PROFILING BACHELOR OF SCIENCE IN STATISTICS (BSS) STUDENTS UNDER THE OPEN ENROLMENT POLICY

Susana B. Miñoza[1] and Leomarich F. Casinillo[2]
[1,2]Visayas State University, Visca, Baybay City, Leyte, Philippines
correspondence: leomarich_casinillo@yahoo.com

Abstract
This study established a profile of Bachelor of Science in Statistics (BSS) students under the open enrolment policy of Visayas State University (VSU). The study also determined the graduation rate of the BSS students. Data on the present BSS students were collected from a survey of currently enrolled students while data on the past BSS students were taken from the previous study. Data used to track down the BSS students since their first year to determine the graduation rate of each batch covered and were taken from the Office of the University Registrar. Results showed that majority of the present BSS students are female. All BSS students surveyed come from the Visayas area with most of them come from Region VIII, Philippines. While most of the BSS students have annual family incomes below the poverty line in Region VIII, still most of them get their financial support from their parents only. Majority are regular students and want to work as statisticians in the future. The relative importance of factors influencing the choice of degree program are very similar between the past and the present BSS students. The graduation rate of BSS students is variable (coefficient of variation of 42.5%) with a median of 26.1% and a mean of 25.3%. Hence, an extensive recruitment and orientation about the program must be done to increase the enrollees and develop their interest towards the program, respectively.

Keywords: BSS students, graduation rate, open enrolment policy, profiling, Visayas State University

Introduction

Profiling students in a university is crucial for curriculum proposal and assessment as well as for recruitment criteria and suitability of students. Perhaps, data from graduate students can be a great help to determine the quality and defect of the curriculum (Pongsena, 2014; Scott & Wilson, 2002; Cuadra et al., 2019). Seemingly, data gathered from profiling may evaluate how fit the curriculum program meets the student needs, suitability of students, and monitor the quality of teachers in the program (Bernal et al., 2019; Guilloux et al., 2019; Marfori, 2002; Casinillo & Miñoza, 2020). Additionally, information from profiling may also assess the career obtained by the graduates of the degree program which is the main

purpose of having an education. Hence, profiling is an evaluation of a progressive achievement especially in public, professional, or business aspect (David et al., 2020; Nor et al., 2020; Owoseni et al., 2020). One of the in demand careers in our society today is the statistician. Zou (2017) pointed out that statistics is seen as a dreary and drab occupation involved with data tabulation. Its role in research in science and social policy is not recognized. Additionally, statistics is newsworthy when it is in trouble - poor election prediction or a perceived undercount of minorities in the census (Fienberg, 2007).

A bachelor's degree in statistics is sufficient for many entry-level jobs (Lovaglio **et al., 2018; Meng, 2018).** Job opportunities include a teaching job in statistics and related fields, being a researcher, a statistician or data analyst and computer programmer. However, most statisticians pursue further education and earn a master's degree in statistics, mathematics, or survey methodology (Zou, 2017). Apparently, research and academic jobs generally require a Ph.D. Many statisticians would do well to have additional training in related fields such as business, finance, computer science, or biology. Biology is especially helpful for those who wish to work in the pharmaceutical industry. Because statisticians can work in a variety of industries, job prospects are good in the coming years. With computers able to crunch ever increasing amounts of data, employers will want statisticians to run the numbers to determine product reliability, popularity, and/or effectiveness (Reid, 2018; Shi, 2018). Many positions may not have the title statistician but will require such knowledge nonetheless.

Different types of schools have different admission policies. In the Philippines, there are different kinds of admission policy. The Visayas State University (VSU) for example, has an open enrolment policy. That is, there is no strict policy in student admission to the university as long as a student applicant meets the minimum requirements of the university (ViSCA Code, 1974). It is clearly stated in Section 283 of the ViSCA code that every applicant for admission to the degree programs must meet the minimum requirements: (1) pass the National College Entrance Examination (NCEE); (2) present form 138-A or its equivalent; (3) Be physically fit as certified by the college physician; and (4) possess good moral character as certified to by the principal or head of the school he last attended. In section 282 of the ViSCA Code (1974), it is stated that no student shall be denied admission to the college by reason of age, sex, ethnic considerations, or religious beliefs or affiliations. It should be noted, however, that the NCEE was last conducted in the 1980s. No replacement for this test was made by VSU for the BSS program, among many others.

A profile of the BSS students in Leyte State University (LSU) was made by Marfori (2002). The profile showed that most of the BSS students are female and come from the Visayas, particularly Region VIII. Majority of the BSS students' annual family incomes are below the average annual family income for Region VIII and most of them get financial support from their parents alone. Most are regular students but only a few are scholars. Moreover, most BSS students want to work as statisticians in the future. Only a few BSS students have high levels of intelligence, numerical aptitude, and interest in statistics. Though a large portion of the BSS students have average levels of intelligence and numerical aptitude and high level of interest in statistics, a few have low level of intelligence. Hence, it is of interest to know whether the type of BSS students now at the Visayas State University (VSU),

is significantly different from the type of BSS students then under the same enrolment policy. Although the BSS program of the University has long introduced to prospective students as part of the recruitment program, it cannot be ignored that there are now many degree programs offered by VSU compared to the past. Hence, even students suited to the BSS degree program may choose not to enroll in the program. Another issue is whether the BSS program has the "right" students at present considering the increased public awareness about the field of statistics through the years. Aside from diligence and good study habits, the ideal students for the program are those who have the following qualities: analytical mind, excellent mathematical and problem-solving skills, logical reasoning ability, and proficient in both oral and written English. On the other hand, there is also a need to track down the BSS students and determine the percentage of graduates relative to the number who started as BSS since their first year.

This study basically aims to update the profile of BSS students at VSU under the open enrolment policy of the BSS program. Specifically, this aims to: (1) establish the latest profile of BSS students with respect to selected characteristics; (2) determine the factors influencing the present BSS students' choice of degree program and their relative importance; (3) know when their decision to pursue the BSS program was made; (4) compare the profile and related characteristics of the present BSS students (VSU) to those of the past (LSU); and (5) determine the percentage of students who enrolled in the BSS program since their first year and finished the program in four (4) years. The results of this study will not only update the BSS students' profile but also may provide valuable inputs to further improve the recruitment and career guidance programs of the University, in general and of the department, in particular.

Method

In this study, a quantitative methods were used. The first population of interest in this study is all BSS students of VSU since its change of name from LSU to VSU in 2007. All the BSS students officially enrolled in the second semester of SY 2012–2013 at VSU were taken as the sample. This included not only those who have taken the BSS program since the first semester of their first year and are still in the program up to the time of the study but also the transferees and shifters to the program. The complete list of BSS students officially enrolled in the second semester of SY 2012-2013 was secured from the Office of the University Registrar. The second population of interest is the past BSS students way back when it was still LSU. The present 52 BSS students of VSU were surveyed using a developed questionnaire parallel to the study by Marfori (2002). The questionnaire has three parts: personal information, factors affecting choice of degree program, and the when the decision to pursue the BSS program was made. The survey was conducted on the first week of November 2012. Based on the official list of enrollees for the second semester of SY 2012-2013 provided by the University Registrar, 54 were listed as BSS students. Two (2) however, were excluded in this study since they were no longer taking BSS courses and are in the process of shifting to another degree program. The same questionnaire was used to identify the factors influencing the choice of BSS as the degree program to pursue in college along with the time that decision was made. The second part of the questionnaire presented 12 factors that may have influenced a student's decision in choosing the BSS program. The

respondents were asked to rate the factors using a 5-point rating scale with the following codes and meanings: 1 – no influence; 2 – little influence; 3 – moderate influence; 4 – considerable influence; and 5 – great influence. The data collected using the questionnaire were arranged in a data matrix with 52 rows and k columns. The rows were the students and the k columns were the variables measured using the questionnaire. Descriptive statistics were generated using SPSS while statistical charts came from MS Excel. Furthermore, some statistical methods was employed to draw inferences in the data.

