



PLUS – An Academic Mentorship Guide for Undergraduate Studies: A Preliminary Study

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ABSTRACT

This paper introduces an approach to academic mentorship, named PLUS, that specifically assist students in their academic performance through personalised guidance. Through the guidance of a mentor, PLUS lets mentees evaluate their strength and weakness before setting their target to achieve for each subject. Based on this preliminary study with 23 computer science undergraduate students by measuring their academic performance using the cumulative grade point average (CGPA), students that are not introduced to PLUS tend to perform inconsistently throughout their undergraduate studies compared to those introduced to PLUS. Weaker students (CPGA <2.8) with face-to-face guidance with a mentor using the PLUS approach displayed constant improvement compared to those who did not have any mentor. Regardless of what stage of their undergraduate studies the students are introduced to PLUS, all the students that applied PLUS showed consistent improvement and agreed that the method is valid. PLUS, personalised guidance helps the mentor connect with the mentee better, a good complement to the digital education lacking in human connection. It warrants further investigation beyond this preliminary study.

Keywords: undergraduate academic mentorship, undergraduate studies, zone of proximal development and scaffolding

ARTICLE INFO

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<https://doi.org/10.33736/jcshd.3675.2021>

e-ISSN: 2550-1623

Manuscript received: 22 July 2021; Accepted: 15 September 2021; Date of publication: 25 September 2021

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1 INTRODUCTION

Koch and Johnson (2000) stated that mentoring is a personal relationship in which a more experienced (usually older) individual acts as a guide, role model, teacher, and sponsor of a less experienced (usually younger) protege. In undergraduate academic mentorship, this is translated to personalised guidance from a faculty member to an undergraduate student for generally two purposes: guiding new students to adjust to university life or assisting academically challenged students to improve their academic performance. Even for experienced faculty members, academic mentorship can take time and effort because students come from various backgrounds with different academic levels. With exception to fields that involve human counselling or consultation, most faculty members are not trained for the role of mentor. Although it is recognised that there are many aspects to undergraduate academic mentorship (Gershenfeld, 2014; Jacobi, 1991), this paper investigates an approach to guide faculty members to build personalised guidance for mentees to assist the mentees to improve academically.

There have been many documented benefits of mentorship (Castellanos et al., 2016; Koch & Johnson, 2000), from improved emotional and psychological support to direct assistance with career and professional development, improving the learning experience during undergraduate studies. Most of all, caring for students as human beings (Cramer & Prentice-Dunn, 2007). An effect. mentorship can bring the relationship beyond the university's walls (Hudley et al., 2017). Despite these. documented benefits, the guidance for faculty members in academic mentorship are general (Johnson, 2015), and none has been shown to assist the students to improve academically.

This paper aims to propose a method for academic mentorship to assist undergraduate students in improving their academic performance. In addition, the study's objective is to observe whether face-to-face guidance will improve the students' academic performance. Academic performance for undergraduate studies is normally measured using cumulative grade point average (CGPA). Thus, CGPA is used to measure the students' academic performance to observe the effectiveness of the PLUS approach.

The results obtained from this preliminary study indicated that students observed an increase in academic performance when the PLUS approach was used, regardless of at which stage of their undergraduate studies they were introduced to the method. However, for academically challenged students, continuous face-to-face discussion is required in addition to the PLUS table. From the academic mentor's perspective, the PLUS approach is easy to follow and let students take ownership of their learning by setting their target according to their ability. It also provides a discussion point where the focus is placed on the students' strengths and weaknesses.

2 METHODOLOGY

2.1 PLUS - An Academic Mentorship Approach

The PLUS approach is a guide for academic mentors to assist undergraduate students to identify their strengths and weaknesses before setting the target score for each subject. The first step in the

PLUS approach is to provide the mentee with a PLUS table (as shown in Table 1) which consists of the five columns, namely course assessment, assessment weightage, possible score, possible improvement, and actual result. The student will write a course he/she is taking. Then the student is required to list the assessments for that course in the assessment column and the weightage of those assessments in the Weightage column. The steps and an example of the inputs for the table are shown in Figure 1.

