Apprenticeship Program
Respondents: 7



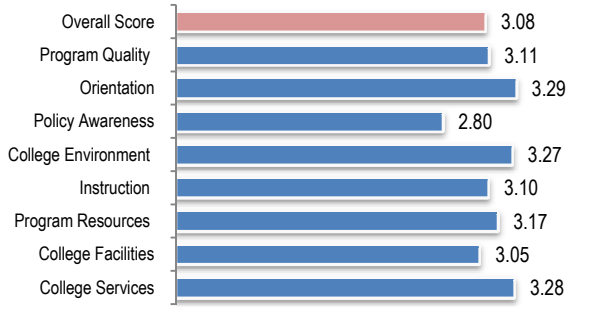

## Architectural/Engineering Technology

32-Month Diploma Program
Respondents: 14



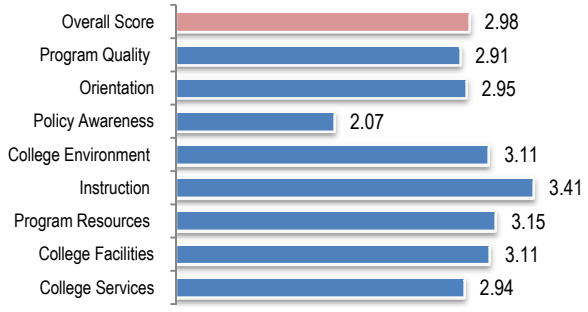

## Building Design CAD Technology

Twenty-Month Diploma Program
Respondents: 12



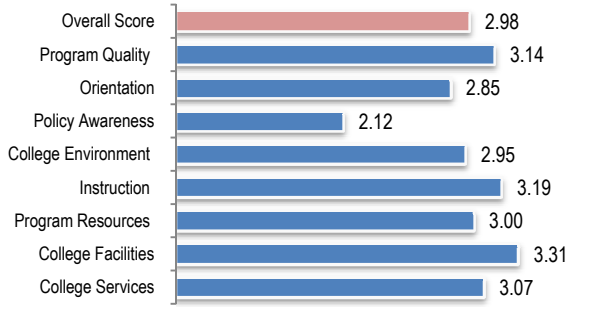

## Carpentry & Woodworking

One-Year Certificate Program
Respondents: 11



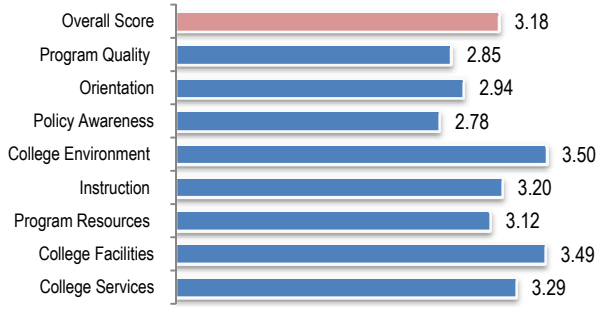

## Electrical

One-Year Certificate Program
Respondents: 23



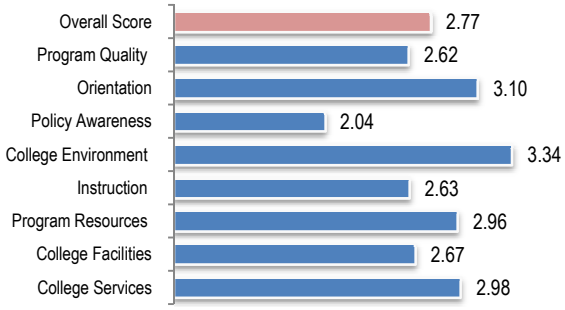

## Electronic and Network Technician

One-Year Certificate Program
Respondents: 8



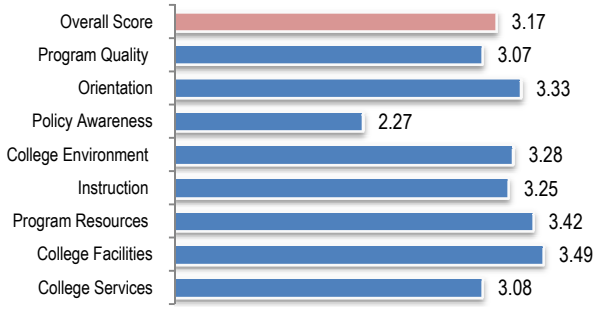
## Environmental Protection Technology

32-Month Diploma Program
Respondents: 5



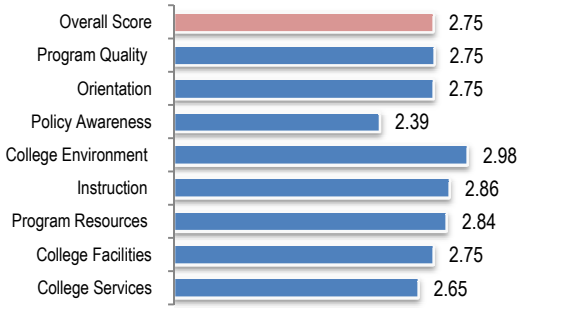

## Geographic Information Systems Technology

One-Year Advanced Diploma Program
Respondents: 6



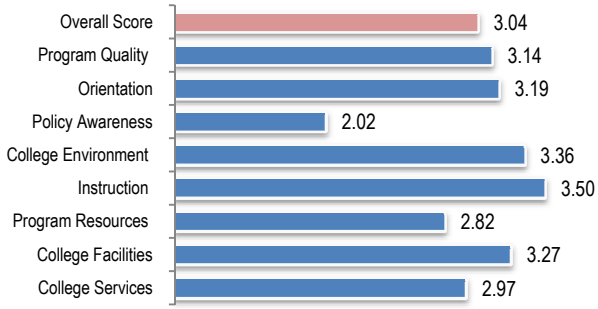

## Geomatics Technology

32-Month Diploma Program
Respondents: 14




## Greenspace Management

Thirty-Month Diploma Program
Respondents: 16

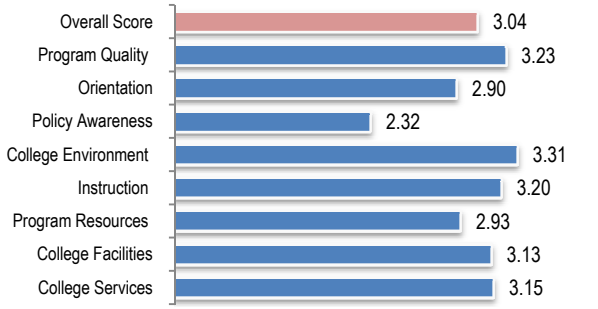



## Municipal Engineering Technology

Two-Year Diploma Program
Respondents: 24

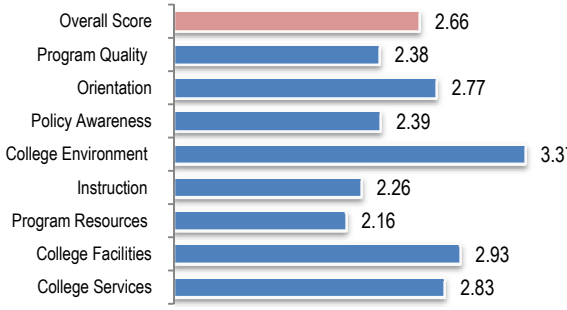
## Network Technology (CCNA) Certificate

One-Year Certificate Program
Respondents: 5



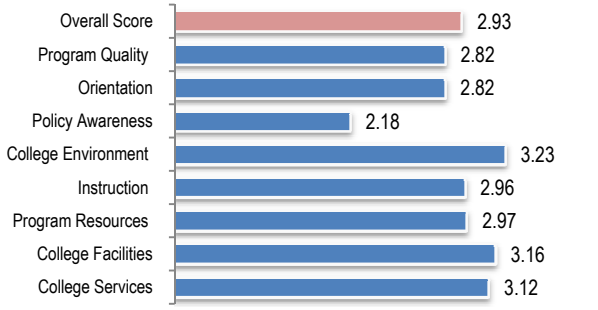

## Piping Trades

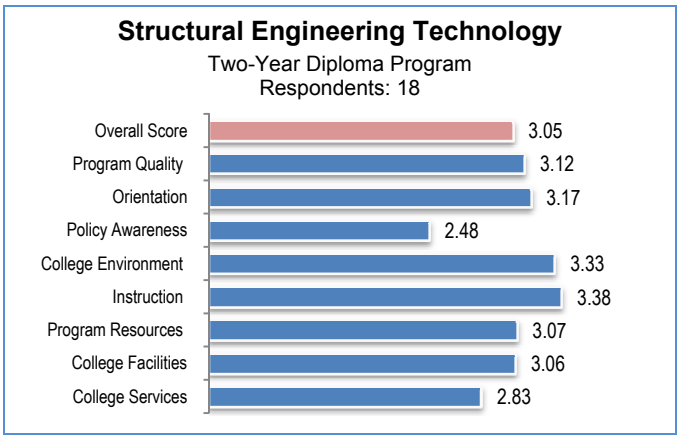
One-Year Certificate Program
Respondents: 13




## Refrigeration & Air Conditioning

One-Year Certificate Program
Respondents: 15

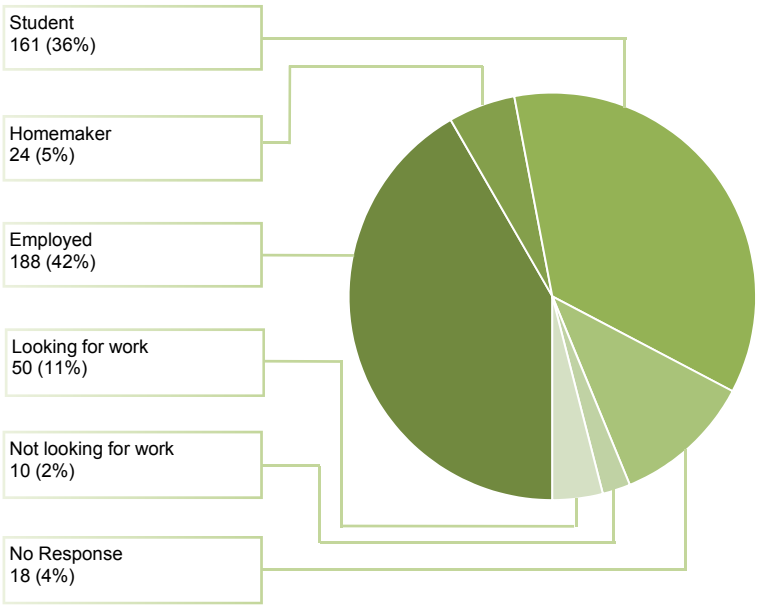



Structural Engineering Technology
Two-Year Diploma Program
Respondents: 18
Overall Score
3.05
Program Quality
3.12
Orientation
3.17
Policy Awareness
2.48
College Environment
3.33
Instruction
3.38
Program Resources
3.07
College Facilities
3.06
College Services
2.83