Finding and Discussion
Profile of the Present BSS Students
   The present BSS students were characterized using the results of the survey among those enrolled this second semester of SY 2012-2013. The variables considered were: year level, sex, island group and region of origin, source of financial support, father's occupation, mother's occupation, scholarship status, semestral load, reasons for being an irregular student, and desired work in the future.
   Year Level. The distribution of the BSS students by year level is shown in Figure 1. Among the 52 BSS students surveyed, one-third (33%) are juniors, followed by the seniors (29%). The smallest group is that of the freshmen which is about half the size of the juniors. A little over one-fifth are sophomores. This reflects the decline in enrolment in the BSS program in recent years. In the past, the largest group used to be the freshmen, decreasing in size as the year level rises.
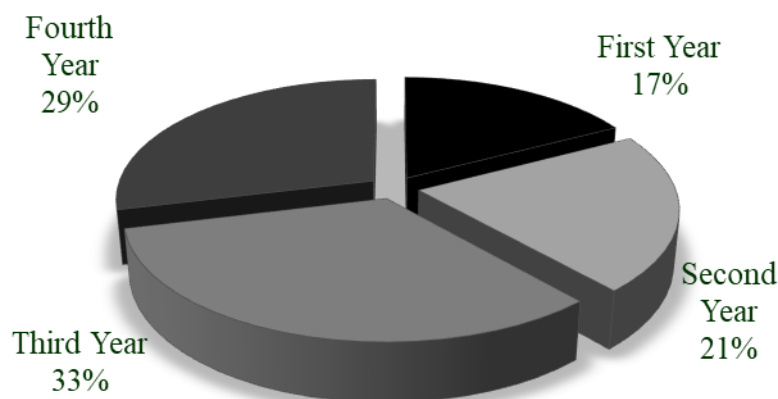

Figure 1. Distribution of BSS students by year level (n=52).

Sex. Most (77%) of the students taking the BSS program are females (Figure 2). A ratio of 3 females to 1 male prevails with the females more dominant than before.
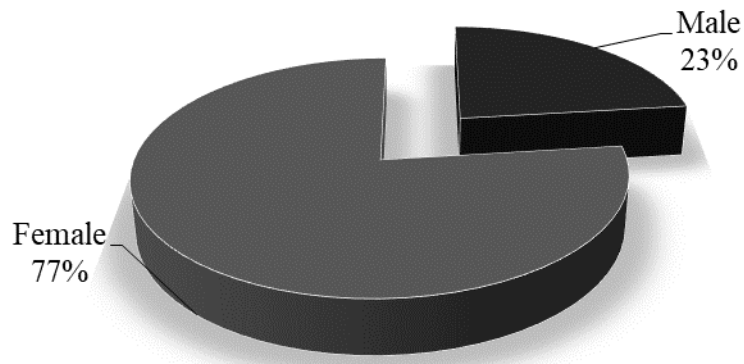
Figure 2. Distribution of BSS students by sex (n=52).

Island Group and Region of Origin. All BSS students surveyed come from the Visayas (Figure 3). Almost all (96%) are from Region VIII where VSU is located while the remaining few (4%) are from Region VII, a nearby region. In the past, there were a few from Luzon and Mindanao.
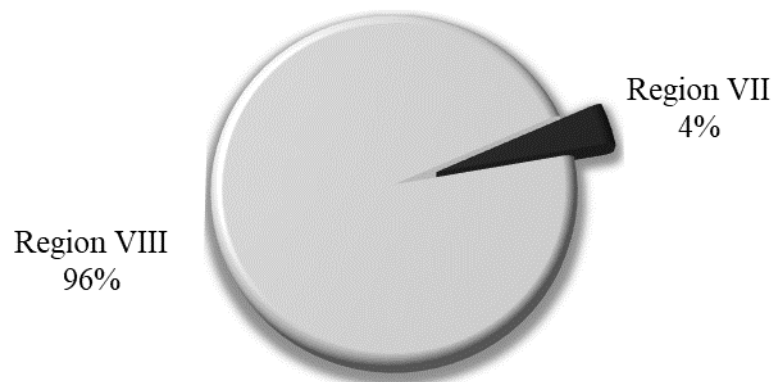

Figure 3. Distribution of BSS students by region of origin (n=52).

Source of Financial Support. Most (59.6%) of the BSS students get financial support from their parents only (Figure 4). Both from parents and scholarship (17.3%) is a weak second followed by both parents and relatives (11.5%), and relatives only (9.6%). Almost 2% depend on parents, relatives, and scholarship as sources of financial support while none solely depend on grant-in-aid and scholarship, respectively.
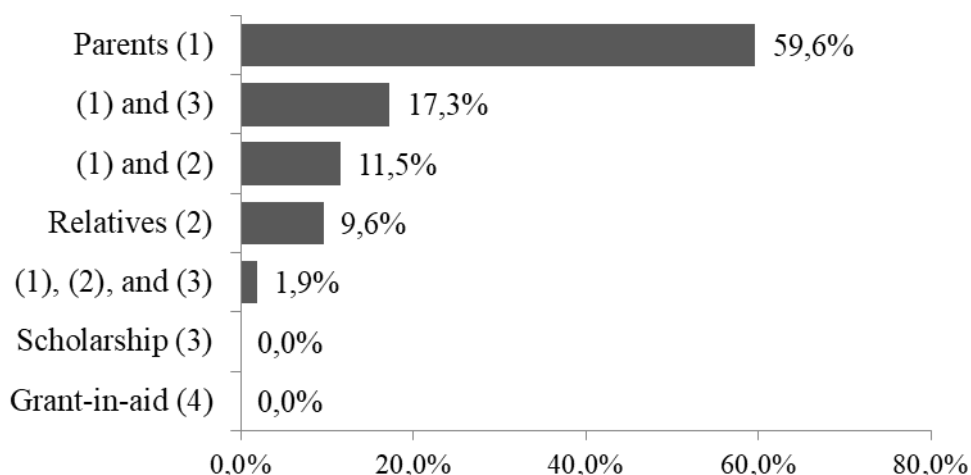
Figure 4. Distribution of BSS students by source of financial support (n=52).

Father's Occupation. Almost 60% of the fathers of the BSS students work in the agriculture and service sectors with the former being the largest group (Figure 5). Close to 20% are in production and related occupations including laborers. In the past, the professional, technical, and related workers group was four times as large in percentage. On the other hand, the present agricultural and related workers group is higher by 9%.