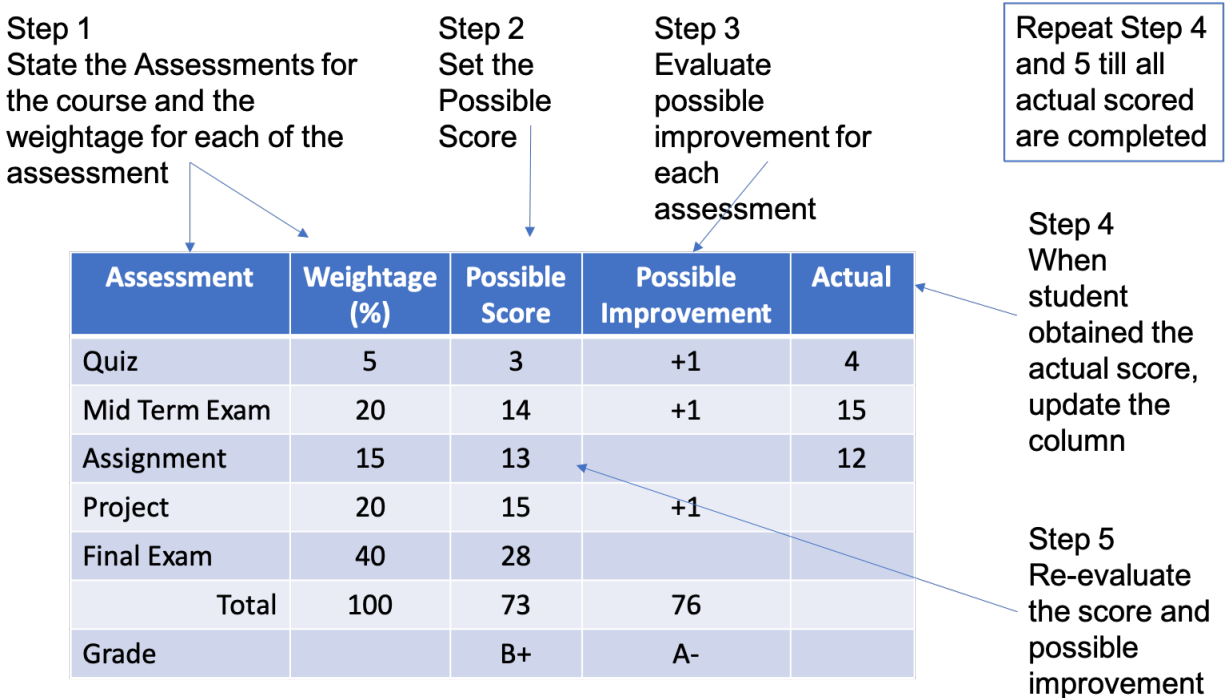


Figure 1. Step 1 to 5 of PLUS approach with an example of a score

The next step is for the student to evaluate their strength and weakness for the course. Then based on this evaluation, the student will write the possible scores for each of the assessments within the weightage of the assessment. The mentor can guide the student by asking the student what he/she enjoys, for example, mathematics or programming. The student should be advised to take time for this process. It lets the student understands their academic interest better and set a realistic score. Once all possible scores are added for all the assessments, the total and grade will be generated from the PLUS table.

The third step in PLUS is for the student to ask him/herself how hard is the student willing to work to improve the predicted possible score or grade obtained from Step 2. The student is advised to consider their strength and weakness and other components of personal development such as well-being and socialising. It is not necessary to fill in this column if the student is not ready. The role of a mentor is crucial here to give the right motivation to the student. For this column, the student will write the possible additional improvement within the weightage of the assessment that he/she can achieve (refer to Figure 1 for examples for this step). This addition rendered the name of the approach PLUS.

When the student has obtained the actual score given by the course lecturer, the student will update the PLUS table, which is done in Step 4. The student then compared the actual mark with the possible score and improvement set in Step 2 and 3 in Step 5. If the actual mark is low, the student will re-evaluate the possible improvement for those assessments yet to be submitted. This step lets student re-evaluate their strength and weakness mainly after he/she has acquired more knowledge of the course. If a possible improvement can be made, the student will adjust in the possible improvement column (refer to the example in Table 1).

