DOES PARTICIPATION IN PEER ASSISTED STUDY SESSIONS IN THE ENTRY YEAR IMPROVE THE ACADEMIC PERFORMANCE OF STUDENTS? A CASE STUDY IN ODL

G. Bandarage[1], E.A.D.N.D. Edirisinghe[2], J.C.N. Rajendra[3], K.D.V.F. Siriwardana[4*], R.U. Tantrigoda[1], J. Wattavidanage[2]

[1]Department of Chemistry, [2]Department of Zoology, [3]Department of Physics, [4]Department of Mathematics, The Open University of Sri Lanka

INTRODUCTION

Peer Assisted Study Sessions (PASS) is a well-established supplemental instruction scheme practiced in various forms in more than 1000 higher education institutions in 29 countries (Power, 2010). The objective of a PASS programme is to render support to students in a group setting where they share their educational experiences, problems and successes, which will help to build sound study habits and will lead to improve the overall academic performance of the student. In the PASS model, the group discussions are led by one or two senior students of high academic standing (which brings in the role model element) who have also followed a similar learner support. The role of such peer leader is to show how a good student learns by guiding the peer students in finding out solutions to subject related problems. The environment of a PASS session is deliberately made informal so that students can admit ignorance and misconceptions and seek information, advice and remedy, without fear of jeopardizing their academic performance (Topping, 1996).

A hallmark of a quality ODL programme is the flexibility in time, the location and the choice of courses given to the learner in completing a study programme. In such a scenario, support given to the learner by the institution plays a crucial role in achieving high success rates. The development of a novel approach to the provision of learner support in the B.Sc. (Natural Sciences) programme, based on well accepted peer learning methodology goes way back to 2010. The faculty has conducted a slightly modified version of PASS sessions in disciplines Botany, Chemistry, Physics and Zoology for two years (2011/2012 & 2012/2013 years) which were held approximately every fortnightly. The faculty developed a variant of PASS where the small group discussions were led by a recently graduated BSc graduate of OUSL accomplished with a class, defined as a Graduate Young Mentor (GYM). GYM was assisted by one or two senior students of good academic standing called a Student Young Mentor (SYM). GYMs and SYMs were trained through periodically conducted 3-day workshops. A study on these PASS sessions in OUSL (Bandarage *et. al*., 2011) has indicated that the PASS programme has been successful in developing good ODL study habits in participants.

The Faculty of Natural Sciences conducted PASS in Level 3 courses amounting to 6 credits in each of the five disciplines Botany, Chemistry, Physics, Pure Mathematics and Zoology in the B.Sc. programme in the academic year 2013/2014. These sessions were held in Colombo, Kandy, Matara and Jaffna Regional Centres of OUSL (namely, CRC, KRC, MRC and JRC, respectively). At the entry students were informed that attendance in 10 out of the 16 PASS sessions offered in a year in one discipline of choice was made compulsory to register for any Level 4 course in the relevant discipline of choice. However later this restriction was removed and all the students were allowed to move forward. The study by Bandarage *et. al*.(2015), have shown that the attendance in PASS in one course in a discipline in the first year, can improve the academic performance not only in the particular course, but also in the other first year courses in all the disciplines.The objective of this study is to find any evidence to support the impact of participation in PASS on accomplishment of the academic goals of students throughout their study in OUSL.

METHODOLOGY

The students who have entered to the B.Sc degree programme at the Faculty of Natural Sciences in 2013/2014 academic year had to complete totally 108 credits, 36 credits for each year of study. Since the students are new to the ODL system, they are being encouraged to register less than 30 credits courses at the first year of study. Hence, it has been observed that a student needs a minimum of 4 academic years to complete the B.Sc. general degree programme. It is recorded that 615 students entered to the BSc degree programme in the academic year 2013/2014 at the CRC. In this study, 61 students who registered in the BSc programme in 2013/2014 academic year in the Colombo Regional Centre have graduated in 2016/2017 academic year were included in the study sample.