Figure 5. Distribution of BSS students by father's occupation (n=48).
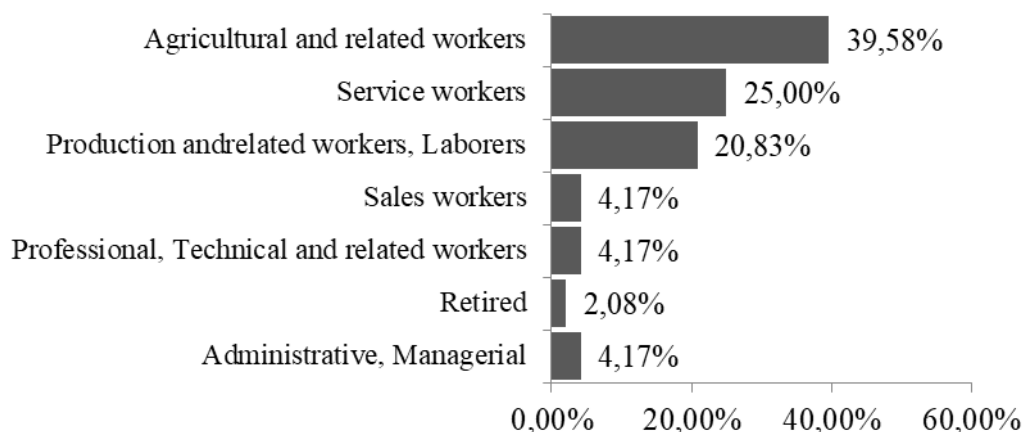
Mother's Occupation. Majority (63.46%) of the mothers are plain housewives (Figure 6). A little over 17% are production and related workers, and laborers. Only about 6% are professional, technical, and related workers which is half of that in the past. On the other hand, the present percentage of production and related workers and laborers is five times the past.
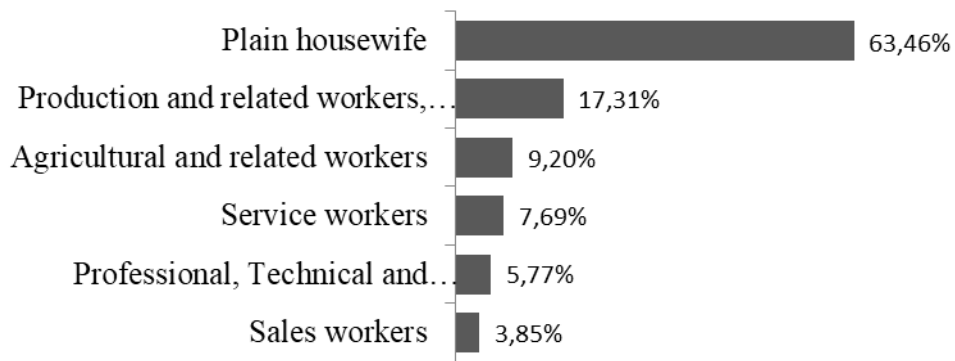
Figure 6. Distribution of BSS students by mother's occupation (n=52).

Annual Family Income. Annual family income and occupation of parents are associated. About 56% of the BSS students' annual family incomes are less than or equal to P60,000 (Figure 7). The parents with these incomes work in either the agriculture or service sector. BSS students whose annual family incomes range from P60,001 to P84,000 (13.46%) have parents who are production and related workers or sales workers. Close to one-third (30.77%) of the BSS students have annual family incomes of at least P84,001. These are the BSS students whose parents are professionals, or have administrative or managerial jobs, or enjoying sizeable retirement benefits.
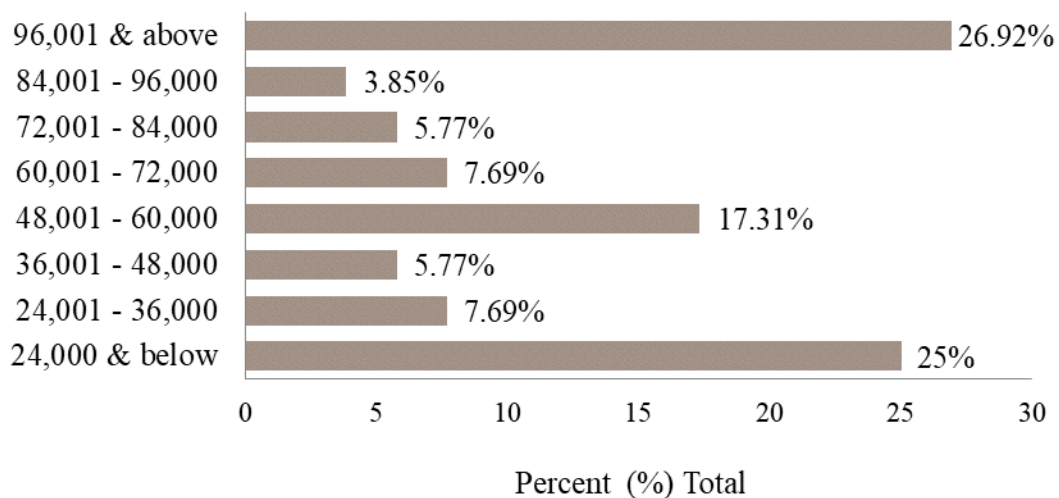
Figure 7. Distribution of BSS students by annual family income (n=52).

The average number of family members of the BSS students surveyed is six. Based on the 2009 poverty threshold, a family of six (6) in Region VIII should have at least P101,046.00 to stay above the poverty line for at least one whole year. In relation to this, close to 80% of the BSS students have annual family incomes below the poverty threshold indicating that the present BSS students belong to poor families, in general.

Scholarship. VSU has many scholarship grants available but only close to one-fifth of the BSS students are enjoying a scholarship grant (Figure 8). This may be

explained by the fact that BSS students continue to find it difficult to maintain their scholarships as they move up the curriculum since they start to obtain either low, incomplete, or failing grades in the fundamental mathematics and major statistics courses.
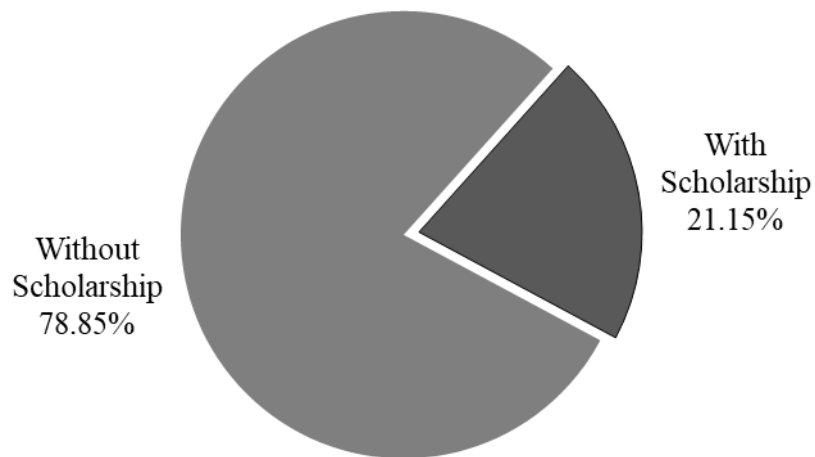
Figure 8. Distribution of BSS students by scholarship status (n=52).

Four (4) types of scholarship grants are enjoyed by the BSS students (Figure 9). The biggest group (5 out of 11) are VSU scholars while close to 30% (3 out 11) are DOST-SEI scholars. Close to 20% (2 out of 11) are CARI scholars while close to 10% (1 out of 11) is an LGU-ORMOC scholars.
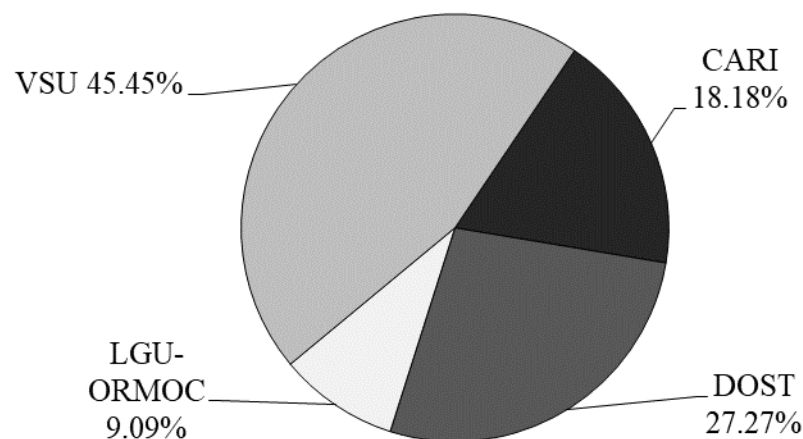
Figure 9. Distribution of BSS students by type of scholarship (n=11).