Table 1. Possible improvement (see sell in orange colour) after evaluation in Step 5 when actual scores are obtained

Assessment	Weightage (%)	Possible Score	Possible Improvement	Actual
Quiz	5	3	+1	4
Mid Term Exam	20	14	+1	15
Assignment	15	13		12
Project	20	15	+1	
Final Exam	40	28	+1	
Total	100	73	76	
	Grade	B+	A-	

Repeat the process above for all the courses taken for that semester. Based on the possible scores and improvements, the student can calculate GPAs for that semester and predict the CGPA for that semester. Mentor and mentee are advised to do Steps 1 to 3 at the start of the semester for all the courses and update the tables when actual scores are obtained. PLUS lets students set their standards regardless of if they are good or weaker students.

2.2 Research Method

The research design for this study first proposes an approach for academic mentorship, or the PLUS approach (as described in the earlier section). Based on the study's objective, the student's academic performance using cumulative grade point average (CGPA) is compared (click for CGPA calculation) because CGPA is a measurement widely used in Malaysian undergraduate studies. A minimum of one full academic calendar year is required to be able to compare the results.

The participants' description for this preliminary is 23 undergraduate students from the field of computer science. The field of computer science is selected as the faculty members have limited training in human counselling and consultancy. The sample for this study consists of students who has either completed or undergoing the Bachelor of Computer Science major in Software Engineering programme. This is a 4-year degree, and students are required to fulfil a total of 132 credits. By strictly following the curriculum structure, this programme takes eight semesters to complete. Some of the students in this study were tracked for eight consecutively semesters (4 years). The sample is divided into five groups to observe the specific effectiveness of PLUS to answer the main objective of the paper, that is to propose a guide for undergraduate academic

mentorship. The number of participants varied in the different groups because students were given the flexibility to participate in this preliminary study and they can opt-out at any time, and the groups are also dependent on the students' CGPA that can only be determined after one semester of their studies. The groups are listed below:

- (a) Students are not introduced to PLUS at all or confirmed not using the PLUS method. This group serves as a baseline comparison. There are four students in this group, with three students agreed to be in the baseline group as they declined to participate in the PLUS method. At the same time, one opted out after the PLUS method was explained due to confidence in academic performance.
- (b) Students are introduced to the PLUS method at the later stage of their study, after the 6th semester, to observe the aftereffect of the use of the PLUS method. Six students agreed to participate in this group.
- (c) Students are introduced to PLUS, and students with CGPA above 2.8 must continue doing the PLUS table without discussion with the mentor. It is to observe the effectiveness of PLUS on students that performed academically better. There are four students in this group, as results are only known after one semester. Four students were able to reach that CGPA. Although they were encouraged to continue using the PLUS table without face-to-face discussion, the students were also informed that at any time if they require discussion, they are free to plan, which none of them did.
- (d) Students are introduced to PLUS, and students with CGPA 2.8 and lower are required to submit their PLUS table with Step 1 – 3 fulfilled and followed by a face-to-face discussion with the mentor. It is to investigate if face-to-face discussions in PLUS will be helpful to weaker students. There are four students with that CGPA that agreed to participate in this group. The students were also informed that if they do not require face-to-face discussion, they can opt out of this arrangement, which none did.
- (e) Students are introduced to PLUS through face-to-face discussions for the first two semesters of their undergraduate studies to investigate the effect of PLUS from the start of undergraduate studies. Five students agreed to participate from the start of their academic studies.

On top of comparing the students' academic performance, participating students are given online surveys to gather students' perceptions of the PLUS approach. They are asked

- Do you think the PLUS method is useful?
 - If it is useful, how is it useful?
 - If it is not useful, what aspect of the approach is not helpful (for example, possible score, possible improvement, face-to-face discussion)?
- Do you have any suggestions to improve the method?
- Should all students be guided to use the PLUS approach?

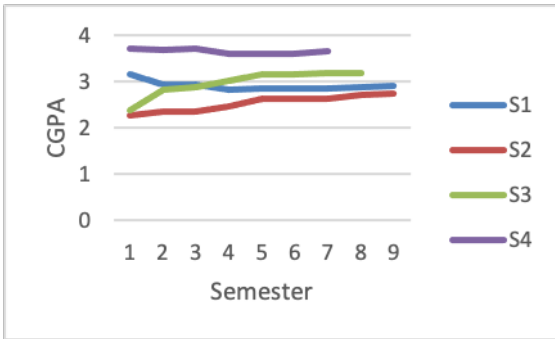
3 RESULTS AND DISCUSSION

This section shows the academic performance of the different groups of students as described in the earlier section. It is followed by a summary of the feedback obtained from the students. This section also discusses the results.

