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A Study of the Correlation between Students' Moodle Log for Content and the Other Forms of Engagement on Moodle for a Mandatory Pre-Degree English Course

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ABSTRACT

This study investigates students' Moodle log on content on LLFXX Moodle page and correlates it with the students' Moodle logs for the other forms of engagement (instructor, other learners, assessments and feedback from assessments). 80 students from a mandatory English language course at pre-degree level at the USP participated in the research. These students were enrolled in LLFXX in Blended mode at the Laucala campus in the Fiji Islands. Data on students' Moodle logs were extracted from LLFXX Moodle page and were analysed using the SPSS software. Pearson's chi-square test was used to find the correlation between students' Moodle log on content on LLFXX Moodle page and their academic achievements. Pearson's Product Moment Correlation Coefficient test was used to find the p value and r value to determine the statistically significant bivariate association and strength of association between students' Moodle log on content and the other forms of engagement on LLFXX Moodle page. The findings reflect the importance of content and engagement with content. It also emphasises the need to be vigilant with the quality and quantity of content placed on the course Moodle page.

INTRODUCTION

While designing, preparing and implementing teaching strategies, a component that is given utmost importance is the content. The content is one of the most crucial components of the lessons and needs to be taught in the assigned period of time. In traditional classrooms, the content was covered from the textbooks and any other prescribed books. With the introduction of the virtual learning environments, you tube, online resources, videos, and text books deliver the content to students. A range of content can be made available to students, but it defeats its purpose if students do not interact or engage with it. Interaction is one of the main factors (Saba, 2000; Zawaki-Richter & Naidu, 2016; Ozturk & Kumtepe, 2023) affecting learners' academic success, continuing education and motivation to learn (Anderson, 2006; Zimmerman, 2012; Ozturk & Kumtepe, 2023).

In a school environment, especially in the Pacific, students success are measured through their academic achievements. Their academic achievement can be their rank in examinations, marks in external exams or grades at tertiary level. Therefore, it is crucial for instructor to be vigilant on the content that they make available for their students or deliver to their students.

Background

At the University of the South Pacific (USP), four modes of teaching are employed: Blended, Print, Online, and Face-to-Face. According to USP's Flexible Learning Policy and USP's Handbook and Calendar 2023, Blended mode of teaching is a hybrid teaching mode with a mixture of online (30 – 79% of content) and face-to-face (interaction between student and instructor) modes

of delivery. Face-to-face mode has 2 hours of lectures per week and tutorials with Moodle used as a Learning Management System (LMS). 80% of Online mode is delivered online with some face-to-face interaction. A print mode course has learning resources in print and online forms and may include tutorials. (The University of the South Pacific, 2017; The University of the South Pacific, 2023).

Moodle is the LMS that is used in the teaching process. Moodle is a mandatory component for all courses at USP, despite their modes of study. USP's Flexible Learning Policy highlights students' engagement with the content, instructor, other learners, learning environment, assessment, feedback from assessments and institutions under 'Dimensions of Flexibility' (The University of the South Pacific, 2017). The engagements are also categorized as learner to self, learner to interface, learner to instructor, learner to learner, learner to other human, learner to content, learner to tool, learner to environment and learner to instruction (Hirumi, 2006).

The Rationale of the Study

Despite the importance of the content in the process of teaching and learning, there is no study yet done in the Pacific to study students' association with it and the other forms of engagement on the Moodle platform. Since the content of the course is essential, despite the mode of study it is delivered in, it is important to study its effectiveness in students' academic achievement and its use while studying a course at tertiary level, especially in a pre-degree program.

Therefore, the two research questions that framed this study were:

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Q1. There is a correlation between students' Moodle log on content on LLFXX Moodle page and their academic achievement (grade) in LLFXX.

Q2. There is a correlation between the students' Moodle log on content on LLFXX Moodle page and Moodle log on the other forms of engagement (instructor, other learners, learning environment, assessment and feedback on assessment).