Semestral Load. Two-thirds of the BSS students officially enrolled in the second semester of SY 2012 – 2013 are regular students (Figure 10). Among the irregular students, close to 90% (30% of the total respondents) have deficiencies or with back subjects while the remaining 10% are either octoberian (started the program in the second semester not the first) or shifter to the program (Figure 11). According to Bryce et al. (2001), statistics degree is a tough program that requires a good

mathematical background. Hence, some students are having difficulty surviving some courses in the program.
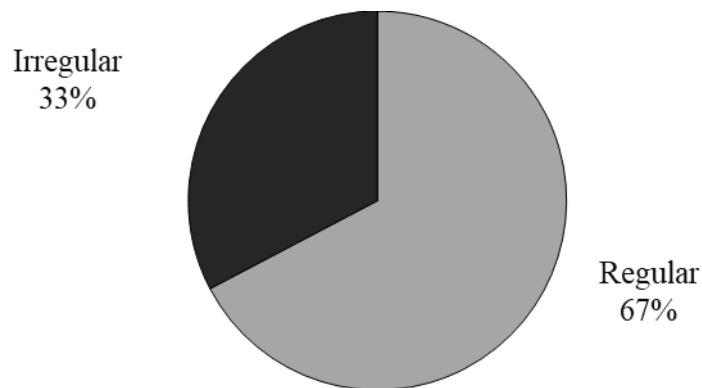
Figure 10. Distribution of BSS students by semestral load (n=52).
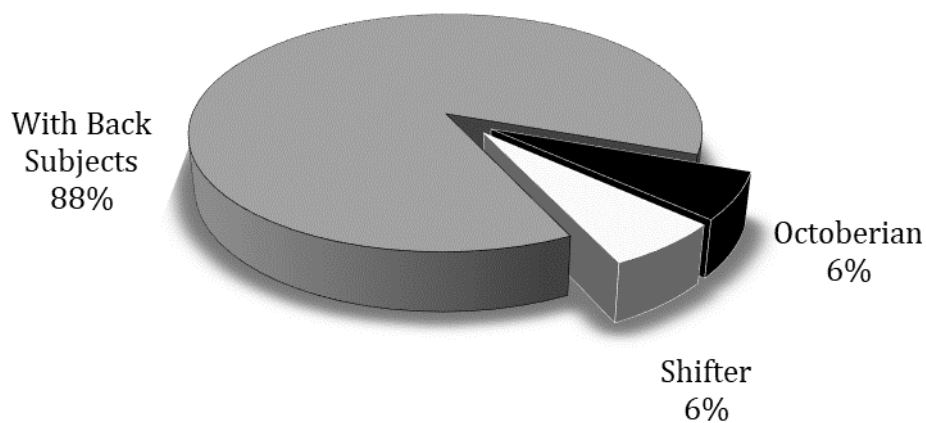
Figure 11. Distribution of irregular BSS students by reason (n=17).

Desired Work in the Future. Majority (63.5%) of the BSS students surveyed want to be employed as a statistician or data analyst in the future (Figure 12). A little over 10% want to teach statistics and related courses and want to work as a computer programmer or data encoder, respectively. Close to 8% want to be a researcher while close to 6% want to work in other fields, like banking. It is worth noting that there are several factors affecting students' career preferences according to the study of Pascual (2014). Hence, one can expect that there are diverse preferences for the desired work in the future.
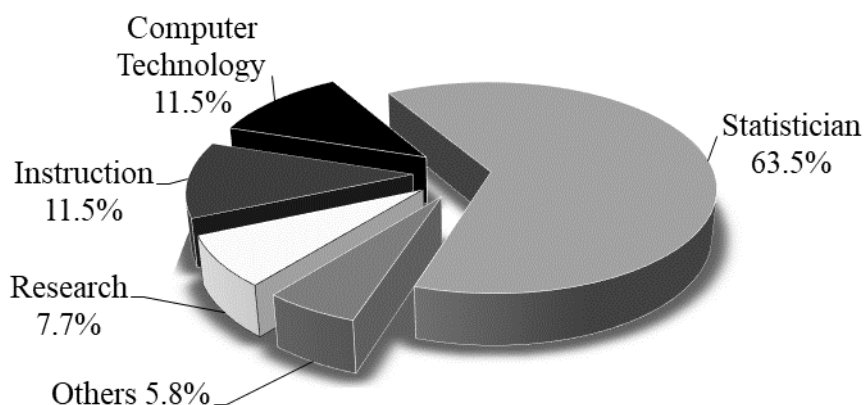
Figure 12. Distribution of BSS students by desired work in the future (n=52).

Factors Influencing Choice of Degree Program and Their Relative Importance

The ranks given by the group of BSS students who started the program since first semester of their first year to the twelve factors perceived to influence their choice of career are presented in Table 1. The ranks given by the group of transferees and shifters to the program are presented in Table 2. Based on the results, at least two factors differ significantly in relative importance for both groups of BSS students at the 1% level using the Friedman two-way analysis of variance by ranks.

Table 1. Mean and median ranks of the twelve factors for BSS students who started in the program since first semester of first year (n=43)

Factor	Relative Importance R_j	Mean Rank	Median Rank
Many job opportunities	R_1	9.91	10.5
Ease in finding a well-paying job	R_2	9.28	9.5
Personal interest	R_3	8.87	9.0
Good name, honor, and prestige associated with career	R_4	8.57	8.5
Chance for overseas employment	R_5	6.86	6.5
Chance for self-employment	R_6	6.66	7.0
Money	R_7	6.51	6.5
Someone admired	R_8	5.57	4.5
Parents	R_9	4.76	3.5
Relatives	R_{10}	4.14	3.0
Close friends	R_{11}	3.44	2.5
High school teacher	R_{12}	3.43	3.0

Table 2. Mean and median ranks of the twelve factors for the group of transferees and shifters to the program (n=9)

Factor	Relative Importance S_j	Mean Rank	Median Rank
Many job opportunities	S_1	9.67	10.00
Personal interest	S_2	9.50	9.00
Ease in finding a well-paying job	S_3	8.50	8.50
Good name, honor, and prestige associated with career	S_4	8.17	9.00
Chance for overseas employment	S_5	7.67	8.50
Someone admired	S_6	7.39	9.00
Chance for self-employment	S_7	6.72	7.00
Money	S_8	5.56	5.00
Parents	S_9	4.44	3.00
Close friends	S_{10}	4.39	3.50
Relatives	S_{11}	3.22	3.00
High school teacher	S_{12}	2.78	2.50

The ranking of the factors influencing the choice of degree program of the present BSS students who started in the program since first semester of their first year is more or less the same as that of the past BSS students. Exceptions are "chance for self-employment" which now ranks fifth from being sixth in the past; "chance for overseas employment" which now ranks sixth from being the fifth in the past; "money" which now ranks seventh from being eighth in the past; and "someone admired" which now ranks eighth from being the seventh in the past. The ranking of the factors influencing the choice of degree program of the present BSS students who are transferees and shifters to the program is the same as that of the past BSS students. Exceptions are "someone admired" which now ranks fourth from being seventh in the past; "good name, honor, and prestige" which now ranks fifth from being fourth in the past; "chance for self-employment" which now ranks seventh from being fifth in the past; "close friend" which now ranks ninth from being tenth in the past; "parents" which now ranks tenth from being ninth before; "relatives" which now ranks eleventh from twelfth; and "high school teacher" which now ranks twelfth from being eleventh in the past. Pairwise comparison of the mean ranks given by the group of BSS students who started in the program since first semester of their first year using the Friedman multiple comparison procedure resulted to three groupings of the twelve factors (Table 3) while the same pairwise comparison procedure applied on the mean ranks given by the group of transferees and shifters to the program also resulted to three distinct groupings of the factors (Table 4). For the group of BSS students who started in the program since first semester of their first year, items R_1 (many job opportunities), R_2 (ease in finding a well-paying job), R_3 (personal interest), and R_4 (good name, honor, and prestige associated with career) are equally ranked first. These were followed by R_5 (chance for overseas employment), R_6 (chance for self employment), R_7 (money), and R_8 (someone admired) which are equally ranked second. The least important factors were R_9 (parents), R_{10} (relatives), R_{11} (close friends), and R_{12} (high school teacher) which are

equally ranked third and last. This results are in line to the findings of Pascual (2014) that students' preferences are governed with different factors depending on the students' perspectives. Likewise, Zou (2017) stated that being a student in statistics has a diverse view in the era of big data which influences job preference and interest.

