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INSIGHTS AND FINDINGS

1. Patterns and Trends in Student Engagement

This study explored the patterns and trends in student engagement with the Virtual Learning Environment (VLE) by examining various factors such as age band, gender, region, IMD, disability status, and educational level.

1.1 Student Engagement by Age Band

Student engagement, measured by total clicks, varied across different age bands. Students aged 55 and above exhibited the highest level of engagement, followed by the age band of 35-55. Conversely, the age band of 0-35 recorded the lowest level of engagement. These findings highlight the influence of age on student involvement with the VLE which might be because older students are more mature and have a relatively stable mind compared to the younger ones who are probably involved in other things apart from school. Older students might also have been clicking around on the VLE while trying to navigate and find their way through since some of them might not be as technology-savvy as the younger ones. Further investigation is needed to understand the underlying cause of this.

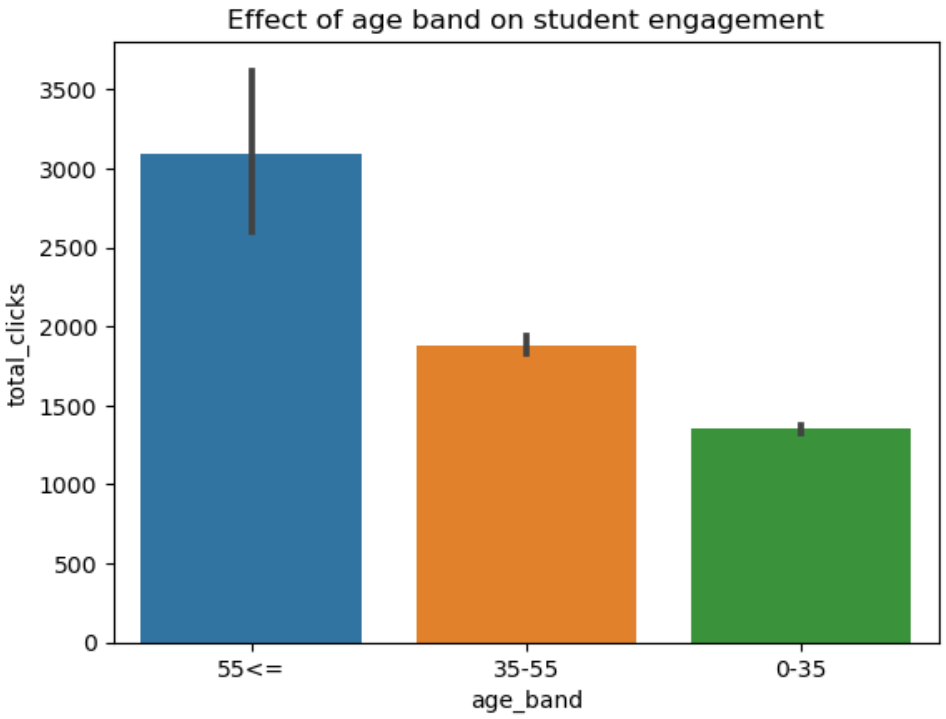


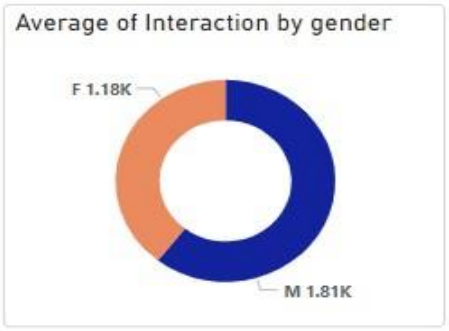
Figure 1: Student Engagement with the VLE by Age Band

1.2 Student Engagement by Gender

The study revealed that male students had more interactions with the VLE than female students, with an average interaction of 1814 and 1181 interactions for male and female students respectively. An independent sample t-test was conducted to examine the statistical significance of interactions

between both groups at a 5% significance level. The result shows that the mean interaction for male gender was significantly higher than that for the female gender with $p < 0.05$.

	Variable	N	Mean	SD	SE	95% Conf.	Interval
0	Male	13900.0	1814.642086	2094.589983	17.766080	1779.818176	1849.465997
1	Female	12174.0	1181.335140	1674.718974	15.178375	1151.583113	1211.087168
2	combined	26074.0	1518.949873	1935.994635	11.989479	1495.449835	1542.449912



Satterthwaite t-test	results
Difference (Male - Female) =	633.3069
Degrees of freedom =	25861.9214
t =	27.1026
Two side test p value =	0.0000
Difference < 0 p value =	1.0000
Difference > 0 p value =	0.0000

Figure 2: Mean interaction with the VLE by gender and independent sample t-test

1.3 Student Engagement by IMD band

The study explored the relationship between students' location deprivation (measured by the IMD band) and their interaction with the VLE as shown in Figure 3. Students located in areas with high IMD bands showed higher average interactions with the VLE. This indicates that socio-economic factors such as better amenities and better economy could have influenced student motivation, access to resources, or other aspects that impact engagement in a Virtual Learning Environment. Engagement (total_sum_click) increased with imd_band except for where imd_band was 40–50%. This is an anomaly and there may be other factors responsible.