# School of Continuing & Distance Education (Continuing Studies)

**Number of Respondents in this School: 451**

**Primary Prior Activity**
(Before entering program)



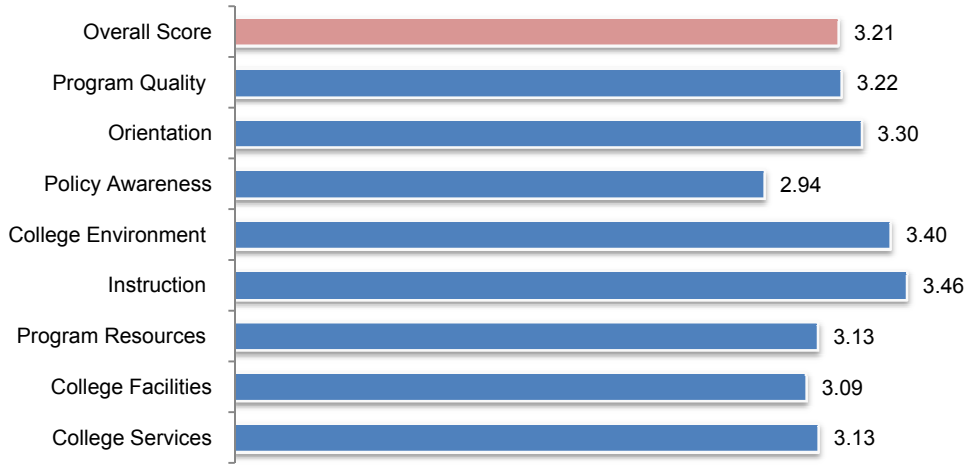

**Programs in this report:**

*Continuing Studies Adult Learning Centre Programs*:
Academic English for Univ/College Entrance
English for Business Purposes
English for Health Care Aides
English for Nursing Purposes
English for Professional Purposes
English for Technical Purposes
Intensive English as an Additional Language

*Continuing Studies Full-time Programs:*
Applied Counselling
Cardiology Technician
Health Unit Clerk
Occupational Health & Safety
Office Technician
Para Educator
Photography - Enhanced
Power Engineering - 5th Class
Recreational Facilitator for Older Adults

*Programs with less than 5 respondents are not illustrated in this report, but are included in the School statistics.*

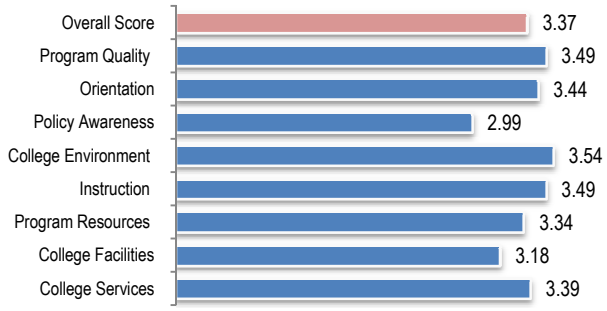
**Summary of Student School Ratings**




***Note:*** *Student assessments are presented in a four-point scale from 1 to 4, with 1 indicating strong dissatisfaction and 4 indicating strong satisfaction*

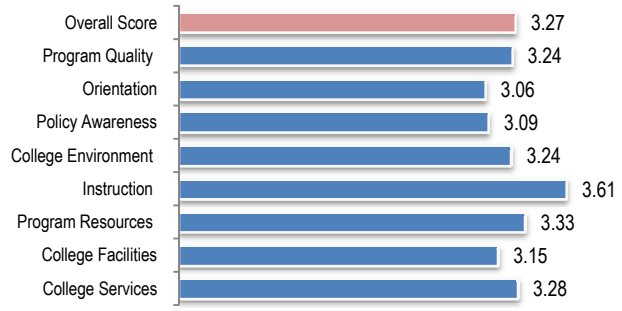
## Academic English for Univ/College Entrance