Table 3. Relative importance of the twelve factors for those who started in the program since first semester of their first year based on the Friedman multiple comparison procedure (n=43)

Relative Importance	Ordered Factor, R_j
First	R_1, R_2, R_3, R_4
Second	R_5, R_6, R_7, R_8
Third	$R_9, R_{10}, R_{11}, R_{12}$

For the group of transferees and shifters to the program, items S_1 (many job opportunities), S_2 (personal interest), S_3 (ease in finding a well-paying job), S_4 (good name, honor, and prestige), and S_5 (chance for overseas employment) were equally ranked first. These were followed by S_6 (someone admired), S_7 (chance for self employment), and S_8 (money) equally ranked second. The last group consisting of S_9 (parents), S_{10} (close friends), S_{11} (relatives), and S_{12} (high school teacher) were equally ranked third.

Table 4. Relative importance of the twelve factors for transferees and shifters to the program based on the Friedman multiple comparison procedure (n=9)

Relative Importance	Ordered Factor, S_j
First	S_1, S_2, S_3, S_4, S_5
Second	S_6, S_7, S_8
Third	$S_9, S_{10}, S_{11}, S_{12}$

.

Comparison of the Influential Factors on Choice of Degree Program Between Two Groups of BSS Students

The median ranks of the factors perceived to influence the choice of degree program of the two groups of BSS students in the present time are shown in Table 5. The two groups of BSS students gave the same median rank on the first (personal interest), the third (relatives), and the eleventh (chance for self-employment) factors. Other factors in the list received more or less the same median ranks. The Kendall's rank-order correlation coefficient was computed to be 0.624 and was found to be highly significant ($\alpha = 0.01$). That is, there is a relatively moderate agreement between the ranks of the factors as rated by the two groups of BSS students.

Table 5. Median ranks of factors influencing choice of degree program as rated by two groups of BSS students

Factor	Median Rank	
	X	Y
1. Personal interest	9.0	9.0
2. Parents	3.5	3.0
3. Relatives	3.0	3.0
4. High school teacher	3.0	2.5
5. Close friends	2.5	3.5
6. Money	6.5	5.0
7. Someone admired	4.5	9.0
8. Many job opportunities	10.5	10.0
9. Ease in finding a well-paying job	9.5	8.5
10. Chance for overseas employment	6.5	8.5
11. Chance for self-employment	7.0	7.0
12. Good name, honor, and prestige associated with career	8.5	9.0

Note: X – BSS students who started in the program since first semester of first year (n=43)
            Y – Transferees and shifters to the BSS program (n=9)

When the Decision to Pursue the BSS Program Was Made

Majority (67.3%) of the present BSS students decided to pursue their degree program before entering college (Fig. 13). Close to one-fifth decided on their first semester, first year college while close to 8% decided on their second semester in second year college. The remaining 6% decided on their second year in college.

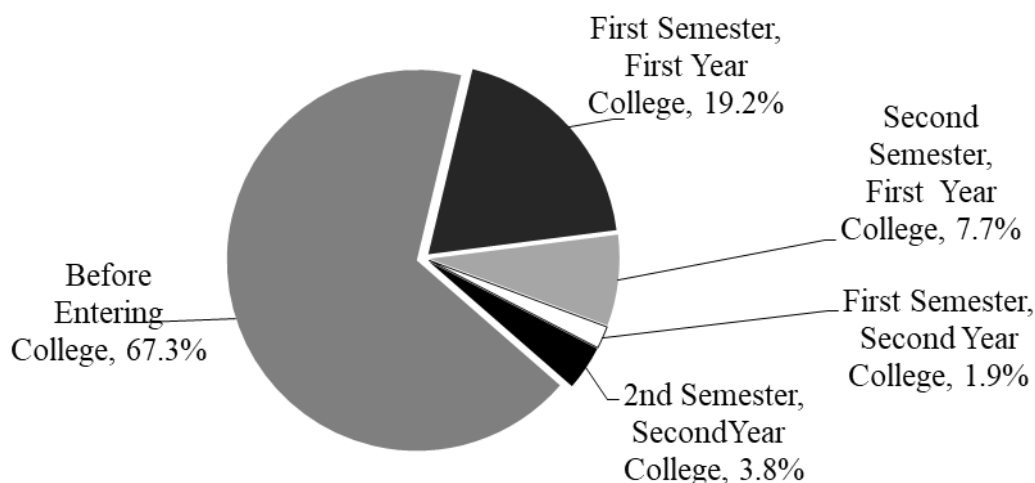Figure 13. Distribution of BSS Students by time of decision to pursue the BSS program (n=52).

Majority of the past BSS students also decided to pursue the BSS program before entering college but the percentage is 8% lower than that of the present BSS students. The percentage of the present BSS students who decided to pursue the program in the first semester of their first year is 2.7% higher than that of the past

while the percentage of those who decided in the second semester of their first year, first semester of their second year, and second semester of their second year are lower than those of the past. Also, some of the past BSS students decided to pursue the BSS degree program beyond second year college.

Comparison of Year Level Distribution of the Present BSS Students to the past

There was a highly significant decrease in the proportion of first year BSS students, from 0.418 (past) down to 0.17 (present) based on the Z test, indicating lower enrolment in the program at present compared to the past (Table 6). However, there was a significant increase in the proportion of fourth year BSS students, from 0.132 (past) to 0.29 (present). Although there is always the decline in proportion from third year to fourth year, this observed increase between the two periods is due to the presence of more irregular students from third year to fourth year in the present period.

Table 6. Relative frequency distribution of past and present BSS students by year level

Year Level	Past (2002)	Present (2013)	Z_c	p-value
First Year	0.418	0.17	3.0391**	0.0024
Second Year	0.176	0.21	-0.5002^{ns}	0.6169
Third Year	0.275	0.33	-0.6938^{ns}	0.4878
Fourth Year	0.132	0.29	-2.3194*	0.0204

Note: * – Significant at the 5% level (2-tailed)
    ** – Significant at the 1% level (2-tailed)
    ns – not significant

Comparison of Sex Distribution of the Present BSS Students to the past

The proportions of female and male BSS students at the present and the proportions of female and male BSS students in the past are not significantly different based on the Z test (Table 7). This further shows that the BSS program remains a female territory up to the present.

Table 7. Relative frequency distribution of past and present BSS students by sex

Sex	Past (2002)	Present (2013)	Z_c	p – value
Male	0.34	0.23	1.392532^{ns}	0.1638
Female	0.66	0.77	-0.75132^{ns}	0.1540

Note: ns – not significant

Comparison of Region of Origin of the Present BSS Students to the past

There is a significant difference between the proportion of BSS students at present who are from Region VIII and the proportion of BSS students in the past who are from Region VIII based on the Z test (Table 8). The proportion of BSS students at present who are not from Region VIII and the proportion of BSS students on the past who are not from Region VIII are not significantly different.

Table 8. Relative frequency distribution of past and present BSS students by region of origin

Region Of Origin	Past (2002)	Present (2013)	Z_c	p –value
Region VIII	0.813	0.96	-2.4859[*]	0.0129
Outside Region VIII	0.187	0.04(a)	0.3976[ns]	0.6909

Note: * – Significant at the 5% level (2-tailed)
    ns – not significant
    a – Region VII only

The significant increase in the proportion of BSS students from Region VIII may be explained by the increased favorable public image of VSU in the region as a premier university and yet inexpensive. Also, the present BSS students all come from the Visayas while in the past, there were a sizeable number of BSS students from Luzon and Mindanao.

