An Empirical Analysis of the Relationships among Learning Support Factors and Students’ Learning Outcomes at an Australian University

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Abstract: An Australian university located in Victoria, Australia has a number of types of learning support services. This paper has proposed a conceptual framework of learning support at this university. There are nine factors in the learning support programs to influence the students’ success in their studies. In addition, this paper has determined the significant factors in learning support influencing the students’ learning outcome by applying a statistical analysis (reliability, factor analysis and multiple regression). The finding shows that two factors of learning support (improved understanding and increased motivation) were significantly related to students’ learning outcome.

Key words: learning support, empirical analysis, higher education, improved understanding, increased motivation

1. Introduction

Supplemental Instruction (SI), Peer Assisted Study Sessions (PASS), and other types of learning support services have been adopted by a large number of universities in Australia. One of Australian universities located in Victoria has several types of learning support services. They are Student Learning Advisor Mentor, Study Learning Centre Workshops, Study Learning Centre Drop in service, Study Learning Centre Individual Assistance, International Student Information and Support (ISIS). These types of learning support at this university provide supports for assignments, study and reading, writing skills, time management and planning and achieving study results. In order to better understand the factors affecting students’ learning outcome using the learning support programs, a conceptual framework of learning support has been proposed. A survey has been conducted and data have been analyzed by applying a statistical analysis method. This paper discusses the findings of the survey following literature review, the research question and objective, the development of conceptual framework, research design and method.

2. Literature Review

There is an extensive literature on enhancing and supporting student learning. Rivers (2005) has developed...
body of work on the impact of student learning support programs with a total of 146 international studies on the topic (Rivers, 2005). It is recognized that there is a need to ensure that robust and coherent measures are in place to evaluate the effectiveness of learning support initiatives and a framework is provided to evaluate learning support efforts in mathematics and statistics (MacGillivray & Croft, 2010). However, the literature around students’ use of those services is limited. Dembo and Seli (2004) has determined some of the reasons why universities students have problem to change their academic behaviour, including the failure of students to seek help from supplemental instructions and/or any types of learning support within university (Dembo and Seli, 2004). In contrast, there are a number of studies which have been developed by Bandura’s (1977) about the foundational work on selfefficiency and effectiveness as a predictor of students performance (Bandura, 1977). Radloff (2006) argued that the role of supporting learners effectively is a task shared by all those participating in the university environment (Radloff, 2006). In addition, Radloff categorized a number of educators who have argued for a shift in the focus of education from instruction and learning to how to create environments that support effective student learning.

3. Research Question and Research Objective

The key research question in this paper is “what are the significant factors in learning support influencing the students’ learning outcomes”.

There are two main research objectives. They are:

1) To propose a conceptual framework of learning support, and

2) To examine what the significant factors in learning support influencing the students’ learning outcomes by applying statistical analysis

4. Conceptual Framework Development

There are nine factors in the learning support programs to influence the students’ success in their studies (Figure 1). These include improved understanding, to understand how to go about doing the students’ assessment tasks, to increase students’ learning skills in reading, note taking and exam preparation, encouraged to take responsibility for students’ own learning, helped to manage study time, increased students’ confidence to study their courses, improved problem solving and analytical skills, increased motivation, and increased students’ interest in the course.

Hypothesis statement is:

H₀ (Null hypothesis): Undergraduate students success in their studies have been influenced by at least one critical factors of learning support (improved understanding, to understand how to go about doing the students’ assessment tasks, to increase students’ learning skills in reading, note taking and exam preparation, encouraged to take responsibility for students’ own learning, helped to manage study time, increased students’ confidence to study their courses, improved problem solving and analytical skills, increased motivation, and increased students’ interest in the course).

H₁ (Research hypothesis): Undergraduate students success in their studies have not been influenced by at least one critical factors of learning support (improved understanding, to understand how to go about doing the students’ assessment tasks, to increase students’ learning skills in reading, note taking and exam preparation, encouraged to take responsibility for students’ own learning, helped to manage study time, increased students’
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Confidence to study their courses, improved problem solving and analytical skills, increased motivation, and increased students’ interest in the course).