LITERATURE REVIEW

Interaction on Moodle is any form of engagement that happens on Moodle. The purpose of interaction (submit assessment or access content) will decide how interaction occurs on Moodle. Confirmation, pacing, inquiry, navigation, and elaboration are the functions for computer-based interactions (Hirumi, 2002). These were expanded to synchronous communication, asynchronous communication, browsing and clicking, branching, tracking, help, practice, feedback, and coaching (Hirumi, 2002). Interaction in learning (Wanstreet, 2006; Rhode, 2009) needs to be deep and meaningful (Nisbet, 2004). Initially there were three types of interaction: student to content, student to students and student to teacher (Moore, 1989).

USP's Flexible Learning Policy highlights students' engagement with the content, instructor, other learners, learning environment, assessment, feedback from assessments and institutions under 'Dimensions of Flexibility' (The University of the South Pacific, 2017). The engagements are also categorized as learner to self, learner to interface, learner to instructor, learner to learner, learner to other human, learner to content, learner to tool, learner to environment and learner to instruction (Hirumi, 2002). Interaction occurs between learners and tools in e-learning environments by looking at their behaviors, experiences, preferences and learning styles in an e-learning environment (Meri, 2015). Study found that student interactions can be predictors of student achievement but there was no correlation between IT self-efficacy and student achievement (Abulibdeh & Hassan, 2011). Students engagement or interaction with the content, whether it is a traditional or virtual classroom, is crucial.

Content Engagement

The design of learner-content interaction is critical (Anderson, 2003; Yu, 2013; Zimmerman, 2012; Ozturk & Kumtepe, 2023) and also an important predictor of engagement, course completion, course success, and learner satisfaction (Kuo *et al.*, 2014; Nieuwoudt, 2018; Quadir, Yang, & Chen, 2022; Tang, 2021; Zimmerman, 2012; Ozturk & Kumtepe, 2023). Therefore, how best to facilitate learners' interaction with the content should be studied (Ally, 2008; Ozturk & Kumtepe, 2023). Learners prefer to interact with content more than other types of interaction in online courses (Ozsari & Aydin, 2021; Ozturk & Kumtepe, 2023).

A more structured course, with high quantity of content (resources), best fits the students' needs, because they can

have good interaction with the course and thus succeed (Macarini *et al.*, 2019).

A study in the US showed that students access pattern of the course materials in four categories; core materials, direct support, indirect support and ancillary materials. Students select materials course content based upon the degree to which they perceive it will positively influence performance and outcomes on assignments and assessments (Murray *et al.*, 2012). Therefore, the content of the course should be easily accessible for students and should be informative.

METHODOLOGY

Quantitative research method was used for this study. It involves the examination of numerical data and variables using software (Apuke, 2017; Bloomfield & Fisher, 2019; Queiros, Faria, & Almeida, 2017). This was used to study students' Moodle logs on the content and correlate it with students' Moodle logs on the other forms of engagement (instructor, other learners, learning environment, assessment and feedback on assessment) on LLFXX Moodle page. 80 Blended mode students enrolled into LLFXX, a mandatory pre-degree course at the USP, were investigated for this study. LLFXX is a mandatory English course at Foundation level (equivalent to Year 13) at the USP. These 80 students were based at the Laucala campus (main campus in Fiji Islands).

The 80 students were given information sheet on the research and they filled in the consent form to give permission to be part of the research. They were assured of their confidentiality during and post the study. Statistical data, in form of their Moodle logs on LLFXX Moodle page, was extracted at the end of the semester. The collected data was analysed using SPSS software. Pearson's chi-square test (p value) was used to find the correlation between students' Moodle log and their academic achievement (grade). Pearson's Product Moment Correlation Coefficient test (r value) was used to measure the strength of association between students' Moodle log on content and the other forms of engagement (instructor, other learners, learning environment, assessment and feedback on assessment). The Moodle logs on the components on LLFXX Moodle page that were the content of the course were also studied. Students' Moodle logs were extracted for these content and their mean (μ) and standard deviation (σ) were calculated on excel.