Adult Learning Centre Certificate Program
Respondents: 32



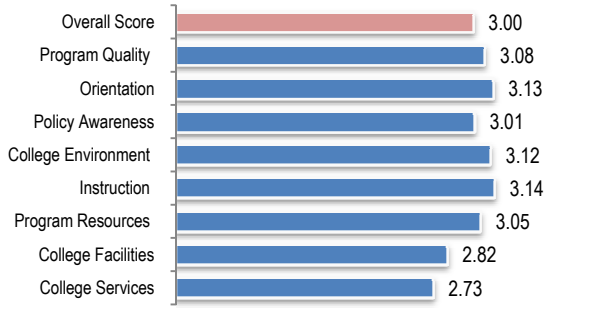

## English for Business Purposes

Adult Learning Centre Certificate Program
Respondents: 9



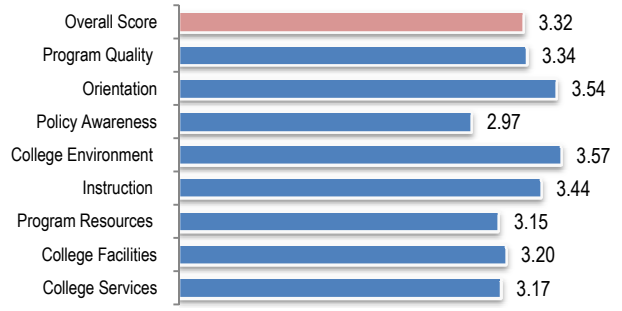

## English for Health Care Aides

Adult Learning Centre Certificate Program
Respondents: 15



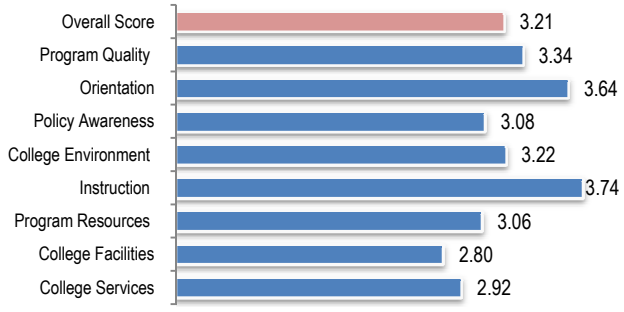

## English for Nursing Purposes

Adult Learning Centre Certificate Program
Respondents: 12



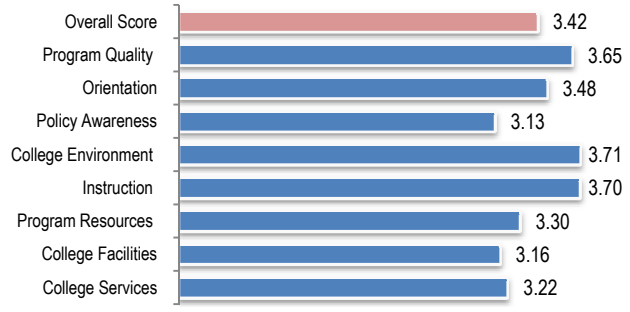

## English for Professional Purposes

Adult Learning Centre Certificate Program
Respondents: 29



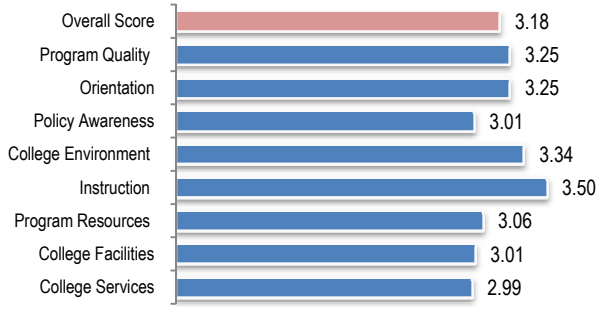

## English for Technical Purposes

Adult Learning Centre Certificate Program
Respondents: 25



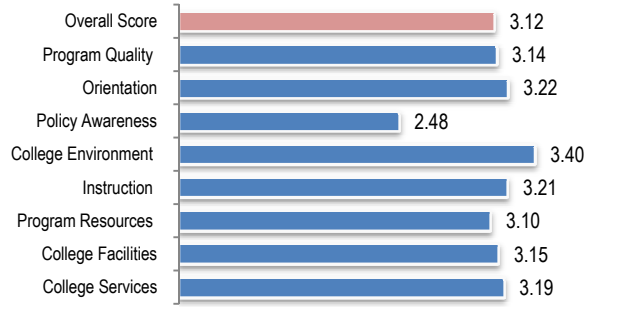

## Intensive English as an Additional Language

Adult Learning Centre Certificate Program
Respondents: 188



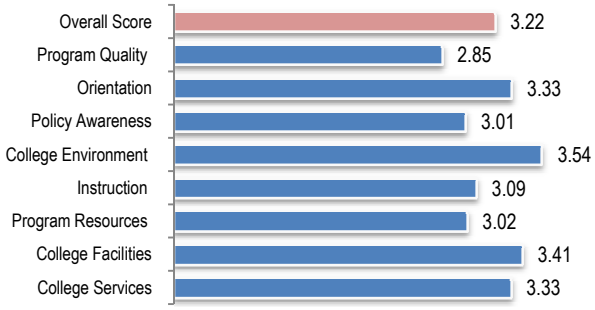

## Applied Counselling

Continuing Studies Certificate Program
Respondents: 30



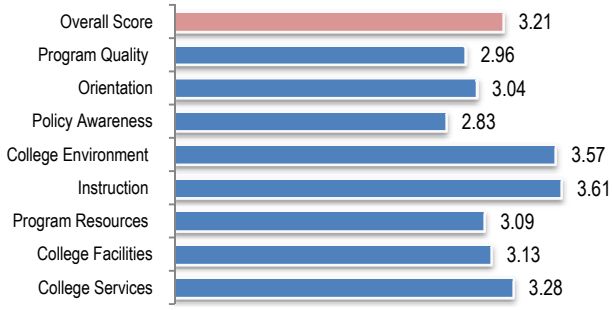
## Cardiology Technician

Continuing Studies Certificate Program
Respondents: 15



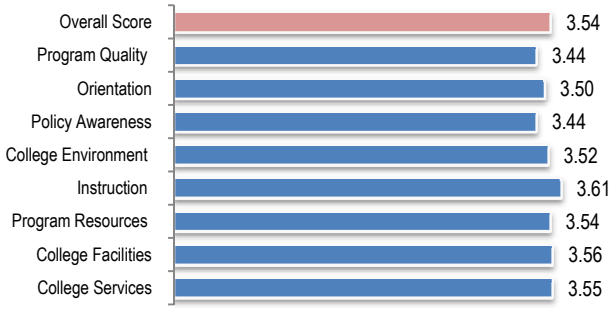

## Health Unit Clerk

Continuing Studies Certificate Program
Respondents: 14



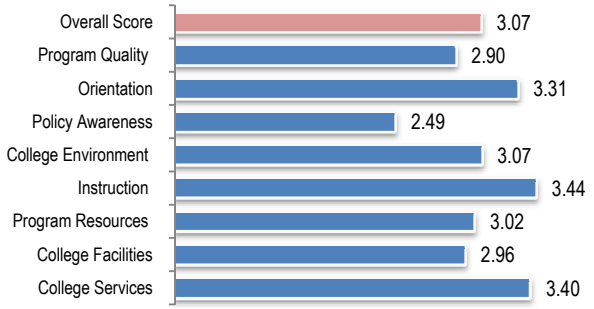

## Occupational Health & Safety

Continuing Studies Certificate Program
Respondents: 9



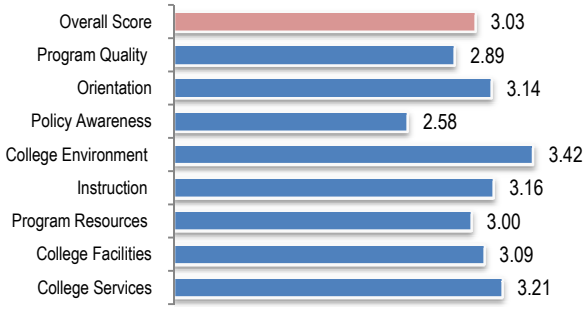

## Office Technician

Continuing Studies Certificate Program
Respondents: 8



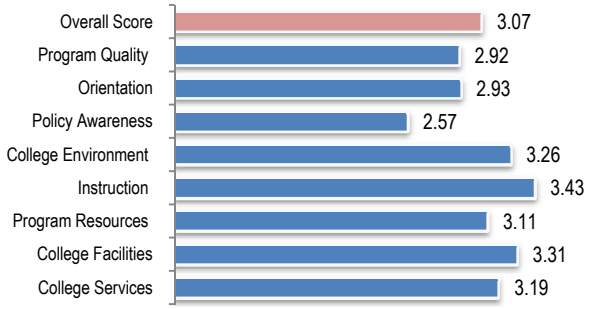

## Para Educator

Continuing Studies Certificate Program
Respondents: 36



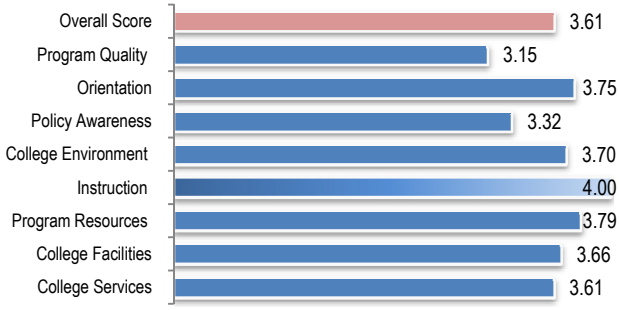

## Photography - Enhanced

Continuing Studies Certificate Program
Respondents: 8



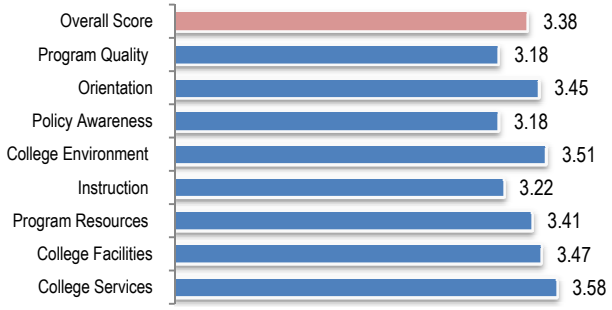

## Power Engineering - 5th Class

Continuing Studies Certificate Program
Respondents: 8




## Recreation Facilitator for Older Adults

Continuing Studies Certificate Program
Respondents: 11



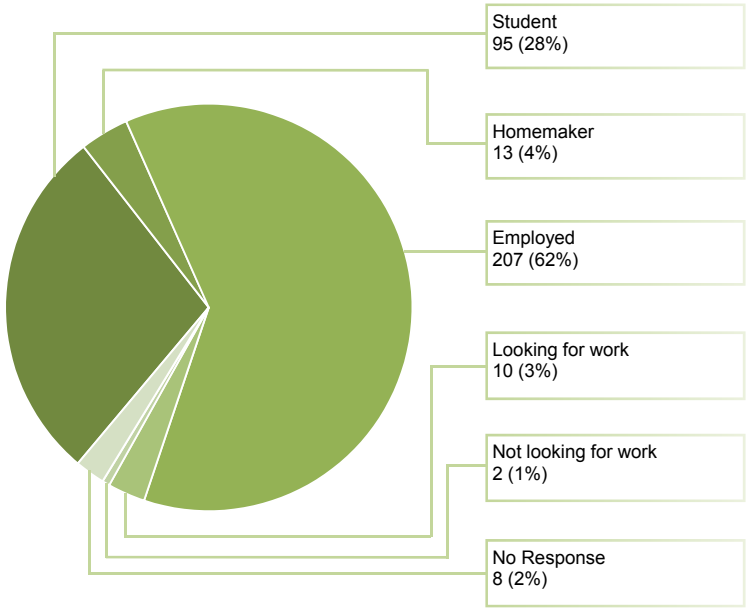
# School of Health Sciences and Community Services

**Number of Respondents in this School: 335**

**Programs in this report:**

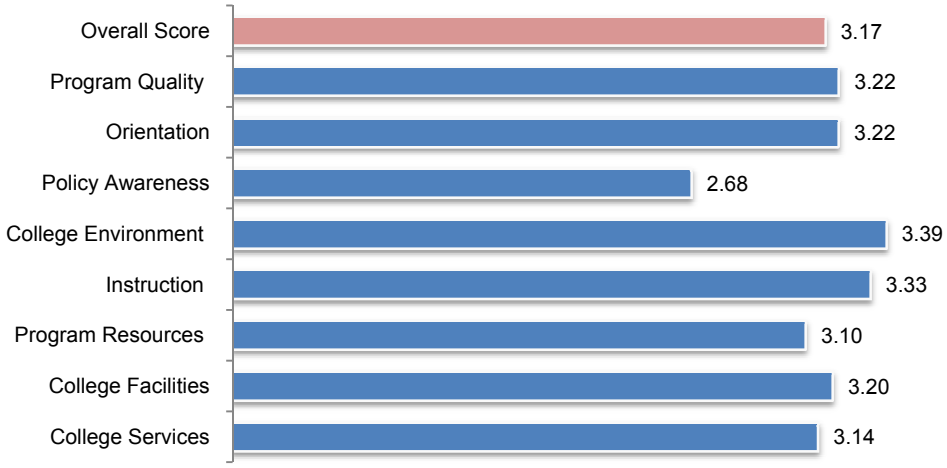
Animal Health Technology
Chemical & Biosciences Technology (Co-op)
Chemical & Biosciences Technology (Non Co-op)
Child and Youth Care
Dental Assisting - Level II
Diploma Nursing (Accelerated)
Disability and Community Support
Early Childhood Education
Early Childhood Education - Workplace
Joint Baccalaureate Nursing
Medical Laboratory Sciences
Medical Radiologic Technology
MRI & Spectroscopy
Pharmaceutical Manufacturing
QA/QC in Pharmaceutical Industry
Radiation Therapy

**Primary Prior Activity**
(Before entering program)




*Programs with less than 5 respondents are not illustrated in this report, but are included in the School statistics.*

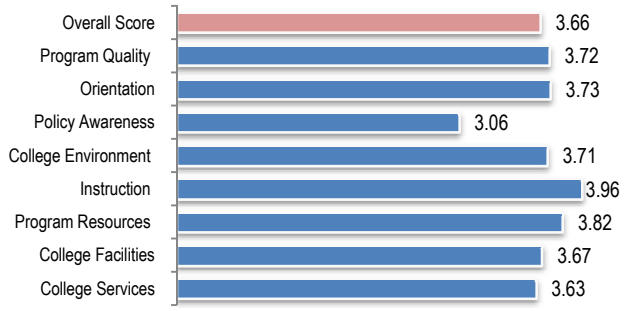
**Summary of Student School Ratings**




***Note:*** *Student assessments are presented in a four-point scale from 1 to 4, with 1 indicating strong dissatisfaction and 4 indicating strong satisfaction*