Figure 1  A Conceptual Framework

5. Quantitative Research Method

The present research used a cross-sectional study design (Malhotra, 1996). Kumar (1996) explained that this design is suitable for studies that aim to analyze a phenomenon, situation, problem, attitude or issue by considering a cross-section of the population at one point in time.

There are many types of survey methods (such as mail panel survey, drop off survey, mail survey, fax survey, e-mail survey and internet survey) but in this case mail survey was selected as the means of data collection (Hair, 2006, p. 82). A mail survey was chosen for several reasons. First, this method is commonly used. Second, it enables the researcher to cover a wider geographic area (in this case Australia context), that in turn makes it much easier for data collection than the personal interview method. Third, self-administered questionnaires can eliminate interviewer bias (Jobber, 1991). Finally, the mail survey is inexpensive to implement. There are no interviewer related costs such as compensation, training, travel or search costs (Hair, 2006).

6. Research Design

There are several steps for the research design (Figure 2).

6.1 Determine the Desirable Sample Characteristics

The sample will be based on stratified random sampling combined with purposive sampling (Trochim, 2002), judgemental sampling (non-probability sampling) (Hair, 2006).

The required sample size for research using multiple regression as a major form of analysis depends on a number of issues, such as the desired statistical power, alpha level and number of independent variables (Tabachnick & Fidell, 1996).
Another way to determine the sample size for research using regression analysis is to calculate the ratio of cases per independent variable. A desirable sample size should be more than or equal to 104+m for testing individual independent variables (Green, 1991).

6.2 Develop Draft Questionnaire

The type of questionnaire proposed is commonly referred to as a closed-question type (the respondents can answer by selecting the provided answer). This questionnaire used a Likert scale with ordinal responses (1 = strongly disagree, 5 = strongly agree) to evaluate most of the items in the survey.

The structure of draft questionnaire was:
Part 1: Students details (optional): 5 questions
Part 2: Feedback about the learning supports: 20 questions (in total)
Part 3: To measure the effectiveness of learning support: 4 questions (in total)

6.3 Pre-test/Pilot Test Questionnaire and Finalize the Questionnaire

A pre-test of 5–10 representative respondents is usually sufficient to identify problems with a questionnaire (Burns & Bush, 1998). Therefore, the questionnaire was tested by eight colleagues/academics and practitioners from the Australian universities to validate the questionnaire before the real data collection process began.

The participants were asked to evaluate the questionnaire for the clarity, bias, ambiguous questions. The
participants were also asked to comment on the instrument with regard to wordings, sequencing and timing.

A pilot test was also conducted by distributing the amended questionnaire to ten university students. The pilot test group was excluded from participating in the actual sample of the research project.

6.4 Distribute the Questionnaire

The questionnaire with a postage-paid reply envelope was distributed by mail, email or fax. Additionally, a reminder letter was sent to those respondents who had not replied ten days after the first mailing.

6.5 Validity

The interpretation of responses to questionnaires depends crucially on the validity (repeatability) of the questions asked (Yaffee, 2000). In survey research, the survey questions must measure what they intend to measure, a concept referred to as construct validity (Hair, 2006).

6.6 Preliminary Assessment of Survey

Using the reliability of the survey questions (Cohen and Cohen, 1983). Using the criteria set forth (Nunnaly, 1967) establishes a desired minimum Cronbach’s coefficient alpha of 0.5 in scale development.

The reliability of the survey/questionnaire can be estimated by SPSS Software Version 15.0.

6.7 Analysis of Survey Responses

SPSS Software Version 15.0 was used to produce descriptive statistics such as summary frequency tables, measures of central tendency, and exploratory factor analysis (principal component analysis with Varimax rotation) combined with multiple regression-Stepwise method. Before doing the statistical analysis, several assumptions were tested. They include outliers (Barnett & Lewis, 1994; Afifi & Clark, 1998; Tabachnick & Fidell, 1996), normality (Tabachnick & Fidell, 1996; Afifi & Clark, 1998), linearity (Tabachnick & Fidell, 1996), multicollinearity (Berry & Feldman, 1985, Tabachnick & Fidell, 1996), and homoscedasticity (Berry & Feldman, 1985; Hair, 2006).