RESULTS AND DISCUSSIONS

The content uploaded on LLFXX Moodle page were the resources that were employed to facilitate teaching and learning.

Table 1 shows that there were eight components for content on LLFXX Moodle page. These were the lecture recordings, tutorial and other recordings, lecture notes, additional resources, course book, course outline, tutorial questions and assignment 2 guidelines. The highest Moodle log was recorded for lecture recordings (198). Its $\mu = 2.2$ and $\sigma = 4.9$. The second highest Moodle log

Table 1: Content on LLFXX Moodle page

Content	Moodle logs	μ
Lecture Recordings	198	2.2
Tutorial & Other Recordings	19	0.21
Lecture Notes	67	0.74
Additional Resources	69	0.76
Course Book	133	1.48
Course Outline	43	0.48
Tutorial Question	25	0.28
Assignment Two guidelines	107	1.19

(133) was for the course book. The $\mu = 1.48$ and $\sigma = 2.04$. There were 107 Moodle logs for assignment 2 guidelines. Assignment 2 guidelines $\mu = 1.19$ and $\sigma = 1.67$. There were 69 Moodle logs for additional resources. This had a μ of 0.76 and σ of 1.65. The lecture notes had 67 Moodle logs and a μ of 0.74 and σ of 2.1. 43 Moodle logs were recorded for the course outline. It had a μ of 0.48 and σ of 0.81. Tutorial questions had 25 Moodle logs. $\mu = 0.28$ and $\sigma = 1.35$. The least number of Moodle logs were recorded for tutorial and other recordings. Its $\mu = 0.21$ and $\sigma = 0.59$.

Pearson’s Chi-square Test

Pearson’s chi-square test from the SPSS software shows the correlation between two variables (quantitative data). This was used to analyse if there was a correlation between students’ Moodle logs on LLFXX Moodle page and their academic achievement (grade).

The alpha value used for this research was 0.05. Before using SPSS to carry out the test, it was formulated that:

Ho: there is no correlation between students’ Moodle log and their academic achievement (grade).

H1: there is correlation between students’ Moodle log and their academic achievement (grade).

Using a two tailed test, the test variable (p) was calculated. If

$P < \alpha$ – result is statistically significant, shows there is correlation (alternative hypothesis);

However, if

$P > \alpha$ – result is statistically insignificant, shows there is no correlation (null hypothesis).

Pearson’s Chi-square Test for Moodle Logs on Content on LLFXX Moodle Page and Student’s Academic Achievement (Grade)

Table 2: Moodle logs on content on LLFXX Moodle page and students’ academic achievement (grade)

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	228.380a	192	.037
Likelihood Ratio	134.400	192	.999
N of Valid Cases	80		

Table 2 shows the chi-square test for students’ Moodle logs on content on LLFXX Moodle page and their academic achievement (grade). The p value for the test variable is,

$$P = 0.037 < 0.05$$

Hence, the result is statistically significant, emphasising that there is a correlation between students’ Moodle log on content on LLFXX Moodle page and their academic achievement (grade).

Pearson’s Product Moment Correlation Coefficient Test

Pearson’s Product Moment Correlation Coefficient test is used when there are two quantitative variables and to check for a linear relationship between those variables.

The formula for the Pearson Product Moment Correlation Coefficient, r, is:

$$r = \frac{\sum(x - \bar{x})(y - \bar{y})}{\sqrt{\sum(x - \bar{x})^2 \sum(y - \bar{y})^2}}$$

Equation 1 Pearson’s Product Moment Correlation Coefficient

Where x and y are the sample means AVERAGE(array1) and AVERAGE(array2).

It looks at two things. Firstly, it shows Pearson’s correlation which shows the association the two variables have with each other. If variable on Y axis increases, so should the variable on the X axis. This correlation is signified by the use of r.