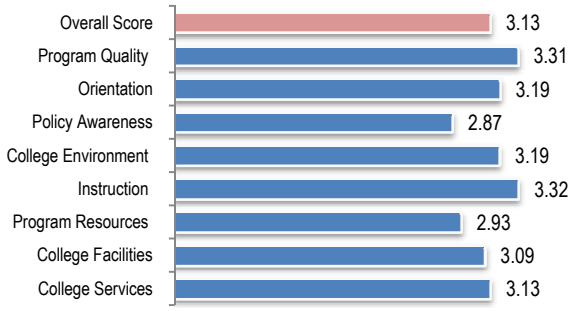
## Animal Health Technology

Two-Year Diploma Program
Respondents: 13



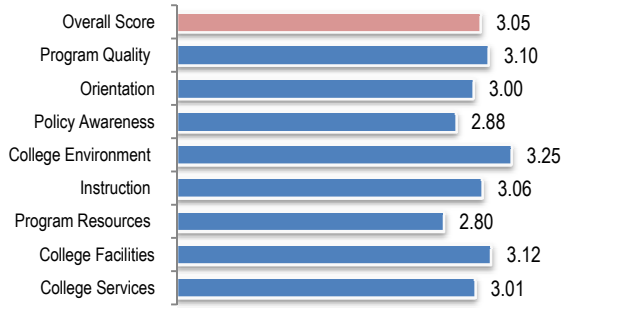

## Chemical & Biosciences Technology (Co-op)

Two-Year Diploma Program
Respondents: 18



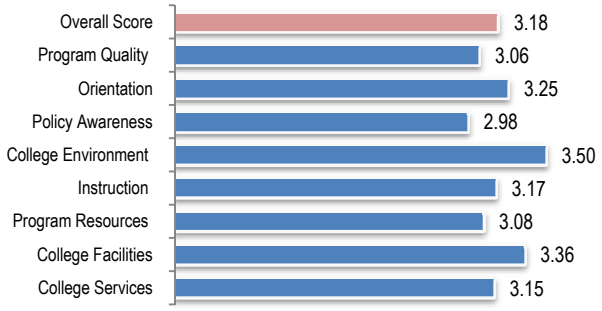

## Chemical & Biosciences Technology (Non Co-op)

Two-Year Diploma Program
Respondents: 10



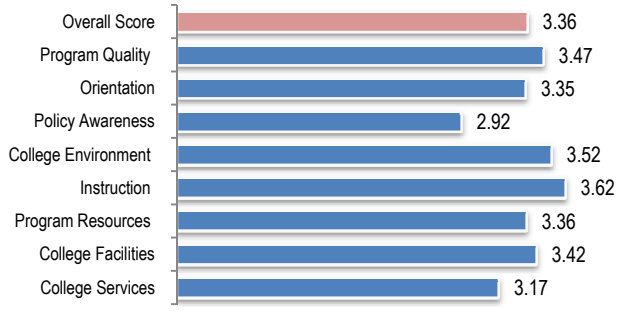

## Child and Youth Care

Two-Year Diploma Program
Respondents: 18



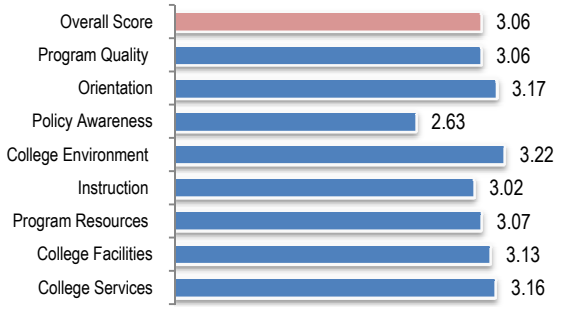

## Dental Assisting - Level II

One-Year Certificate Program
Respondents: 52



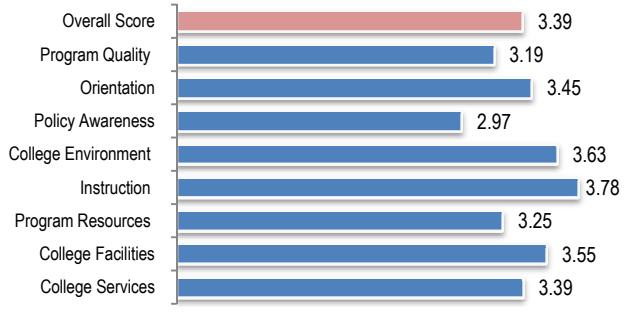

## Diploma Nursing (Accelerated)

Two-Year Diploma Program
Respondents: 65



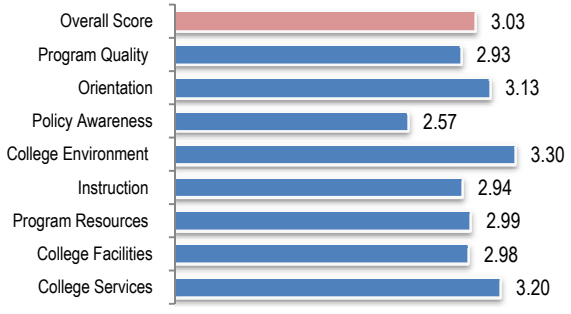

## Disability and Community Support

Two-Year Diploma Program
Respondents: 10



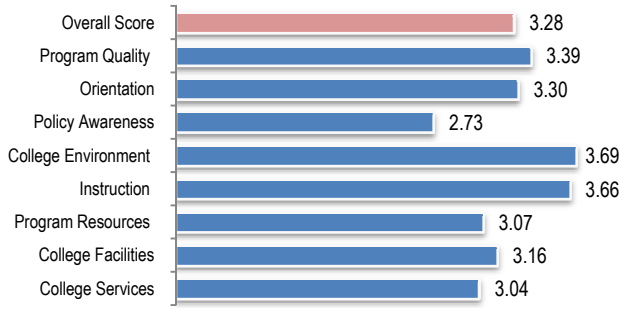

## Early Childhood Education

Two-Year Diploma Program
Respondents: 33



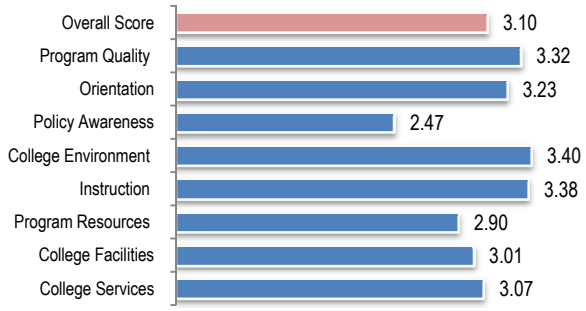
## Early Childhood Education - Workplace

Two-Year Diploma Program
Respondents: 24



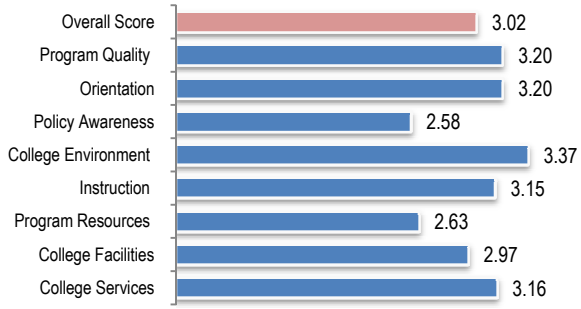

## Joint Baccalaureate Nursing

Four-Year Joint Program
Respondents: 26



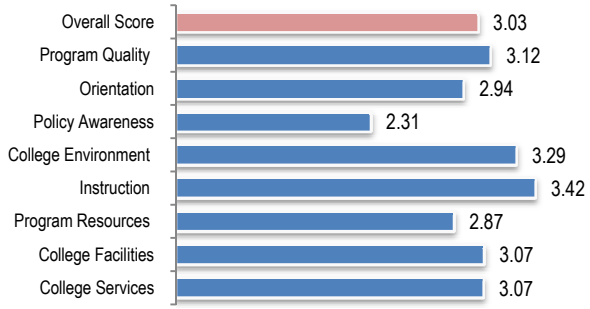

## Medical Laboratory Sciences

Two-Year Diploma Program
Respondents: 5



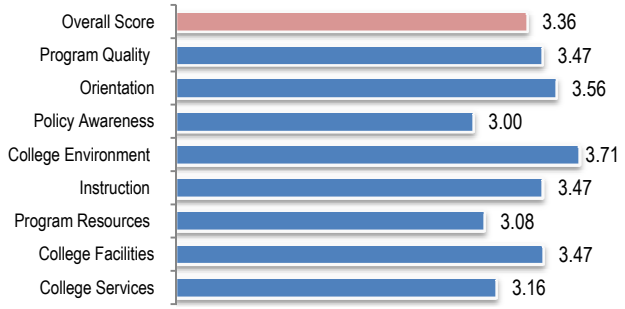

## Medical Radiologic Technology

Two-Year Diploma Program
Respondents: 32



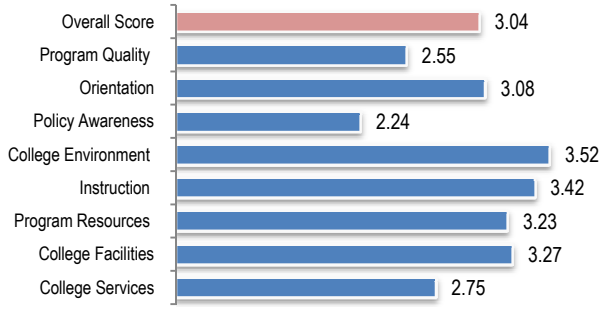

## MRI and Spectroscopy

One-Year Advanced Diploma Program
Respondents: 8



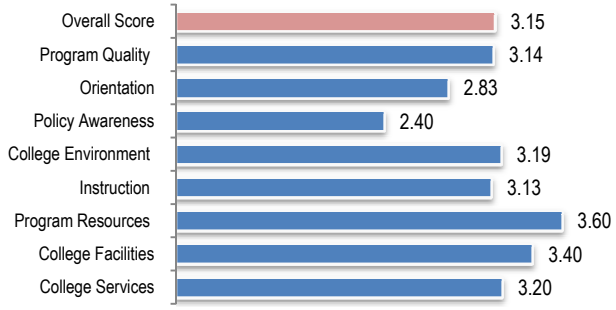

## Pharmaceutical Manufacturing

One-Year Certificate Program
Respondents: 6



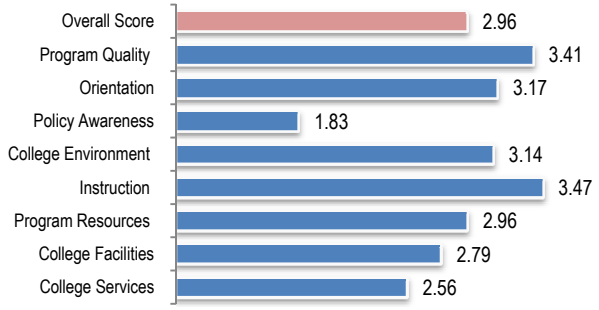

## QA/QC in Pharmaceutical Industry

One-Year Advanced Diploma Program
Respondents: 6




## Radiation Therapy

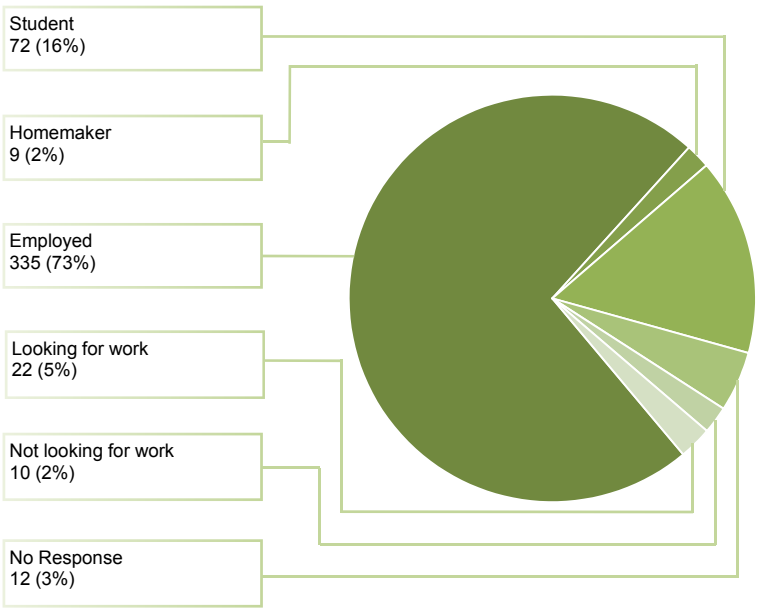
Two-Year Program
Respondents: 9



# School of Transportation, Aviation & Manufacturing

**Number of Respondents in this School: 460**

**Primary Prior Activity**
(Before entering program)



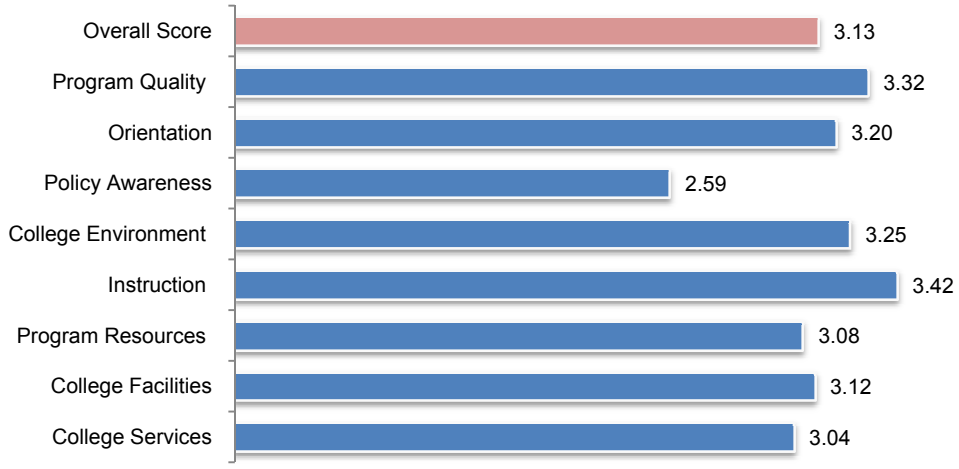

**Programs in this report:**

*Apprenticeship Programs*:
Aircraft Maintenance
Automotive Service Ed Program (ASEP)
Boilermaker
Boilermaker - Entry
Crane & Hoisting Operator
Machinist
Motor Vehicle Body Repairer
Motor Vehicle Mechanic
Motor Vehicle Mechanic ASSET
Tool & Die Maker
Transport Trailer Technician
Truck and Transport Mechanic