Grade Point Average (GPA) was taken as a measure of overall academic performance of a student. GPA was coded into 2 levels (GPA < 3, GPA ≥ 3), used as the response variable. The total set (six) of potential predictors of academic performance of a student included in the study were: attendance at PASS (PASS-Attendance), Gender, General Certificate of Education (Advanced Level) results (as an average index mark giving scoring as 1-S, 2-C, 3-B, 4-A) (AL-IND), the motivation level of the student (IN-Mot) at entry to the B.Sc. programme as measured using a modified version of the questionnaire of Tuan *et al*.,(2005) that was administered on the first day of the Induction programme, students' employment at the entry to the BSc(Employment) and marital status (Marital–S). Categorizations of all predictors were based on Bandarage *et. al*. (2015) other than IN- Mot. IN-Mot was categorized based on the median. Levels of predictor variables are given in Table 1. Descriptive statistics, Chi-square tests, Fisher's exact test, probability plots, Z –test to compare two sample proportions, and Binary Logistic Regression were used to analyse data.

The Binary Logistic Regression model (Agresti, 2013) in Equation 1 was used to fit the multivariate model. All six predictor variables were used as the independent variables in the initial Binary Logistic Regression model and using backward elimination method and then final model was obtained. Minitab Version 14 was used for analysis.

$$Log\left[\frac{Pr(Y=1)}{1-Pr(Y=1)}\right] = (\theta + X'\beta)$$

[Equation 1]

Y – response, Binary variable (0: GPA < 3 , 1 : GPA ≥ 3)
θ = Constant term
X = Vector of predictor variables (6 variables at initial level)
β = The vector of coefficients associated with the predictors

RESULTS AND DISCUSSION

The mean GPA of 61 students who entered in 2013/2014 and have completed BSc degree programme within four years is 2.95, with the standard deviation of 0.44. The observed minimum GPA is 2.08 and the maximum GPA is 3.82. The median GPA is 2.99. Histogram of GPA is given in Figure 1 indicates that one or more factors might associate with GPA. Descriptive Statistics of GPA by predictor variables and results of the Chi Square test of associations are given in the Table 1. Figure 2 gives the scatter plot of GPA vs. Attendance of PASS.

According to Table 1, Attendance to PASS showed by-variate associations with GPA ($p<0.05$). The Figure 2 graphically illustrates the association between GPA and Attendance to PASS. Using Probability plots, found that the GPA of students who attend < 10 PASS sessions follows a Normal distribution with mean 2.55 and Standard Deviation 0.32 ($p = 0.632$) and the GPA of students who attend ≥ 10 PASS sessions follows a Normal distribution with mean 3.04 and Standard Deviation 0.42 (0.399).

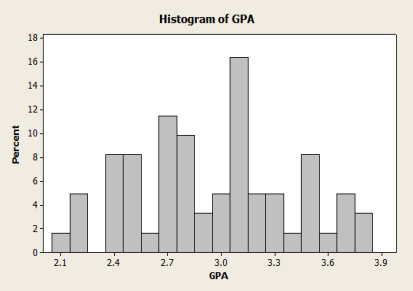

Figure 1: Histogram of GPA

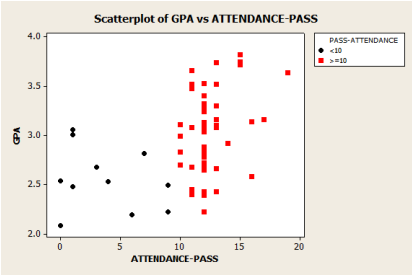

Figure 2: Scatter Plot of GPA vs. PASS attendance

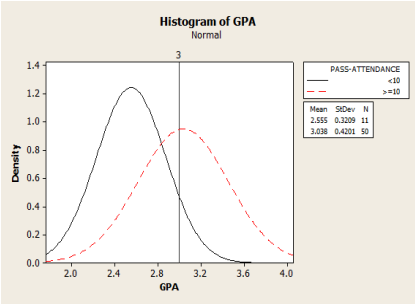

Figure 3: Fitted Normal Distributions for GPA

Table 1: Descriptive statistics by predictor variables and results of Chi- square test *(Null hypothesis: GPA is independent from variable vs Alternative Hypothesis: GPA is associated with variable)*