The r in linear relationship shows the following:

If r is:

- 0.7 < 1 then the linear is a very high correlation,
- 0.5 < 0.7 then there is a high correlation,
- 0.3 < 0.5 then there is a medium correlation,
- 0.1 < 0.3 then there is a low correlation, and
- 0 < 0.1, then there is no apparent correlation.

Secondly, Pearson’s Product Moment Correlation Coefficient shows the p-value of the two tailed test. If the p-value is < 0.05, then there is evidence of a statistically significant bivariate association between the two continuous variables.

Pearson’s Product Moment Correlation Coefficient test in SPSS is used to analyse the correlation between the statistical data. Before using SPSS to carry out the test, it

was formulated that:

H₀: there is no correlation between students' Moodle logs on content and other forms of engagement on LLFXX Moodle page.

H₁: there is correlation between students' Moodle logs on content and other forms of engagement on LLFXX Moodle page.

Using a two tailed test, the test variable (p) was calculated. If

$p < \alpha$ - result is statistically significant (correlation), meaning there is a correlation (alternative hypothesis) between two variables.

However, if

$p > \alpha$ - result is statistically insignificant (no correlation)

and shows that there is no correlation (null hypothesis) between the two variables.

Pearson's Product Moment Correlation Coefficient Test for Moodle Logs on Content on LLFXX Moodle Page and Other Forms of Engagement

Figure 1 shows the Moodle logs between content and

other forms of engagement on LLFXX Moodle page. The p value and r value were calculated on SPSS software using Pearson's Product Moment Correlation Coefficient test. The p value shows the correlation between two variables. The accepted a value is < 0.05 . The highest p value calculated is for the Moodle logs between content and the learning environment (0.215). The lowest p value was calculated for Moodle logs between content and instructor and content and feedback (< 0.001). A p value of 0.006 was calculated for Moodle logs between content and other learners and 0.01 for Moodle logs between content and assessment.

The r value is also shown in Figure 1. R value shows the strength of correlation between two variables. The lowest r value (-0.001) is shown for Moodle logs between content and the learning environment. The highest r value is noted for Moodle logs between content and instructor (0.64). 0.462 r value was analysed for Moodle logs between content and other learners. A r value of 0.267 was calculated for Moodle logs between content and assessment and 0.328 for Moodle logs between content and feedback.