*Regular Programs*:
Aircraft Maintenance Engineer
Automotive Technician - Certificate
Automotive Technician - Diploma
Gas Turbine Engine Repair & Overhaul
Heavy Duty Equipment Mechanic
Introduction to Aircraft Maintenance
Manufacturing CAD
Outdoor Power Equipment Technician
Power Engineering Technology
Welding

*Programs with less than 5 respondents are not illustrated in this report, but are included in the School statistics.*

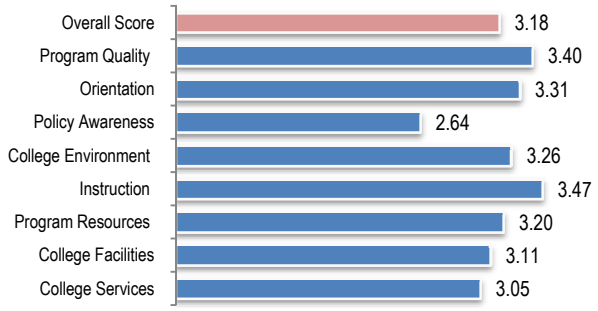
**Summary of Student School Ratings**




***Note:*** *Student assessments are presented in a four-point scale from 1 to 4, with 1 indicating strong dissatisfaction and 4 indicating strong satisfaction*

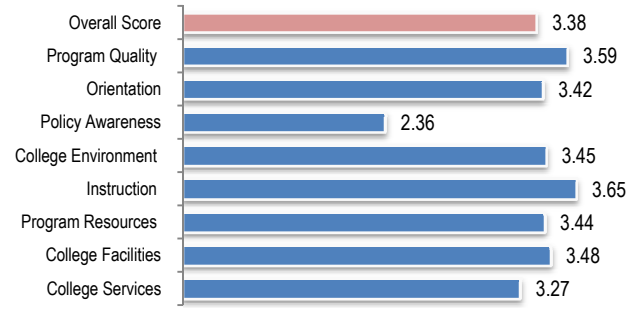
## (Apprenticeship) Aircraft Maintenance

Apprenticeship Program
Respondents: 44



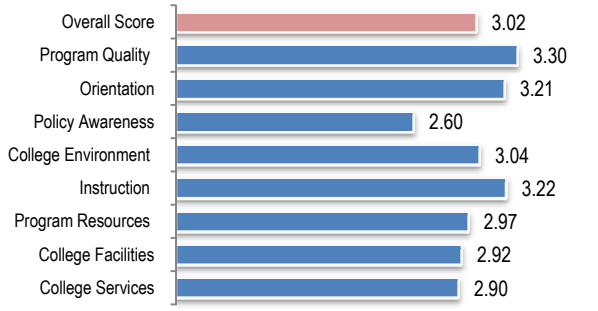

## (Apprenticeship) Automotive Service Ed (ASEP)

Apprenticeship Program
Respondents: 33



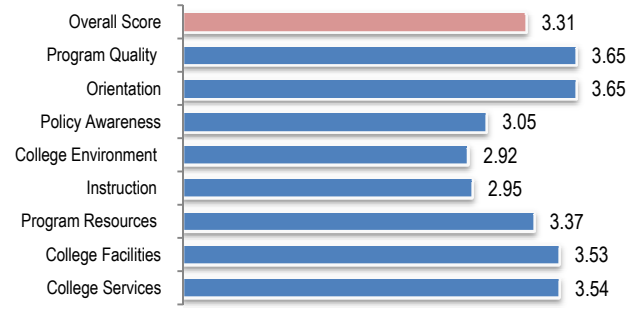

## (Apprenticeship) Boilermaker

Apprenticeship Program
Respondents: 29



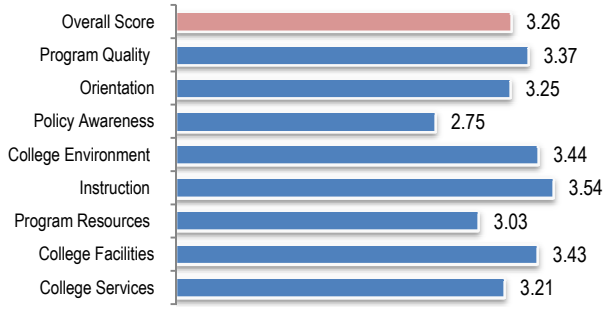

## (Apprenticeship) Boilermaker - Entry

Apprenticeship Program
Respondents: 10



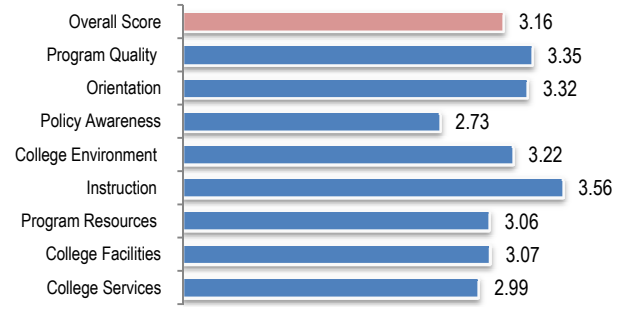

## (Apprenticeship) Motor Vehicle Body Repairer

Apprenticeship Program
Respondents: 24



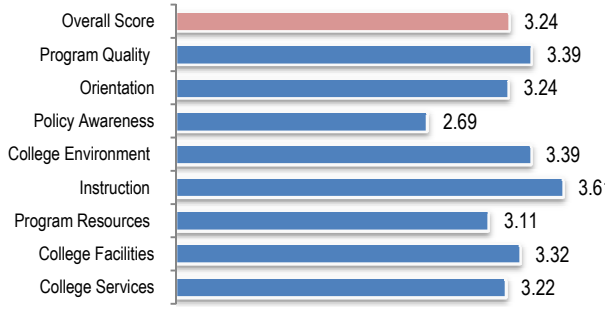

## (Apprenticeship) Motor Vehicle Mechanic

Apprenticeship Program
Respondents: 43



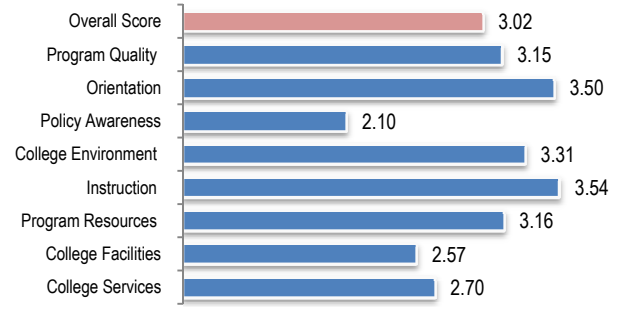

## (Apprenticeship) Motor Vehicle Mechanic ASSET

Apprenticeship Program
Respondents: 19



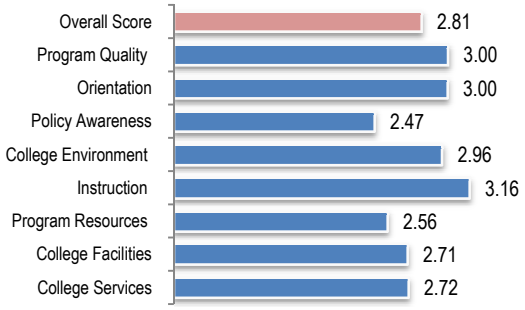

## (Apprenticeship) Tool & Die Maker

Apprenticeship Program
Respondents: 7



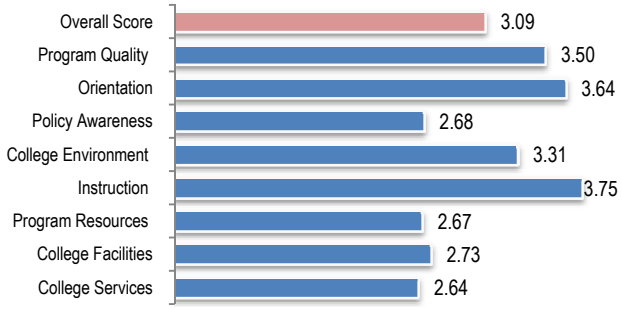
## (Apprenticeship) Transport Trailer Technician