7. Reliability, Factor Analysis and Regression Modeling

The effective response rate to the survey was 52%. Cronbach’s alpha (Cronbach, 1951) was used to test internal consistency, and values of 0.60–0.87 were obtained. While 0.70 or above is desirable (Hair, 2006), 0.50–0.60 is considered sufficient (Nunnally, 1978). The majority of items in the survey were based on established scales that have already been subjected to tests of content validity. In addition, the pre-test confirmed that a group of industry experts viewed the scales used as acceptable.

Discriminant and convergent validity were assessed by using factor analysis. Again the results fell within the acceptable range. Finally, stepwise multiple regression analysis was performed.

There are nine independent variables (x1, x2, x3, ..., x9) and one dependent variable. The research hypotheses in this research project are expressed by the following equations:

\[
Y \text{ Learning Support success} = \alpha + \beta_1 \times x_1 + \beta_2 \times x_2 + \beta_3 \times x_3 + \ldots + \beta_9 \times x_9 + e_i
\]

Where,

Improved understanding: x1
To understand how to go about doing the students’ assessment tasks: x2
To increase students’ learning skills in reading, note taking and exam preparation: x3
Encourage to take responsibility for students’ own learning: x4
Helped to manage study time: x5
Increased students’ confidence to study their courses: x6
Improved problem solving and analytical skills: x7
Increased motivation: x8
Increased students’ interest in the course: x9
Learning support program has been successful for me: Dependent variable

The results are based on the views expressed in the survey by students. By looking at the output of regression model from SPSS, R Square is 0.469. It means that around 46.9% of the variation in students’ learning outcome is being explained by the independent variables in the model.

H0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = \beta_8 = \beta_9 = 0$

(no real relationship exists between students’ learning outcome and the explanatory variables – learning support factors)

H1: at least one $\beta_i \neq 0$ (where $i = 1, 2, \ldots, 9$)

(a real relationship exists between students’ learning outcome and the explanatory variables – learning support factors)

The decision rule is to reject the null hypothesis if Significance F < 0.05.

Significance F from ANOVA Table is 0.001, therefore reject the null hypothesis and conclude that there is a significant relationship between students’ learning outcome and at least one of the explanatory variables — learning support factors.

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
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<td>Std. Error</td>
<td>Beta</td>
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<tr>
<td></td>
<td>X8</td>
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</tbody>
</table>

a: Dependent Variable: students’ learning outcome
Note: X1: improved understanding; X8: increased motivation

By looking at Table 1, only improved understanding and increased motivation have a significant influence on students’ learning outcome. By looking at the unstandardized coefficients (B) value, the estimated regression model equation is (t-statistics are given in parentheses):

$$Y \text{ students’ learning outcome} = a + \beta_1 \times x_1 + \beta_6 \times x_8 + e_i$$

$$Y \text{ students’ learning outcome} = 4.406 + 0.421 \times x_1 + 0.669 \times x_8 + e_i$$

(1) (2.172) (5.095)

8. Discussion

Two factors of learning support (improved understanding and increased motivation) were significantly related to students’ learning outcome. These findings suggest that University learning support should focus on improved understanding and increased motivation factors in order to achieve better outcome of students’ learning.
at the University. The remainder of this discussion considers, in turn improved understanding and increased motivation.

8.1 Improved Understanding

The improved understanding is clearly shown in the students who used the services of student learning support at the University to help them complete a business computing course. This course is a core and compulsory business course for all undergraduate students enrolled in the programs related in business. Normally the number of business students enrolled in this course is more than 800 each semester. This course develops students’ skills to build solutions that meet the requirements of business to effectively integrate Information and Communication Technologies (ICT) into their operations. Students acquire the ability to build models using database, web and spreadsheet technologies and communicate with management using business reports and presentations.

Although this course is a first-year fundamental business course and any prerequisite course, knowledge and capabilities are not assumed, students without knowledge and skills in the area of information technology (IT) and information systems (IS) usually struggle with IT terms, concepts and mindset. As students are also required to employ a variety of IT and IS tools and use these tools to solve business problems and generate solutions, students confront with more difficulties when it comes to apply them in the course assessments where models and systems are built up to solve business problems. This is particularly the case for students enrolled in those programs such as Accounting, Economics, Finance, Management, and Marketing.