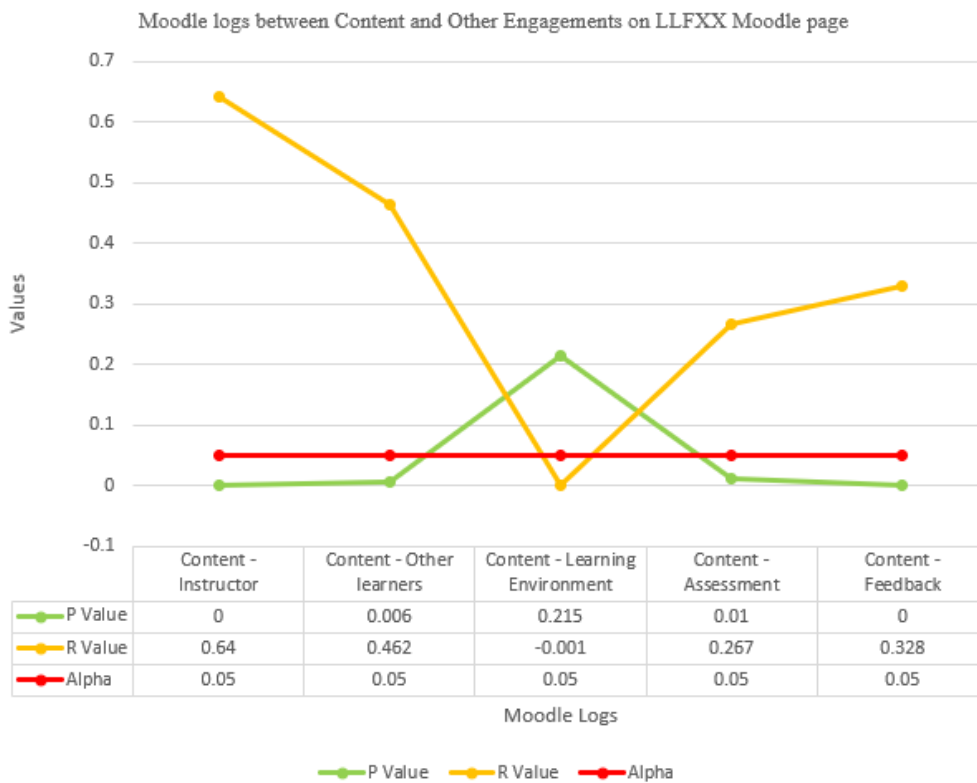


Figure 1: Mean and standard deviation scores for Moodle logs between content and other forms of engagement

Table 3: Results of Pearson's Product Moment Correlation Coefficient Test for Moodle logs between content and other forms of engagement

Moodle Logs	P Value	R Value	Correlation
Content - Instructor	<0.001	0.64	High
Content - Other learners	0.006	0.462	Medium
Content - Learning Environment	0.215	-0.001	No Correlation
Content - Assessment	0.01	0.267	Low
Content - Feedback	<0.001	0.328	Medium

Table 3 shows the correlation between Moodle logs of content and other forms of engagement on LLFXX Moodle page based on the p values and r values calculated by the Pearson's Product Moment Correlation Coefficient test on the SPSS software. A high correlation is found between the Moodle logs of content and instructor on LLFXX Moodle page with a p value of <0.001 and r value of 0.64. A medium correlation was found between two sets of engagements: Moodle logs between content and other learners and Moodle logs between content and feedback. The Moodle logs between content and other learners had a p value of 0.006 and r value of 0.462. the Moodle logs between content and feedback had a p value of <0.001 and r value of 0.328. Table shows a low correlation for Moodle logs between course and assessment on LLFXX Moodle page. It has a p value of 0.01 and r value of 0.267.

The p value (alpha) for the above engagements have been <0.05 , thus there were correlations (alternate hypothesis) between Moodle logs for content and instructor, content and other learners, content and assessments and content and feedback. The r values between 0.5 and 0.7 shows a high correlation, 0.3 to 0.5 shows a medium correlation and 0.1 to 0.3 shows a low correlation (alternate hypothesis).

The only set of Moodle logs that show no correlation are the Moodle logs between the course and the learning environment. The p value for this engagement is 0.215, which is >0.05 . Also the r value for this set is -0.001. This is very close to 0. A r value between 0 and 0.1 or -0.1 and 0 shows no correlation (null hypothesis).

DISCUSSION

This study investigated two research questions and analysed the data accordingly. The first research question examined if there was a correlation between students' Moodle logs and their academic achievement (grade). It was found through Pearson's chi-square test on SPSS software that there is a correlation between students' Moodle logs and their academic achievements (Abulibdeh & Hassan, 2011). A p value of 0.037 ($p < 0.05$) accepts the alternative hypothesis, showing that there is a correlation. This shows that the students Moodle logs determines their grade in LLFXX. It can be said that the more students use the content on Moodle, the better their grades will be.