Apprenticeship Program
Respondents: 17



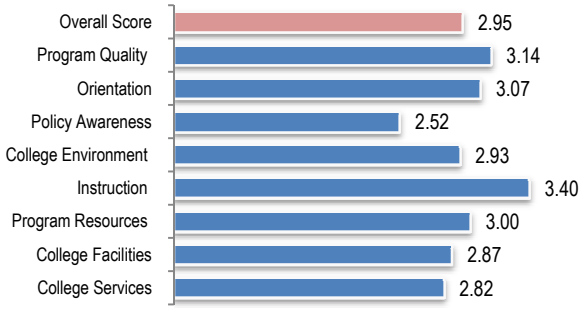

## (Apprenticeship) Truck and Transport Mechanic

Apprenticeship Program
Respondents: 11



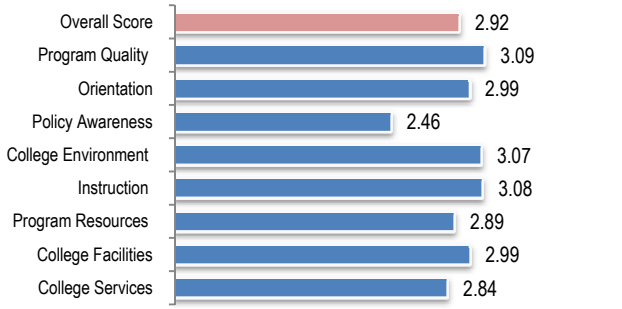

## Aircraft Maintenance Engineering

Fifteen-Month Diploma Program
Respondents: 32



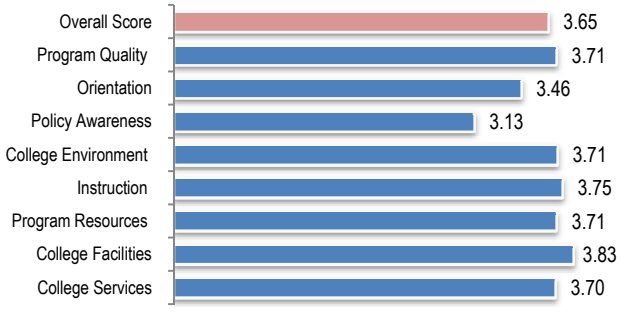

## Automotive Technician - Certificate

One-Year Certificate Program
Respondents: 41



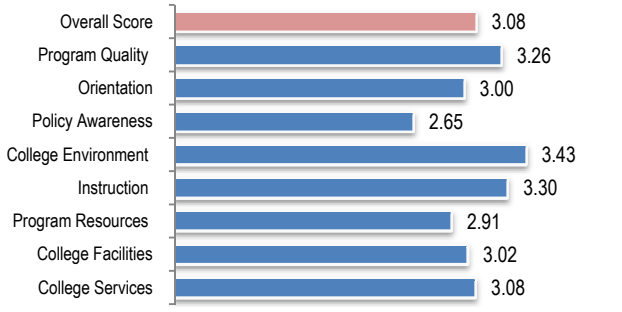

## Automotive Technician - Diploma

Two-Year Diploma Program
Respondents: 12



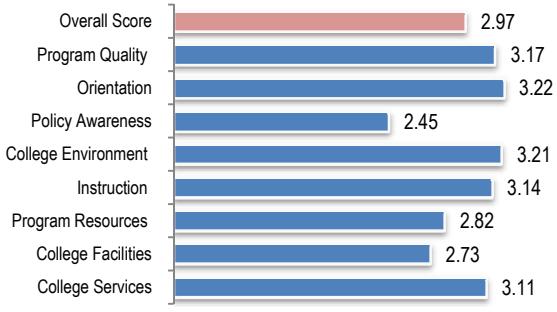

## Gas Turbine Engine Repair & Overhaul

One-Year Certificate Program
Respondents: 13



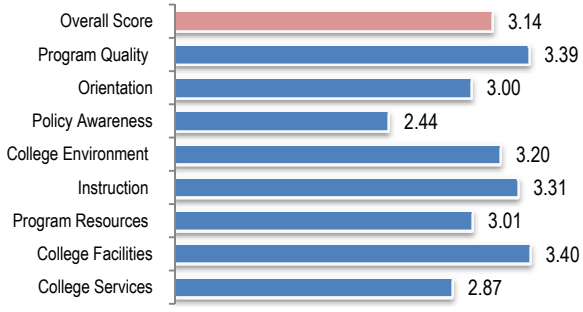

## Heavy Duty Equipment Mechanic

One-Year Certificate Program
Respondents: 38



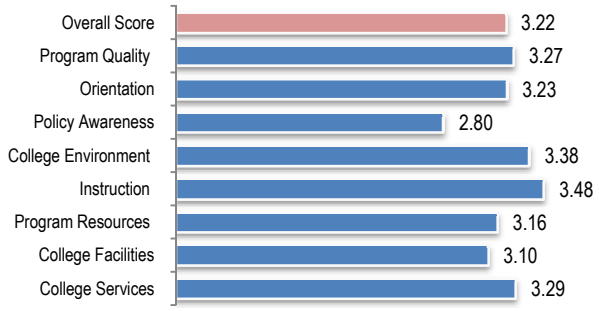

## Introduction to Aircraft Maintenance

Four-Month Certificate Program
Respondents: 8



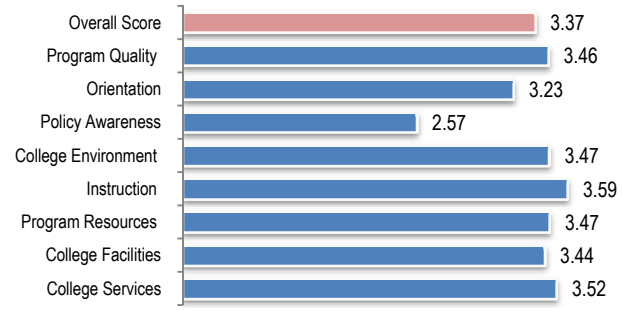
## Manufacturing CAD

One-Year Certificate Program
Respondents: 11



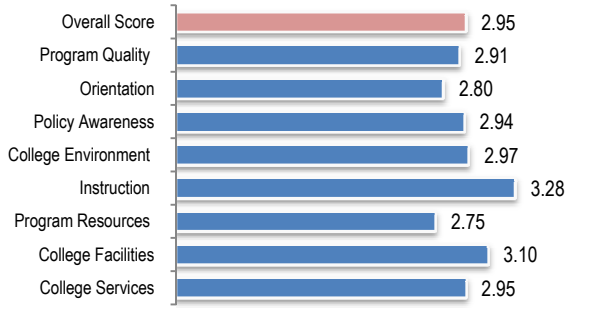

## Outdoor Power Equipment Technician

One-Year Certificate Program
Respondents: 11



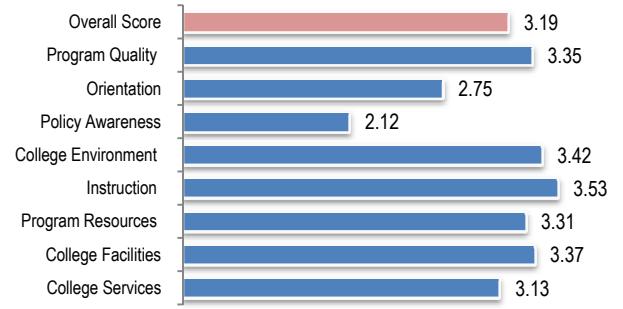

## Power Engineering Technology

Two-Year Diploma Program
Respondents: 5




## Welding

Seven-Month Certificate Program
Respondents: 16



# Appendix A - Programs with less than 5 respondents

**School of Business & Applied Arts**
- American Sign Language - English
- International Business

**School of Construction & Engineering Technology**
- Electrical Engineering Technology
- Electronic Engineering Technology
- Electronic Engineering Technology Integrated
- Environmental Protection Technology
- Network Technology (CCNP) Diploma

**School of Continuing & Distance Education**
*(Adult Learning Centre)*
- Workplace Com for Com Service Workers

**School of Learning Innovation**
- Business/Technology Teacher Education - After Degree
- Technical Vocational Teacher Education

**School of Transportation, Aviation & Manufacturing**
(*Apprenticeship*)
- Ironworker

(*Regular*)
- Technology Management

# Appendix B - Quality Categories

| Quality Category (Dimension) | Chart Category | Survey Question Number |
|---|---|---|
| Overall Program Quality | Program Quality | 12 to 17 |
| Quality of Orientation | Orientation | 18 to 19 |
| Quality of familiarization with College policies | Policy Awareness | 20 to 24 |
| Quality of the welcoming, inclusive college environment | College Environment | 25 to 31 |
| Quality of Instruction | Instruction | 32 to 35 |
| Quality of program resources | Program Resources | 36 to 41 |
| Quality of College facilities | College Facilities | 42 to 47 |
| Quality of College services | College Services | 48 to 55 |

# Appendix C - Quality Category Questions

***Note:*** *Question 1 - 11 ask for demographic information. Question numbers refer to the numbering used in the survey questionnaire, not the numbering used in the survey results reports (which exclude question 1 from the questionnaire.)*

**Overall Program Quality (Program Quality)**

**12.** Before I applied, I had a good understanding of the program's purpose.

**13.** The training I have received in this program has met my expectations.

**14.** The program content is relevant to my career goals.

**15.** The tuition fee for this program is reasonable for the education provided.

**16.** Overall, I am satisfied with this program.

**17.** I would recommend this program to others.

# Appendix C - Quality Category Questions continued

**Quality of Orientation (Orientation)**

**18.** The orientation to the program provided by the Department was effective in explaining the requirements of the program.

**19.** Upon admission to the program, I was made aware of my role and responsibilities as a student.

**Quality of familiarization with College policies (Policy Awareness)**

**20.** I am familiar with the College's challenge for credit policy.

**21.** I am familiar with the College's transfer of credit policy.

**22.** I am familiar with the College's appeals procedure as it relates to academic and/or discipline issues.

**23.** I am familiar with the College's harassment policy.

**24.** I am familiar with Prior Learning Assessment at the College.

**Quality of the welcoming, inclusive college environment (College Environment)**

**25.** My gender does not limit my success in the program.

**26.** My race or ethnic origin does not limit my success in the program.

**27.** My physical ability does not limit my success in the program.

**28.** My financial situation does not limit my success in the program.

**29.** My English language skills do not limit my success in the program.

**30.** My Mathematical skills do not limit my success in the program.

**31.** My experience in the program has increased my awareness of values and cultures that are different from my own.

**Quality of Instruction (Instruction)**

**32.** The instructors treat students with respect.

**33.** The instructors are effective in delivering the program.

**34.** The instructors are knowledgeable in the areas they teach.

**35.** Overall, I am satisfied with the quality of instruction within the program.

**Quality of program resources (Program Resources)**

**36.** The training materials (texts, workbooks, handouts, etc.) used in the program are current.

**37.** I am satisfied with the quality of the training materials used in this program.

**38.** The equipment used in this program is appropriate for learning the required skills.

**39.** The equipment used in this program is current with industry.

**40.** There is a sufficient quantity of equipment provided for the program.

**41.** There is a sufficient quantity of CURRENT library resource materials for use by students in the program. (Books, video tapes, audio tapes, periodicals, pamphlets, etc.).

# Appendix C - Quality Category Questions continued

**Quality of College facilities (College Facilities)**

**42.** The classroom facilities are appropriate.

**43.** The shop/lab facilities are appropriate.

**44.** Adequate study space is available to students.

**45.** Student lounge space is adequate.

**46.** The gymnasium/fitness facilities are satisfactory.

**47.** Overall, the College facilities meet my needs as a student.

**Quality of College services (College Services)**

**48.** I am satisfied with the service provided from the Academic Support Services (Tutorial Centre).

**49.** I am satisfied with the service I received from the Counselling Centre.

**50.** I am satisfied with the service I received from the Job Centre.

**51.** I am satisfied with the service I received from the Library.

**52.** I am satisfied with the service I received from the Bookstore.

**53.** I am satisfied with the service I received from the Enrolment Services Department.

**54.** I am satisfied with the service I received from the Print and Graphic Centre/Copy Centre.

**55.** Overall, I am satisfied with the quality of service provided by the College.

# Appendix D - Technical Overview of Analytic Techniques[1]

Surveys include many questions about one or more topics. Typically, how respondents answer these different questions tends to form patterns, that is, many of the responses are correlated. The RRC Student Evaluation of Program (SEPS) has 44 attitude questions on a variety of matters about the College.