Factor (p value)	Factor Level	% observations (n)	Mean GPA	SD of GPA	Min GPA	Median GPA	Max GPA
Pass-Attendance (0.02)	< 10 ≥10	18% (11) 82%(50)	2.55 3.03	0.32 0.42	2.08 2.22	2.53 3.08	3.06 3.82
Gender (1.00)	Male Female	21%(13) 79%(48)	2.97 2.95	0.48 0.44	2.19 2.08	2.92 3.00	3.82 3.75
AL-IND (0.84)	1 ≤ AL index ≤ 1.5 1.5 < AL index ≤ 2 2 < AL index ≤ 2.5 2.5 < AL index	44%(24) 45%(25) 7%(4) 4%(2)	2.95 2.95 3.15 2.65	0.46 0.45 0.29 -	2.08 2.22 2.81 2.22	2.86 3.06 3.14 -	3.74 3.82 3.53 3.08
IN-Mot (0.08)	Mot- index < 2 2≤ Mot- index	62%(38) 38%(23)	3.03 2.82	0.46 0.39	2.19 2.08	3.06 2.82	3.82 3.74
Employment (0.50)	Un employed Teacher Other	69%(42) 15%(9) 16%(10)	2.97 2.867 2.93	0.48 0.24 0.42	2.08 2.43 2.40	2.98 2.81 3.08	3.82 3.24 3.75
Marital–S (0.55)	Married Unmarried	5%(3) 95%(57)	3.01 2.96	0.25 0.44	2.82 2.08	2.92 3.01	3.29 3.82

Figure 3 graphically illustrate the results. Z -test for compare two sample proportions were done and found that the probability of a student obtaining a GPA ≥ 3 (out of 4) at graduation is significantly higher if he/she has attended at least 10 PASS sessions in his/her first year ($p < 0.05$), and Fisher's exact test showed associations between GPA and Attendance to PASS.($p = 0.043$). Fitted final multivariate model (Log-Likelihood = -37.763, Test that all slopes are zero: G = 9.022, DF = 2, P-Value = 0.011, Goodness-of-Fit Tests: Pearson-p = 0.443 and Deviance-p = 0.327) is given in Table 2. We have confirmed the positive association of participation in

PASS with overall GPA ($p < 0.05$) using a multivariate analysis, using Binary Logistic Regression.

Table 2: Final Binary Logistic Regression model

Factor	Factor Levels(p-value)	Coefficient	SE	Odds ratio	95% CI
Constant	(0.1)	-1.20	0.80	-	-
Pass-Attendance	< 10(ref) ≥10 (0.03)	1.85	0.85	6.37	1.20 - 33.88
IN-Mot	Mot- index < 2 (ref) 2≤ Mot- index(0.067)	-1.05	0.57	0.35	0.11 - 1.08

CONCLUSIONS/RECOMMENDATIONS

We have enough evidence to support that attending PASS may have a positive impact on students' performance. Hence continuing the PASS programme and encouraging the students to attend more than ten PASS sessions are recommended.

REFERENCES

Agresti, A. (2013). *Categorical Data Analysis (3rd edition.).* Wiley Series in Probability and Statistics, USA: A John Wiley & Sons Publishing.

Bandarage, G., Edirisinghe, E.A.D.N.D., Rajendra, J.C.N., Siriwardena, K.D.V.F., Somerathne, S., Tantrigoda, R.U. & Wattavidanage, J. (2015). *Effectiveness of a modified version of peer-assisted study session in improving academic performance: Proceedings of the Annual Academic Sessions of The Open University of Sri Lanka 2015* (pp.1-4). Sri Lanka: Open University of Sri Lanka

Bandarage G., Fernando, G. W. A. R., Nupearachchi, C. N., Peiris, P. K. D., Rajendra, J. C. N., Siriwardena K. D. V. F., Tantrigoda R. U., Wattavidanage J. & Weerakoon S. R. (2011). *Experience in implementing a student support programme based on the PASS model for BSc undergraduates at the Open University of Sri Lanka, Proceedings of the Annual Academic Sessions of The Open University of Sri Lanka 2011* (pp.56-59). Sri Lanka: Open University of Sri Lanka

Power, C. (2010). Peer assisted study sessions (PASS): through a complexity lens. *Australian Journal of Peer Learning*, 3(1), 1-11

Topping, K. (1996). The effectiveness of peer tutoring in further and higher education: a typology and review of the literature. *Higher Education*, 32(3), 321-345

Tuan, H., Chin, C. & Sheh, S. (2005). The development of a questionnaire to measure students' motivation towards science learning. *International Journal of Science Education*, 27(6), 634-659.

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