Table 1 showed that students had the highest Moodle logs for lecture recordings (198) and the course book (133). These can be categorised as the core materials of the course. Assignment two contributes 20% towards their final grade and this is considered a major assignment. Due to the high contribution assignment two has towards the grade, assignment two guidelines (107 Moodle logs) can be considered as a direct support. The additional resources (69 Moodle logs) and lecture notes (67 Moodle logs) can be the indirect support towards the grades. While looking at the lecture recordings, students would have already looked at the lecture notes, thus they do not need

it directly as a resource for their grade. Course outline (43 Moodle logs), tutorial question (25 Moodle logs) and tutorial and other recordings (19 Moodle logs) can be classified as the ancillary materials towards students' performance and grades. Tutorial questions are given to student in the tutorials. They do not need to access it on Moodle, unless they did not attend the tutorial or would have misplaced the questions. The course outline is a guideline for the course and is referred to only in the first week of the semester. It can be seen that student access content according to their perception of which content positively influences their grades (overall performance) or assessments (Murray *et al*, 2012)

Since students' Moodle logs on content on LLFXX Moodle page has a remarkable impact on their grades, it is important to look at the content Moodle logs in detail by comparing it with other forms of engagement.

The second research question studied the correlation between students' Moodle logs in content and the other forms of engagement (instructor, other learners, learning environment, assessment and feedback). Pearson's Product Moment Correlation Coefficient test found a correlation (alternative hypothesis) between students' Moodle logs on content and with the instructor, other learners, assessment and feedback.

Students' Moodle log between content and instructor on LLFXX Moodle page had a p value of <0.001 . This shows a statistically significant bivariate association (alternative hypothesis) between Moodle logs on content and Moodle logs with the instructor. A 0.640 r value also shows a high association between the Moodle logs for content and instructor. It is evident that the students engage a lot with the instructor on Moodle once they engage with the content on Moodle and vice versa. They may need to look for information highlighted by the instructor, clarify points with instructor after looking at content or they may just need to read what the instructor has asked them to from the content.

Similarly, students' Moodle log between the content and other learners also shows a statistically significant bivariate association (alternative hypothesis) with a 0.006 p value. A medium correlation was analysed with a 0.462 r value, emphasising that the students engage with other learners once they engage with the content on LLFXX Moodle page or they engage with the content because they need to clarify things after their engagement with the other learners.

A medium correlation was also calculated for students' Moodle log with the content and the feedback from assessments. A r value of 0.328 from Pearson's Product Moment Correlation Coefficient test shows a medium correlation between Moodle logs for content and feedback from assessments. A p value of <0.001 shows a statistically significant bivariate association between the two forms of engagement on LLFXX Moodle page. Students would definitely refer to the content once they receive their marks or comments on assignments and tests (feedback from assessments) to cross check the

response they got to what is given in the content (notes). Moreover, there was a statistically significant bivariate association found between students' Moodle logs with the content and assessments (alternative hypothesis). A p value of 0.010 and r value of 0.267 was calculated to show a correlation between the two variables. The r value (0.267) shows a low correlation. Students refer to content to complete assessments and also refer to content after assessments (especially after tests) to check their response to questions and verify with what is given in the content (notes). However, it shows that students at pre-degree level associate content with the instructor, other learners and feedback on assessments more than with assessments itself.

In contrast, there was no correlation found for students' Moodle log with content and the learning environment. The p value (0.215) was quite high and thus no statistically significant bivariate association was found (null hypothesis). Also the r value (-0.001) was negative (negative correlation) and close to zero. A r value close to zero (between 0 and 0.1) has a no correlation (null hypothesis). This emphasises that there is no association in students referring to the content on Moodle and them associating with the learning environment on Moodle.

CONCLUSIONS

This research has emphasised on the importance of students' association with the content on Moodle as it has shown that students' academic achievement (grade) is correlated to their Moodle logs on the content. Also it has been shown that the content is closely associated with the other forms of engagements (instructor, other learners, assessments and feedback from assessments). Therefore, instructors need to emphasise to their students to engage more with the content on Moodle. The instructors also need to be careful of the quality and quantity of resources they put on the course Moodle page due to the crucial role students' engagement with it plays with other forms of engagement and students' academic achievement (grade). The limitation of the study is that only Laucala based Blended mode students were investigated for this research. In future, students from the region and of all modes need to be studied to get a result from a diverse group of students.

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