Comparison of Source of Financial Support of Present BSS Students to the Past

There is no significant difference between the past and present BSS students with respect to proportion who get financial support from their parents alone (Table 9). Likewise, the proportions of BSS students at present with two or more sources of financial support are not significantly different from the proportions of BSS students in the past with two or more sources of financial support. There is also no significant difference between the proportions of present and past BSS students who depend solely on their relatives to go to college.

Table 9. Relative frequency distribution of past and present BSS students by source of financial support

Source Of Financial Support	Past (2002)	Present (2013)	Z_c	p – value
Parents	0.670	0.596	0.88853[ns]	0.3743
Parents and Scholarship Grant	0.110	0.173	-1.06754[ns]	0.2857
Parents and Relatives	0.044	0.115	-1.60267[ns]	0.1090
Parents, Relatives, and Scholarship Grant	0.033	0.019	0.48894[ns]	0.6249
Relatives	0.077	0.096	-0.39422[ns]	0.6934

Note: ns – not significant

Comparison of Scholarship Status of the Present BSS Students to the Past

The proportions of the present BSS students with and without scholarship are not significantly different from those in the past based on the Z test (Table 10). This may be because the BSS students continue to find it hard to maintain high grades, after the freshman year, due to the increasing level of difficulty of the courses in the BSS curriculum.

Table 10. Relative frequency distribution of past and present BSS students by scholarship status

Scholarship	Past (2002)	Present (2013)	Z_c	p - value
With	0.198	0.1923	0.08261^{ns}	0.9342
Without	0.802	0.8077	-0.08261^{ns}	0.9342

Note: ns – not significant

Comparison of Semestral Load of the Present BSS Students to the Past

The proportions of BSS students with regular and irregular loads at present are not significantly different from those in the past (Table 11). This may be explained by still having same kind of students from the past due to the same enrolment policy practiced.

Table 11. Relative frequency distribution of past and present BSS students by semestral load

Semestral Load	Past (2002)	Present (2013)	Z_c	p – value
Regular	0.604	0.67	-0.78550^{ns}	0.4322
Irregular	0.396	0.33	0.78550^{ns}	0.4322

Note: ns – not significant

Comparison of Reasons for Irregular Status of the Present BSS Students to the Past

The difference between the present proportion of BSS students with deficiencies or back subjects and the proportion of past BSS students with deficiencies or back subjects is highly significant whereas the proportions of shifters are not significantly different (Table 12).

Table 12. Relative frequency distribution of past and present BSS students by reason for irregular status

Reason	P_1 (Past)	P_2 (Present)	Z_c	p - value
With back subjects	0.50	0.88	-4.54905^{**}	0.0000
Shifter	0.06	0.06	-1.45084^{ns}	0.1468

Note: ** – Significant at the 1% level (2-tailed)
    ns – not significant

The past proportion is significantly less than the present proportion since there are more reasons for irregularity in the present than in the past. These reasons include being a shifter, failing in certain courses, having taken courses in advance, and being a returnee.

Comparison of the Father and Mother's Occupations of the Present BSS Students to the Past

The proportion of the present BSS students whose father is a professional, technical, or related worker and that of the past differ significantly based on the Z test (Table 13). Proportions in the other occupations for the past and present BSS students are not significantly different. For the various occupations of a mother of a BSS student, there is no proportion that significantly differs from another (Table 14).

This implies that the BSS students' family financial status then is not significantly different from the BSS students' family financial status now.

Table 13. Relative frequency distribution of past and present BSS students by father's occupation

Father's Occupation	Past (2002)	Present (2013)	Z_c	p – value
Agriculture	0.275	0.3654	-1.12653^{ns}	0.2599
Service Sector	0.220	0.2308	-0.14902^{ns}	0.8815
Production and Related Workers, Laborer	0.176	0.1923	-0.24305^{ns}	0.8080
Professional, Technical and Related Worker	0.154	0.0385	2.10679^{ns}	0.0351
Administrative, Managerial	0.022	0.0192	0.11238^{ns}	0.9105
Sales	0.011	0.0385	-1.10328^{ns}	0.2699

Note: ns – not significant

Table 14. Relative frequency distribution of past and present BSS students by mother's occupation

Mother's Occupation	Past (2002)	Present (2013)	Z_c	p – value
Agriculture	0.033	0.0920	-1.49571^{ns}	0.1347
Service Sector	0.099	0.0769	0.44210^{ns}	0.6584
Production and Related Workers, Laborer	0.121	0.1731	-0.86387^{ns}	0.3877
Professional, Technical and Related Worker	0.121	0.0577	1.22484^{ns}	0.2206
Plain Housewife	0.505	0.6346	-1.49921^{ns}	0.1338
Sales	0.044	0.0385	0.15773^{ns}	0.8747

Note: ns – not significant

Comparison of the Desired Work in the Future of the Present BSS Students to the Past

The difference between the proportions of BSS students who want to work as a statistician or data analyst in the past and in the present is highly significant based on the Z test (Table 15). This may be due to the increased student awareness about the field of statistics in recent years from educational field trips to statistical agencies and motivation from the faculty who finished advanced degrees in statistics recently.

Table 15. Relative frequency distribution of past and present BSS students by desired work in the future

Work	P_1(Past)	P_2(Present)	Z_c	p – value
Statistician	0.33	0.635	-3.53377^{**}	0.0004
Computer Programmer	0.253	0.115	1.93133^{ns}	0.3517
Instructor	0.132	0.115	0.29487^{ns}	0.7681
Researcher	0.110	0.077	0.63849^{ns}	0.5232

Note: ** – Significant at the 0.01 level (2-tailed)
    ns – Not significant

Agreement between the Past and Present BSS Students' Ranking of Factors Influencing Choice of Degree Program

The median ranks of the twelve (12) factors perceived to influence choice of degree program given by the past and present BSS students who started the program since first semester of first year and by the past and present BSS students who are transferees and shifters to the program are presented in Table 16 and Table 17, respectively.

Table 16. Median ranks of twelve influential factors on choice of degree program given by the past and present BSS students who started in the program since first semester of first year

FACTOR	MEDIAN RANKS	
	Past (n=79)	Present (n=43)
Personal interest	4.50	9.00
Parents	8.50	3.50
Relatives	9.50	3.00
High school teacher	9.50	3.00
Close friends	10.00	2.50
Money	7.50	6.60
Someone admired	8.00	4.50
Many job opportunities	3.00	10.50
Ease in finding a well-paying job	4.00	9.50
Chance for overseas employment	5.50	6.50
Chance for self-employment	5.50	7.00
Good name, honor, and prestige associated with career	5.00	8.50

Table 17. Median ranks of twelve influential factors on the choice of degree program given by past and present transferees and shifters to the BSS program

FACTOR	MEDIAN RANK	
	Past (n=11)	Present (n=9)
Personal interest	3.00	9.00
Parents	9.50	3.00
Relatives	9.75	3.00
High school teacher	9.75	2.50
Close friends	9.25	3.50
Money	9.00	5.00
Someone admired	6.25	9.00
Many job opportunities	3.00	10.00
Ease in finding a well-paying job	3.00	8.50
Chance for overseas employment	6.00	8.50
Chance for self-employment	5.25	7.00
Good name, honor, and prestige associated with career	3.75	9.00

The degree of association between the median ranks of the 12 factors influencing the choice of degree program given by the past and present BSS students who started in the program since first semester of first year is presented in Table 18. A Kendall rank-order correlation coefficient T of 0.899 suggests a relatively strong agreement between the median ranks on the factors as rated by the past and present BSS students who started the in program since first semester of first year. Furthermore, this correlation coefficient is significant at the 1% level. The coefficient of determination suggests that approximately 81% of the variation in the median ranks can be attributed to this grouping. A similar degree of association is observed between the median ranks of the 12 factors influencing the choice of degree program of the BSS students as rated by the past and present transferees and shifters to the program (Table 18). The Kendall rank-order correlation coefficient of 0.882 implies that there is a relatively strong agreement between the median ranks of the factors given by the past and present transferees and shifters to the program. Moreover, this correlation coefficient is significant at the 1% level and indicates that about 78% of the variation in the median ranks can be attributed to the composition of the two groups.