Factor analysis is a statistical approach used to analyze interrelationships among a large number of variables and to explain these variables in terms of their common underlying dimensions or factors (Fisher & van Belle, 1993; Green & Salkind, 2003; Pedhazur & Schmelkin, 1991). This statistical technique allows the information contained in a large number of survey questions to be summarized in a smaller set of factors. The analysis compresses the original variables into a smaller set of dimensions. There are two main types of factor analysis, confirmatory and exploratory.

The analysis in the first annual SEPS report (2003-04 survey) was exploratory. Exploratory factor analysis is used to discover the factor structure of a set of observed variables. Observed variables are the measured variables and are sometimes called indicator variables or manifest variables or reference variables, such as items in a survey instrument. It is often used when researchers have no hypotheses about the nature of the underlying factor structure of their measures.

Factor analysis generates a correlation matrix for all the observed variables. A correlation matrix is a rectangular array of the correlation coefficients of the variables with each other. Factors (dimensions) are extracted from the correlation matrix based on the correlation coefficients of the variables. Then, the factors are rotated in order to maximize the relationship between the variables and some of the factors. In general, the number of dimensions or factors is much smaller than the number of original variables. Factors or dimensions are also sometimes referred to as latent variables to distinguish them from the observed variables.

Additionally, it is possible to compute factor or dimension scores for use in subsequent analyses. As well, the reliability of dimensions, which generally include a number of items, can be tested. The results of the initial exploratory factor analysis are included as Appendix D1.

The first year, 2003-04, established the factor structure; this year we wanted to establish its consistency. In factor analysis, confirmatory analysis is used to test the consistency of the structure. The 2003-04 factor structure included eight dimensions arising from the original set of variables. Confirmatory factor analysis (Coughlin, 2005; Pedhazur & Schmelkin, 1991) was applied to the 2004-05 data set using the 2003-04 structure. Confirmatory factor analysis is used when a particular factor structure has been specified, in which the researcher designates the variables to load on each factor – in this case the factor structure arising from the 2003-04 SEPS.

The analysis proceeded through several steps. First a global test of the fit of the original factor model to the new data set was undertaken. The original factor model was re-estimated using the original data set again forcing eight factors, using principal axis factoring with a promax rotation and a maximum likelihood estimation method. The data set had missing data (some of the individual questions had large numbers of non-responses). The chi-square and degrees of freedom were calculated and the model was then applied to the second data set. Table 1 provides the results.

**Table 1.**

| | **SEPS 2003-04** | **SEPS 2004-05** | $\Delta\chi^2$ |
|---|---|---|---|
| $\chi^2$ | 1169.7 | 1275.8 | 106.1 |
| df | 622 | 622 | 0 |

[1] Research and Planning would like to thank Ashley Blackman for his advice and guidance on the statistical procedures.

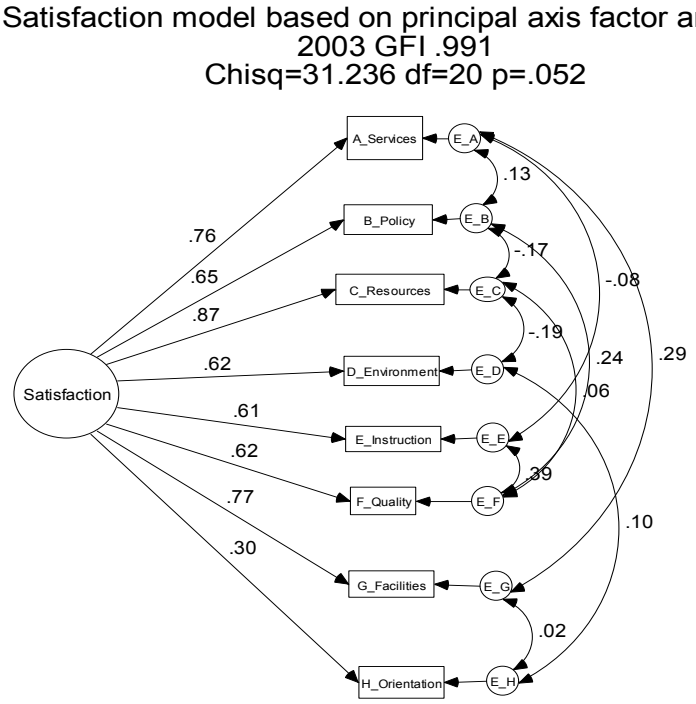
# Appendix D - Technical Overview of Analytic Techniques continued

This meant the model was rejected, that is, the original model did not fit the second data set. In order to proceed, the two data sets were explored using multinomial logistic regression to help identify why they are different. Seven questions (or variables) showed a difference. Compared to 2003-04, the responses to questions 25, 28, 32, 38, 41, 45 and 53 were more positive (or less negative) in 2004-05. Combined, these variables have a reliability alpha .72 and this set of variables showed a significant difference from 2003-04 to 2004-05. While the model would still be rejected, removing the variables that changed removed most of the variability.

The last stage of the analysis conducted the confirmatory factor analysis using structural equation modeling (SEM)[2] with AMOS[3]. Figures 1 and 2 illustrate the factor structure model for the 2003-04 (2003 in the figure) SEPS and for 2004-05 (2004 in the figure) in its final form, allowing correlated error terms[4].

This means[5] that we can have confidence in applying the original factor structure to the 2004-05 survey results. In other words, the original eight dimensions still work with the 2004-05 SEPS findings.

**Figure 1. Factor Model for the 2003-04 SEPS.**




[2] SEM is a multivariate statistical analysis technique that encompasses and extends standard statistical methods such as regression, factor analysis, and simultaneous equations and analysis of variance. It is largely a confirmatory and not an exploratory technique. SEM is used to test hypotheses about the relationships between observed and latent variables. Using SEM it is possible to explore factor models (Coughlin, 2005). The goal of structural equation modeling (SEM) is to compare a covariance matrix generated from a particular sample with a covariance matrix generated by a hypothesized model.

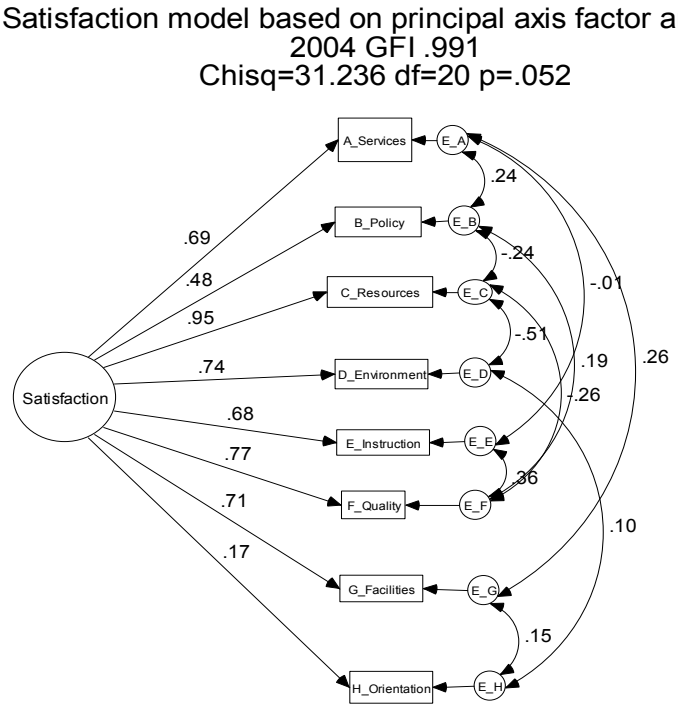
[3] AMOS is a structural equation modeling software distributed by SPSS

[4] Correlated error terms refers to situations where knowing the residual of one variable helps in knowing the residual associated with another variable. The correlation of error terms may and should be explicitly modeled in SEM. In SEM, the researcher must model error as well as the variables. It makes particular sense in this instance in that the variables are correlated with each other.

[5] For example, the goodness-of-fit (GFI) index should be at .90 or greater to have the model considered as adequate (Schumacker & Lomax, 1996).

# Appendix D - Technical Overview of Analytic Techniques continued

**Figure 2. Factor Model for the 2004-05 SEPS.**




The reliability scores of the eight dimensions for the 2004-05 SEPS data set are illustrated in Table 2.

**Table 2. Factors Extracted from the Student Evaluation of Program Survey 2004-05.**

| Dimension | Reliability[6] | Number of Items |
|---|---|---|
| Overall Program Quality | .839 | 6 |
| Quality of Orientation | .660 | 2[7] |
| Quality of familiarization to College policies | .886 | 5 |
| Quality of the welcoming, inclusive college environment | .802 | 7 |
| Quality of Instruction | .877 | 4 |
| Quality of program resources | .852 | 6 |
| Quality of College Facilities | .842 | 6 |
| Quality of College Services | .914 | 7 |

These reliability scores are very similar to the scores from the 2003-04 SEPS, excepting Orientation, which is somewhat lower.

[6] Cronbach's alpha measures how well a set of items (or variables) measures a single unidimensional latent construct. When data have a multidimensional structure, Cronbach's alpha will usually be low. Cronbach's alpha is not a statistical test - it is a coefficient of reliability (or consistency). The acceptable range is normally considered to be between .7 and 1.0 (Nunnally, 1978).

[7] Velicer and Fava (1998) argue that factors should have at least three variables, however, if the original variables are best interpreted as a pair and the intent is to develop the underlying dimensions it makes sense to use only two.

# Appendix D1 - Exploratory Factor Analysis Results from the 2003-04 SEPS

The first step in exploratory factor analysis is to assess whether or not the data set is appropriate for factor analysis. SPSS 13.0 was used to conduct the analysis. The overall factor analysis was evaluated through the Kaiser-Meyer-Olkin (KMO) and Bartlett's Tests. The KMO measures the sampling adequacy which should be greater than 0.6 for a satisfactory factor analysis to proceed (Tabachnik & Fidell, 2001). The Bartlett's test[8] of sphericity examines whether there are adequate intercorrelations between the items to use factor analysis and it should be significant ($p \leq .05$).