In recognition of this situation, a range of student learning support services are provided to students. SLAMs, Drop-in help sessions, Catch-Up Labs, Student Tutors and Online Forum are some of them. Students are not only able to pose any question they feel confusing to Online Forum from anywhere at any time, but also able to seek help from peer students as well as teaching staff on the face-to-face basis.

As a result, students consolidate and extend their understanding of theoretical concepts introduced in the course along their study journey. Furthermore, the support provided in the practical application of IT and IS tools to their assessment tasks enable them to understand the assessment specifications, the business requirement gathering approaches, business problems modeling techniques, solutions design methods and business solutions presentation skills. This, in return, enhances students’ learning process and assist them in achieving the learning objectives.

8.2 Increased Motivation

Motivation refers to “the reasons underlying behavior” (Guay et al., 2010, p. 712). Paraphrasing Gredler, Broussard and Garrison (2004) broadly define motivation as “the attribute that moves us to do or not to do something” (p. 106). Intrinsic motivation is motivation that is animated by personal enjoyment, interest, or pleasure. As Deci et al. (1999) observe, “intrinsic motivation energizes and sustains activities through the spontaneous satisfactions inherent in effective volitional action.”

Many factors affect a given student’s motivation to work and to learn (Bligh, 1971; Sass, 1989): interest in the subject matter, perception of its usefulness, general desire to achieve, self-confidence and self-esteem, as well as patience and persistence.

Researchers have begun to identify those aspects of the teaching situation that enhance students' self-motivation (Lowman, 1984; Lucas, 1990; Weinert & Kluwe, 1987; Bligh, 1971).
The increased motivation is also demonstrated among the students enrolled in the course mentioned above. In this course, students are required to complete two group assignments which are due respectively in the midst and at the end of a semester. As each assessment task stretches three to four weeks, students are easily distracted and often leave the task uncompleted until the due date. The scenario tends to become worse in conjunction with the difficulty when students attempt to complete the task. This is particularly the case for students who are new in a university environment and are still yet in the process of developing a range of learning skills essential to the successful outcome of their university study. The motivation, therefore, is found to be a critical success factor for this group of students in achieving the desired learning outcomes.

Student learning support services enable students to seek help in their particular learning areas and specific topics, but also enable them to be motivated by teaching staff and peer students working in the support services. The latter is achieved mainly through offering the relevant guidance, giving a prompt feedback, exposing students to role models, providing positive comments, and helping them set achievable goals. Peer students providing assistance in SLAMs, Catch-Up Labs, Student Tutors and Online Forum appear to be especially welcome and appeal to other students. Those students qualified to provide help in the support services are either causal employees or volunteers who have completed the same courses with a grade of High Distinction or Distinction. They are not only able to help other students with learning difficulties, but also pass their learning experience and set role models for other students and, hence, increase their motivation.

Under the circumstance of aforementioned course, it is found that students are easier to communicate and interact with their student tutors who have similar experience with similar age. The presence of student tutors and mentors also inspires them to develop perception that they can be one of those tutors and mentors themselves after they successfully complete the course. This is exemplified by the continuous need for SLAMs which are composed of volunteering students as mentors and learning advisors.

9. Conclusion

A conceptual framework of learning support at an Australian university has been developed. There are several factors in the learning support programs to influence the students’ success in their studies. These include improved understanding, to understand how to go about doing the students’ assessment tasks, to increase students’ learning skills in reading, note taking and exam preparation, encouraged to take responsibility for students’ own learning, helped to manage study time, increased students’ confidence to study their courses, improved problem solving and analytical skills, increased motivation, and increased students’ interest in the course.

A statistical analysis (reliability, factor analysis and multiple regression analysis) has been applied to examine what the significant factors in learning support influencing the students’ learning outcomes.

The findings show that two factors of learning support (improved understanding and increased motivation) were significantly related to students’ learning outcome.

References
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