Table 18. Association between the median ranks of twelve factors as rated by the past and present BSS students by type of student

Type of Student	Kendall's T	p-value	Coefficient Of Determination
Started since first semester of first year	0.899**	<0.001	0.808
Transferee or shifter	0.882**	0.001	0.778

Note: ** - Correlation is significant at the 0.01 level (2-tailed)

Past and Present Correlation Coefficients on the Ranks of Factors Influencing Choice of Degree Program

In the past study of BSS students (Marfori, 2002), a Kendall rank-order correlation coefficient T of 0.841 (n=91) was computed measuring the degree of agreement between the median ranks of the 12 factors influencing choice of degree program given by the two groups of BSS students: (1) those who started the program since first semester of first year and (2) those who are transferees and shifters to the program. In this study, the same was done and Kendall's T turned out to be 0.624 (n=52). The Z test on the difference of the two correlation coefficients yielded an observed value of -2.766. The null hypothesis of no difference between the two correlation coefficients in the population can be rejected with confidence since the test is non-directional and the critical Z value for $\alpha/2=0.025$ is 1.96. Hence, the two groups of BSS students in the past agree more on the relative importance of the 12 factors said to influence their decision to take up BSS compared to the present BSS students.

Graduation Rate of BSS Students at VSU for Freshman Batches, SY 1998-1999 to SY 2009-2010

The number of BSS students enrolled as first year in the first semester of a school year was the basis for determining the graduation rate of each batch (Table 19). Those who completed the program either finished in exactly four years or longer (at most six years) for as long as they did not stop schooling. On the other hand, those who did not complete the program either shifted to another degree program at VSU or stopped schooling or transferred to another school. However, it cannot be determined whether they transferred to another school or stopped schooling. This findings shows that a BSS student must have a right attitude and literacy towards statistics to survive the degree program (Legaki et al., 2020; Repedro & Diego, 2021)

Table 19. Summary table on the number of students who enrolled on their first semester as BSS and finished the program in four years and beyond, SY 1998-1999 to SY 2009-2010

School Year	Number of First Year Students (a)	Number who Shift	Number who Transferred / Stopped Schooling	Number who Graduate In Four Years (b)	Number who Graduate in more than Four Years	Graduation Rate (b / a, %)
ViSCA						
1998-1999	**41**	**10**	**18**	**5**	**8**	**12.2**
Male	12			2		16.7
Female	29			3		10.3
1999-2000	**40**	**7**	**18**	**12**	**3**	**30.0**
Male	13			3		23.1
Female	27			9		33.3
2000-2001	**44**	**10**	**22**	**10**	**2**	**22.7**
Male	16			4		25
Female	28			6		21.4
LSU						
2001-2002	**44**	**6**	**22**	**13**	**3**	**29.5**
Male	13			4		30.8
Female	31			9		29.0
2002-2003	**22**	**2**	**14**	**4**	**2**	**17.4**
Male	9			0		00.0
Female	13			4		30.8
2003-2004	**31**	**2**	**22**	**2**	**5**	**6.3**
Male	14			2		14.3
Female	17			0		00.0
2004-2005	**22**	**3**	**12**	**5**	**2**	**22.7**
Male	10			2		20.0
Female	12			3		25.0
2005-2006	**16**	**0**	**9**	**5**	**2**	**29.5**
Male	6			1		16.7
Female	10			4		40.0
2006-2007	**9**	**1**	**5**	**3**	**0**	**33.3**
Male	5			1		20.0
Female	4			2		50.0
VSU						
2007-2008	**14**	**2**	**4**	**7**	**1**	**50.0**
Male	7			3		42.9
Female	7			4		57.1
2008-2009[c]	**10**	**1**	**4**	**3**	**1**	**30.0**
Male	5			1		20.0
Female	5			2		40.0

School Year	Number of First Year Students (a)	Number who Shift	Number who Transferred / Stopped Schooling	Number who Graduate In Four Years (b)	Number who Graduate in more than Four Years	Graduation Rate (b / a, %)
2009-2010c	**10**	**0**	**5**	**2**	**0**	**20.0**
Male	3			1		33.3
Female	7			1		14.3

Note: c – Some students are still in the program at the time of the study.

The number of first year BSS students declined over the years. The number of first year BSS students started to level off when ViSCA became LSU in SY 2001-2002 and started to decline starting SY 2002-2003 when B. S. in Computer Science was first offered at VSU. Enrolment in the BSS program further declined in SY 2005-2006 when B. S. in Geodetic and Geomatic Engineering was first offered at VSU. However, there appears to be no correlation between enrolment in the program and graduation rate. The number of BSS students who shifted to another degree program relative to the number of first year BSS students was greater when it was still ViSCA compared to the years that followed. This may be due to the larger fraction of undecided freshmen during this time compared to the following years. Of the three school years when 22 BSS students stopped schooling or transferred to another school, SY 2003-2004 has the highest percentage of students who transferred or stopped schooling which in turn made the said school year the lowest in terms of graduation rate. SY 2007-2008 (now VSU) may have the highest graduation rate of 50% but it also belongs to the bottom four in terms of enrolment in the BSS program. Every year, female students dominate the BSS population from first year (except SY 2006 – 2007) until graduation (except SY 2003 – 2004). Though there are shifters almost every year, in SY 2005-2006 not one BSS student shifted but more than half stopped schooling or transferred to another school. In the period covered, half of the graduation rate of the BSS students are below 26.1% with a mean of 25.3%. Graduation rate is indeed variable with a coefficient of variation of 42.5% during this period. Figure 14 shows fluctuations in the graduation rate of BSS students covering freshman batches from SY 1998-1999 to SY 2009-2010. Clearly, the range of the graduation rate, from 6.3% to 50.0%, is relatively low for a degree program. The movement of the graduation rate into the future is not promising. It is expected, however, that for a smaller group of freshmen, the graduation rate will tend to be higher. In the findings of Casinillo and Miñoza (2020), it is stated that there are only few BSS students in VSU has high level of intelligence and numerical aptitude. Thus, this also explains the low graduation rate in the BSS program at VSU aside from low number of students enrolling the program. This finding is in consonant to the study of Kang and García Torres (2021) that deals with low graduation rate of minority students. Additionally, in the study of Casinillo (2019) and Casinillo et al. (2020) there are different factors affecting the failure in mathematics in the university. Hence, students must have diligence, good study habits, interest, analytical mind, logical reasoning ability, and mathematical and problem-solving skills (Mutambayi et al., 2016; Casinillo & Aure, 2018; Casinillo & Miñoza, 2020).
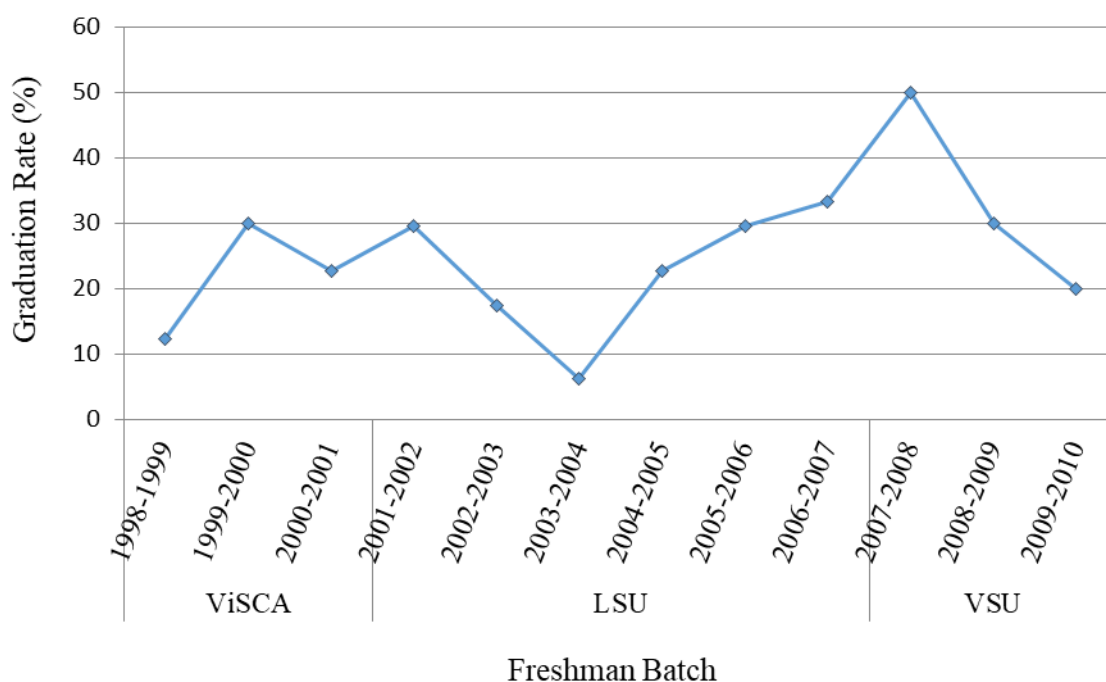
Figure 14. Graduation Rate of BSS students at VSU for freshman batches from SY 1998-1999 to SY 2009–2010.