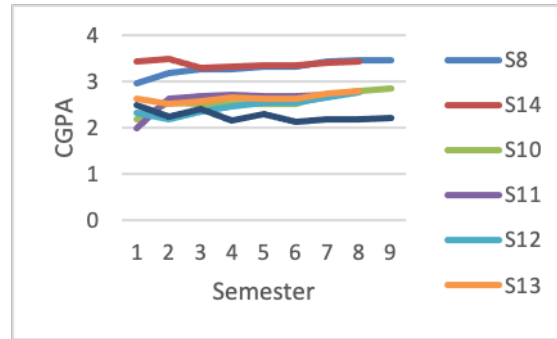
Figure 2(a) shows the students' academic performances for the group of students who entirely do not use the PLUS approach. The academic performance is inconsistent i.e., increasing and decreasing, even for high performing student (S4). Similar observation is observed for the group of students who have not being introduced to the PLUS method yet (i.e., Semester 1 to 6) (Figure 2(b)). Students' academic performance increased consistently after the introduction of the PLUS approach. Some of these students extended beyond the 4-year programme to the 9th semester to improve their CGPA. Their improved results could also be justified because they could be more well-versed with the university academic system later in their undergraduate studies.

Figure 2(c) shows the academic performance of the group of students introduced to the PLUS approach at the earlier stage of their studies but without face-to-face discussion with their mentor on the possible improvement to their scores. This group of students observed a more consistent uphill trend compared to the first two groups (Figure 2 (a) and (b)). Other than the PLUS approach, such uptrend observation could be due to other factors not considered in this study, such as better social-economic standing or higher proficiency in the English language, which is the primary medium of communication in computer science.

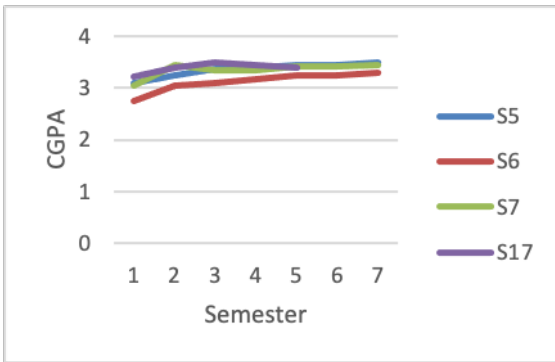
Only the students with CGPA below 2.8 were required to prepare the PLUS table and have face-to-face discussions with their mentors. The results of this group are shown in Figure 2(d). Although this group is academically challenged, their academic performance improved compared to the group in Figure 2(a). The face-to-face discussions could be interpreted as a concern from the mentor, which can serve as a big motivation, especially for undergraduate students that stay away from their families. In addition, intervention for undergraduate students with academic difficulties is helpful (Lacasse et al., 2019). In this case, PLUS acts as an intervention from the mentor other than the course lecturer.



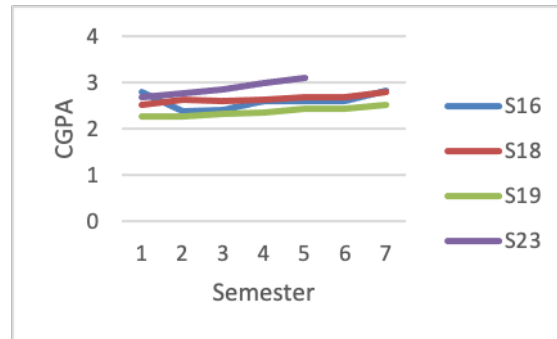
(a) Without using PLUS



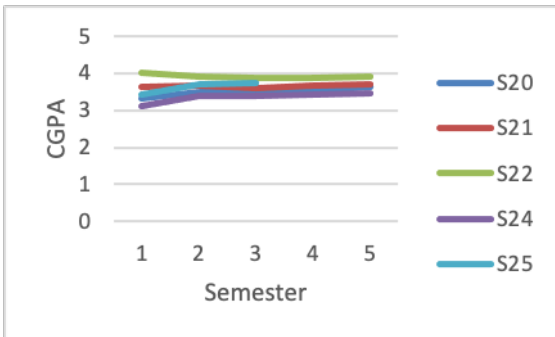
(b) PLUS is introduced in the 6th semester



(c) PLUS is introduced without Face-to-Face Discussion with Mentor



(d) PLUS is introduced with three or more Face-to-Face Discussions with Mentor



(e) A mentor guides students to use the PLUS approach from the 1st semester and make the PLUS approach independently from the 3rd semester onwards.