For the factor analysis of the SEPS, the results (Table 1) indicate a satisfactory analysis:

**Table D1. KMO and Bartlett's Test Results for SEPS 2003-04 Factor Analysis**

| | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | .944 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 11753.541 |
| | df | 946 |
| | Sig. | .000 |

The steps in factor analysis are to select an extraction method for the correlations from the matrix and a rotation method to maximize the loadings of the items into a factor. Examining the correlations among the many survey items in the Student Evaluation of Program Survey (SEPS) for 2003-04 revealed that there was a significant correlation among various subgroups of questions. There are two main extraction methods, principal components analysis or common factor analysis (there are several specific techniques). Two strategies were used in conducting the exploratory factor analysis. First, principal component analysis (PAC)[9] with a varimax[10] rotation was used for the analysis of the forty-four questions, all of which were attitude-type questions with a four point[11] agree – disagree scale. Factors are extracted in order and the first factor accounts for the largest amount of variability and the second factor the second most and so on. The factors were initially selected based on the scree plot[12] (included as Figure 1) and included all factors with an eigenvalue (the variability of a factor)[13] greater than one. This yielded seven factors. Then the selected factors were rotated through a varimax routine to yield separate uncorrelated factors or dimensions. Factor loading[14] were at a minimum of .30[15]. Subsequently, the derived factors were examined in relation to the original set of questions and a further analysis was conducted to achieve eight dimensions, which seemed to be more interpretable for the original question items. The scree test and the eigenvalue-greater-than-one criteria are meant to act as guides in determining factors; what is more important is to have a set of factors that arise from the data and are more meaningful (Fabrigar, et. al., 1999).

[8] A test statistic used to examine the hypothesis that the variables are uncorrelated. It is used to test the suitability of a correlation matrix for factor analysis by examining if the data contain sufficient correlations to warrant analysis (i.e., whether the correlation matrix (variance/covariance matrix) is an identity matrix). If the obtained chi square value is significant, then the correlation matrix to be analyzed is non-random and is suitable for factor analysis.

[9] Principal components analysis (PCA) is a form of factor analysis. It involves a mathematical procedure that transforms a number of (possibly) correlated variables into a (smaller) number of uncorrelated variables called *principal components*. The first principal component accounts for as much of the variability in the data as possible, and each succeeding component accounts for as much of the remaining variability as possible.

[10] A *variance maximizing (varimax) rotation* is a method for rotating axes of a plot such that the eigenvectors remain orthogonal (that is uncorrelated) as they are rotated. These rotations are so that the axes are rotated to a position in which the sum of the variances of the loadings is the maximum possible. This type of rotation is called *variance maximizing* because the purpose of the rotation is to maximize the variance (variability) of the factor (the "new" variable), while minimizing the variance around the new variable. It assumes uncorrelated factors.

[11] It may be argued that a four-point scale is not continuous, however, factor analysis is very robust and it is not uncommon to use factor analysis with four point scales.

[12] A scree plot is a plot of the eigenvalue for each factor; generally, a criterion for selection of factors is that all factors are retained with eigenvalues in the sharp descent part of the plot before the values level off.

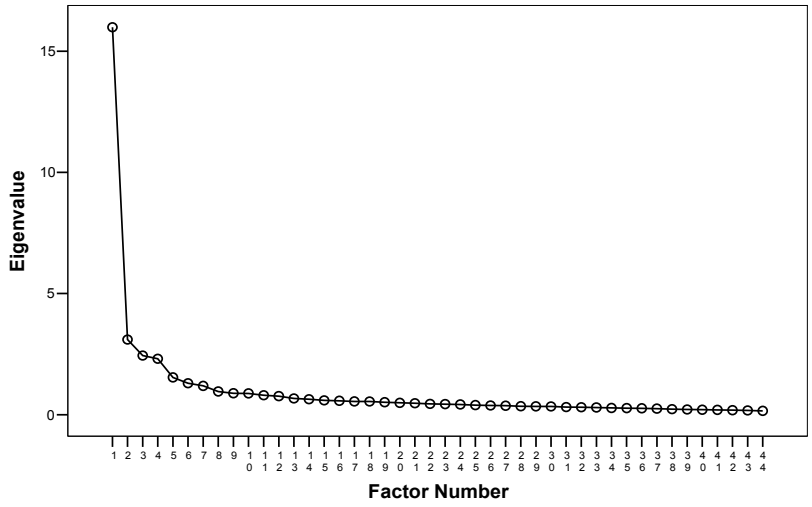
[13] An eigenvalue is the standardized variance associated with a particular factor.

[14] A factor loading expresses the correlation of an item with a factor.

[15] A general rule of thumb is that factor loadings greater than .30 are considered to be useful. This is just a guideline and may need to be adjusted, for example, as the sample size and the number of variables increase, the criterion may need to be adjusted slightly downward and it may need to be adjusted upward as the number of factors increases (see Hair, et. al., 1998).

# Appendix D1 - Exploratory Factor Analysis Results from the 2003-04 SEPS continued

**Figure 1. Scree Plot**




In addition, a separate analysis was conducted using principal axis factoring (PAF)[16] with a promax[17] rotation. Factor loading were at a minimum of .40. Initially, seven factors were extracted as with the PCA, but the factors varied very slightly. The analysis was re-run for eight factors, and the results were virtually identical to the PCA. What is reported here derives from the pattern matrix of the principal axis factoring (see Table 3 for the factor loadings). Some researchers (Fabrigar, et. al., 1999; Gorsuch, 1990; Preacher & MacCallum, 2003) suggest that principal axis factoring with an oblique rotation is the preferred method of factor analysis even if principal component analysis is widely used and explained in many texts (for example, Green & Salkind, 2003).

According to the analysis, the forty-four questions can be summarized in eight dimensions, or scales as illustrated in Table 2. The dimensions or scale items were also tested for reliability. Hence, the forty-four items can be summarized in eight dimensions with high reliability.

**Table D2. Factors (Dimensions) Extracted from the 2003-04 Student Evaluation of Program Survey.**

| Dimension | Reliability[18] | Number of Items |
|---|---|---|
| Overall Program Quality | .814 | 6 |
| Quality of Orientation | .721 | 2[19] |
| Quality of familiarization to College policies | .892 | 5 |
| Quality of the welcoming, inclusive college environment | .794 | 7 |
| Quality of Instruction | .875 | 4 |
| Quality of program resources | .856 | 6 |
| Quality of College Facilities | .869 | 6 |
| Quality of College Services | .902 | 7 |

[16] Principal axis factoring is another common form of factor analysis. It uses squared multiple correlations as the initial estimates of the communalities. The general factor model asserts that there is common factor plus individual idiosyncrasies. Principal component works only with the common factor, whereas principal axis tries to use both. (Principal component treats the individual elements as part of the error term). In theory, developing a model that takes into account more of the sources of variability can be useful. As well, with the SEPS data set, it is likely that the factors are correlated.

[17] Promax is an oblique rotation such that the vertices can have any angle. It allows factors to be correlated. Its name derives from procrustean rotation because it tries to fit a target matrix which has a simple structure. With the SEPS data set, it is likely that the factors are correlated.

[18] Cronbach's alpha measures how well a set of items (or variables) measures a single unidimensional latent construct. When data have a multidimensional structure, Cronbach's alpha will usually be low. Cronbach's alpha is not a statistical test - it is a coefficient of reliability (or consistency). The acceptable range is between .7 and 1.0 (Nunnally, 1978).

[19] Velicer and Fava (1998) argue that factors should have at least three variables, however, if the original variables are best interpreted as a pair and the intent is to develop the underlying dimensions it makes sense to use only two.

# Appendix D1 - Exploratory Factor Analysis Results from the 2003-04 SEPS continued

**Table D3. Summary of Factor Loadings for Promax, Principal Axis Factoring for the Student Evaluation of Program Survey 2003-04. (*Note. Only factor loadings greater than .40 are shown.)***

| | Factor | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | College Services | Policy Awareness | Program Resources | College Environment | Instruction | Program Quality | College Facilities | Orientation |
| Q12 | | | | | | .551 | | |
| Q13 | | | | | | .574 | | |
| Q14 | | | | | | .720 | | |
| Q15 | | | | | | .473 | | |
| Q16 | | | | | | .672 | | |
| Q17 | | | | | | .590 | | |
| Q18 | | | | | | | | .433 |
| Q19 | | | | | | | | .447 |
| Q20 | | .756 | | | | | | |
| Q21 | | .904 | | | | | | |
| Q22 | | .922 | | | | | | |
| Q23 | | .722 | | | | | | |
| Q24 | | .747 | | | | | | |
| Q25 | | | | .768 | | | | |
| Q26 | | | | .767 | | | | |
| Q27 | | | | .830 | | | | |
| Q28 | | | | .425 | | | | |
| Q29 | | | | .612 | | | | |
| Q30 | | | | .482 | | | | |
| Q31 | | | | .418 | | | | |
| Q32 | | | | | .779 | | | |
| Q33 | | | | | .844 | | | |
| Q34 | | | | | .682 | | | |
| Q35 | | | | | .828 | | | |

# Appendix D1 - Exploratory Factor Analysis Results from the 2003-04 SEPS continued

**Table D3. continued**

| | Factor | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | College Services | Policy Awareness | Program Resources | College Environment | Instruction | Program Quality | College Facilities | Orientation |
| Q36 | | | .677 | | | | | |
| Q37 | | | .652 | | | | | |
| Q38 | | | .788 | | | | | |
| Q39 | | | .821 | | | | | |
| Q40 | | | .760 | | | | | |
| Q41 | | | .527 | | | | | |
| Q42 | | | | | | | .658 | |
| Q43 | | | | | | | .635 | |
| Q44 | | | | | | | .785 | |
| Q45 | | | | | | | .723 | |
| Q46 | | | | | | | .613 | |
| Q47 | | | | | | | .507 | |
| Q48 | .571 | | | | | | | |
| Q49 | .687 | | | | | | | |
| Q50 | .847 | | | | | | | |
| Q51 | .729 | | | | | | | |
| Q52 | .754 | | | | | | | |
| Q53 | .860 | | | | | | | |
| Q54 | .818 | | | | | | | |
| Q55 | .768 | | | | | | | |

# Appendix D1 - Exploratory Factor Analysis Results from the 2003-04 SEPS continued

**Table D4. Factor Correlation Matrix**

| Factor Correlations | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | College Services | Policy Awareness | Program Resources | College Environment | Instruction | Program Quality | College Facilities | Orientation |
| College Services | 1.000 | | | | | | | |
| Policy Awareness | .549 | 1.000 | | | | | | |
| Program Resources | .659 | .500 | 1.000 | | | | | |
| College Environment | .502 | .407 | .467 | 1.000 | | | | |
| Instruction | .416 | .410 | .518 | .402 | 1.000 | | | |
| Program Quality | .458 | .552 | .561 | .382 | .623 | 1.000 | | |
| College Facilities | .706 | .486 | .692 | .443 | .469 | .494 | 1.000 | |
| Orientation | .212 | .277 | .232 | .263 | .221 | .236 | .235 | 1.000 |

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