Conclusion

Based on the current profile of the BSS students, a heterogeneous group of students are admitted to the program under the open enrolment policy of VSU. Such mixture is expected under an open enrolment policy where there is no control on the quality of students getting in the program. On the selected characteristics studied, the present BSS students are not significantly different from the past BSS students, in general. This can be explained by the same enrolment followed in admitting the past and present students to the BSS program. The graduation rate of BSS students under the open enrolment policy of VSU is very much dependent on the quality of the freshmen batch. The smaller is this group, the higher will be the graduation rate, in general. Concrete actions on the recruitment of students to the BSS program must be made considering the most influential factors on choice of degree program given by the BSS students.

References

Bernal, V. T., Camara, J., Buted, D. R., & Mejia, R. A. (2019). Comparative employment applicability and reflectivity of profiled culinary booklets of hospitality management students: An input for work eFolio. *Asian Journal of Multidisciplinary Studies*, *2*(2), 140-144.

Bryce, G. R., Gould, R., Notz, W. I., & Peck, R. L. (2001). Curriculum guidelines for Bachelor of Science degrees in statistical science. *The American Statistician,* *55*(1), 7–13. https://doi.org/10.1198/000313001300339879

Casinillo, L., & Aure, M. R. K. (2018). Econometric evidence on academic performance in basic calculus of science, technology, engineering and

mathematics (STEM) senior high students. *Journal of Educational and Human Resource Development*, *6*, 238-249.

Casinillo, L. (2019). Factors affecting the failure rate in mathematics: the case of Visayas State University (VSU). *Review of Socio-Economic Research and Development Studies*, *3*(1), 1-18.

Casinillo, L., Camulte, M. C., Raagas, D., & Riña, T. S. (2020). Cultural factors in learning mathematics: the case on achievement level among Badjao students. *International Journal of Indonesian Education and Teaching (IJIET)*, *4*(1), 71-81.

Casinillo, L. F., & Miñoza, S. B. (2020). The suitability of students in Bachelor of Science in Statistics (BSS) program. *Journal of Education Research and Evaluation*, *4*(4), 343-351.

Cuadra, L. J., Aure, M. R. K. L., & Gonzaga, G. L. (2019). The use of tracer study in improving undergraduate programs in the university. *Asia Pacific Higher Education Research Journal (APHERJ)*, *6*(1), 13-25.

David, A. P., Reyes, Z. Q., Miranda, P. A., Nalipay, M. J. N., Ancho, I. V., & Roxas, M. M. (2020). Graduate teacher education in the Philippines: Observations and pospects. *The Normal Lights*, *14*(2), 248-271.

Fienberg, S. E. (2007). Memories of election night predictions past: Psephologists and statisticians at work. *Chance*, *20*(4), 8-17.

Guilloux, A. G. A., Ramos, J. A., Citron, I., Roa, L., Amundson, J., Massenburg, B. B., ... & Scheffer, M. C. (2019). Profiling recent medical graduates planning to pursue surgery, anesthesia and obstetrics in Brazil. *BMC medical education*, *19*(1), 1-8.

Kang, C., & García Torres, D. (2021). College undermatching, bachelor's degree attainment, and minority students. *Journal of Diversity in Higher Education*, *14*(2), 264.

Legaki, N. Z., Xi, N., Hamari, J., Karpouzis, K., & Assimakopoulos, V. (2020). The effect of challenge-based gamification on learning: An experiment in the context of statistics education. *International journal of human-computer studies, 144*, 102496. doi:10.1016/j.ijhcs.2020.102496

Lovaglio, P. G., Cesarini, M., Mercorio, F., & Mezzanzanica, M. (2018). Skills in demand for ICT and statistical occupations: Evidence from web-based job vacancies. *Statistical Analysis and Data Mining: The ASA Data Science Journal*, *11*(2), 78-91.

Marfori, F. O. (2002). *Characteristics of BSS students under the open enrolment policy of LSU.* Undergraduate Special Problem, Leyte State University, Visca Baybay Leyte, Philippines.

Meng, X. L. (2018). Conducting highly principled data science: A statistician's job and joy. *Statistics & Probability Letters*, *136*, 51-57.

Mutambayi, R. M., Odeyemi, A. S., Ndege, J. O., Mjoli, Q. T., & Qin, Y. (2016). A statistical analysis of students' attitudes towards statistics: A case study of undergraduate bachelor of science students at the University of Fort Hare. *International Journal of Educational Sciences, 14*(3), 294– 303. https://doi.org/10.1080/09751122.2016.11890504

Nor, M. Z. M., Rahim, A. F. A., Pa, M. N. M., & Baharuddin, K. A. (2020). Profiling of medical graduates of Universiti Sains Malaysia: What the Data Said. *Education in Medicine Journal*, *12*(1), 53-63.

Owoseni, A., Ibem, E., & Opoko, A. (2020). Socio-economic profiling of students and its impact on learning outcomes. *International Journal of Emerging Technologies in Learning (iJET)*, *15*(19), 213-222.

Pascual, N. T. (2014). Factors affecting high school students' career preference: A basis for career planning program. *International Journal of Sciences: Basic and Applied Research, 16*(1), 1–14. http://www.academia.edu/download/55816217/2261-4881-1-PB_1.pdf

Pongsena, S. (2014). A follow–up study of bachelor of science graduates in applied statistics from Suan Sunandha Rajabhat University during the 1999-2012 Academic Years. *International Journal of Information and Communication Engineering*, *8*(7), 2241-2243.

Reid, N. (2018). Statistical science in the world of big data. *Statistics & Probability Letters*, *136*, 42-45.

Repedro Jr, R. E., & Diego, C. V. (2021). Attitudes toward statistics and statistical literacy of public senior high school students. *Philippine Social Science Journal, 4*(3), 48-56.

Shi, J. Q. (2018). How do statisticians analyse big data—Our story. *Statistics & Probability Letters*, *136*, 130-133.

Scott, G., & Wilson, D. (2002). Tracking and profiling successful IT graduates: An exploratory study. ACIS 2002 Proceedings. Retrieved from https://aisel.aisnet.org/acis2002/92/

ViSCA Code. (1974). *Visayas state college of agriculture.* Baybay, Leyte Philippines.

Zou, K. H. (2017). View from a woman statistician and data scientist in the era of big data. *AMSTAT news: the membership magazine of the American Statistical Association*, (477), 28-30.