Figure 2. Students' academic performance

Figure 2(e) shows the academic performance of the group of students guided with face-to-face discussions from the first semester and followed by the same protocol for their second semester. This approach is practical in that all the students performed CGPA above 2.8. The students continued using the PLUS approach without face-to-face discussion with the mentor and continued performing academically and maintaining a good relationship. It is an early indicator that the PLUS approach is practical if used as undergraduate academic mentorship since the first semester.

Out of the 23 students, only 13 students provided their feedback on PLUS through the online survey. All 13 students indicated that students should be guided to use PLUS. 12 out of 13 students indicated that PLUS is helpful, with one respondent stating that the student did not use the PLUS approach. When asked what is helpful about the PLUS approach, the students' feedbacks can be summarised as PLUS table helps students to keep track of their academic performance while serving as a guide to achieve the students' goals. PLUS requires the students to evaluate their weaknesses and trigger them to think about what they need to do to improve. In addition, students also gave feedback that PLUS helped them divide their focus and effort efficiently by considering the possible improvement.

In general, PLUS approach requires students to think optimistically about the possible improvement scores they can achieve. Optimism has been shown to correlate with grade expectation (Stoecker, 1999; Svanum & Bigatti, 2006) which could be a valid justification of the uphill trend in students' academic performance using the PLUS approach. In addition, PLUS lets students set their own academic progression intention. From the students' perspective, PLUS is similar to the self-regulating intentional approach that investigates wishes, obstacles, outcomes, and plans (WOOP) proposed by Oettingen et al. (2015), which is effective. However, the difference is that PLUS focuses specifically on undergraduate academic performance rather than a general intention.

From the psychology development of learners' perspective, the effectiveness of the PLUS method could be attributed to PLUS as an application of the approach zone of proximal development (ZPD) and scaffolding in undergraduate academic mentorship. Zone of proximal development is defined as a cognitive gap between the level where a student currently performs and, usually determined by a more mature collaborator (Murray & Arroyo, 2002), while instructional scaffolding is defined as the support provided by the instructor throughout the learning process (Hammond & Gibbons, 2005). PLUS highlights what the students want to achieve from their current academic state or the ZPD under the guidance of a mentor. In comparison, face-to-face discussions with the mentor are similar to the role of dialogue to deliver scaffolded instructions (Palincsar, 1986). The advantage of the PLUS table is that it provides a systematic approach to ZPD. PLUS method provides minimal or minor interference by letting the students evaluate their strengths and weaknesses while monitoring their progress throughout the semester. Scaffolding has been shown to move learners towards independent learning (Beed et al., 1991). More extensive study is required to fully understand the PLUS as an application of ZPD and scaffolding for undergraduate academic mentorships, such as the applicability of the PLUS method to other fields or the impact if less experienced mentors guide the students.

4 CONCLUSION

There is a limited guide available for undergraduate academic mentorship for both faculty members and students. The preliminary results indicated that the PLUS approach could be used as a guide in undergraduate academic mentorship to assist students in improving academically. This preliminary study also shows that the approach is more effective if introduced earlier in the undergraduate studies with face-to-face discussion with their mentors. Although this preliminary study was conducted with computer science students, PLUS can be extended to other fields with limited human counselling or consultancy training such as engineering and science.

The study contributes an undergraduate academic mentorship guide called PLUS. It provides a structured table for the mentors and mentees to evaluate their studies' strengths and weaknesses. It enables students to target the improvement they want to make. Specifically, PLUS lets a mentor and a mentee determine the zone of proximal development. In this study, PLUS has also been shown to improve students' academic performance consistently.

For future works, this preliminary study can be extended to other fields such as engineering and science. The study can also adjust PLUS to a pre-university programme that uses the CGPA grading system. PLUS method can improve the lecturer-student relationship because both mentors and mentees are engaged in a discussion that focuses on helping the students improve academically. Such is a relationship where human connection is lacking in this digital education.

ACKNOWLEDGEMENTS

Thank you to the participating students. Thanks to Universiti Malaysia Sarawak Postgraduate Diploma in Higher Education in Teaching and Learning programme. Special thanks to Brother Joseph Tan Yee Ping for his valuable suggestions.

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