1.4 Student Engagement by Region

Figure 4 shows the variation in student engagement patterns across different regions. The North region, Ireland, Scotland, and the South region exhibited higher number of clicks, indicating greater student activity on the VLE platform. On the contrary, Wales recorded the lowest engagement level among the listed regions.

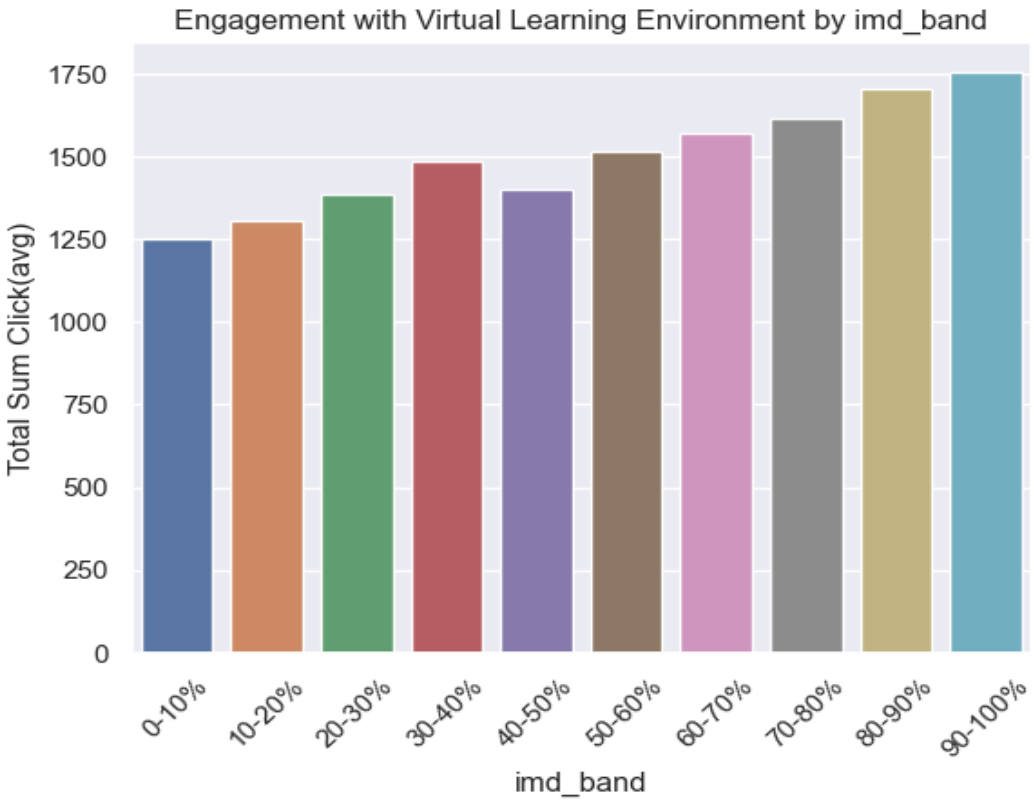


Figure 3: Average interaction by IMD band

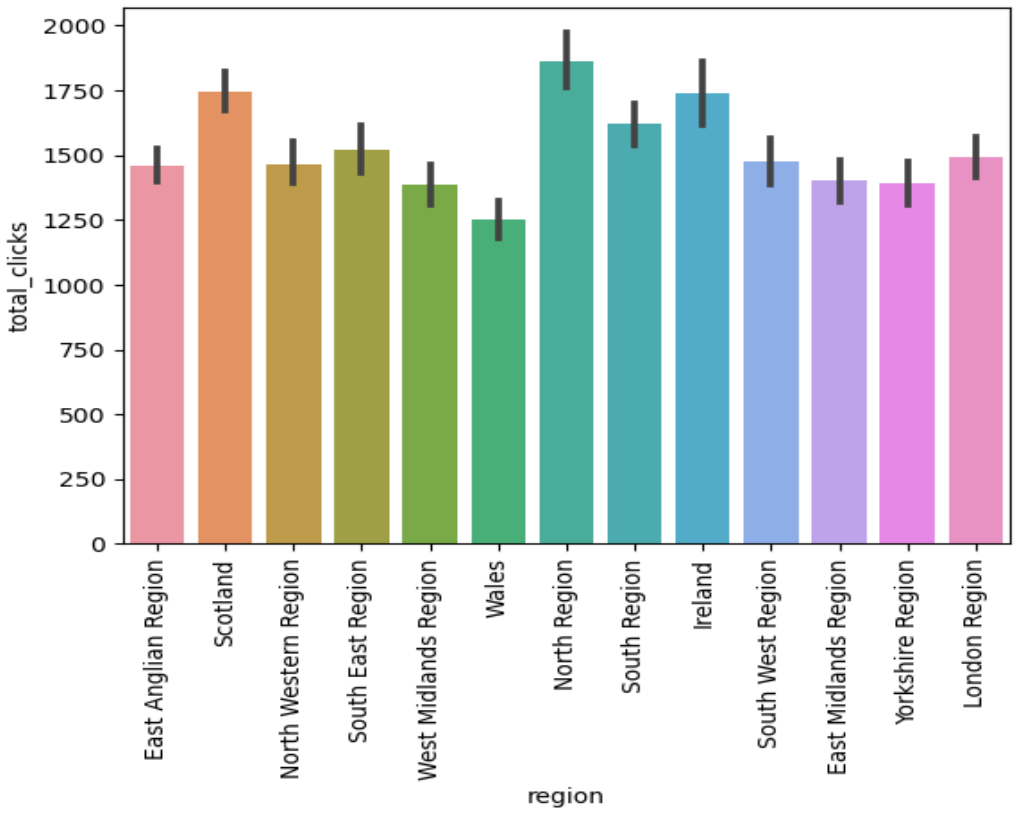


Figure 4: Student Engagement with the VLE by Region

1.4 Student Engagement by Disability Status

The study revealed that students without disabilities tend to be more active compared to students with disabilities. This finding suggests that disability status may influence the level of engagement and utilization of the VLE.

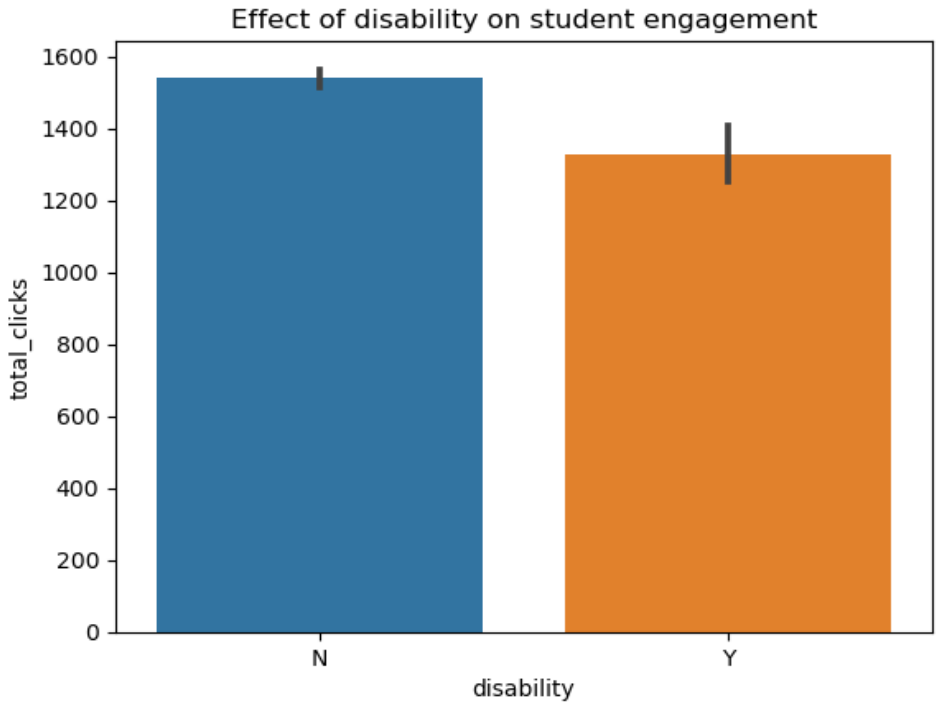


Figure 5: Student engagement with the VLE and Disability Status

1.5 Student Engagement by Educational Level

Student interaction with the VLE platform significantly differs based on the level of education. Specifically, students with no formal qualifications exhibited the lowest level of interaction, while those with postgraduate qualifications had the highest average interaction with the VLE, as shown in Figure 6.

1.6 Student Engagement by Activity Type

The level of engagement with the VLE based on activity type is presented in Figure 7. Students engaged more with the oucontent compared to other activity types. This might be because the oucontent has to do with accessing the course content and materials. This is followed by the forumng which are online discussion forums where students can share and discuss problems with each other. Quiz (course quizzes) and homepage which is the course homepage and the first screen visited by every student before accessing other course materials also had high engagement.

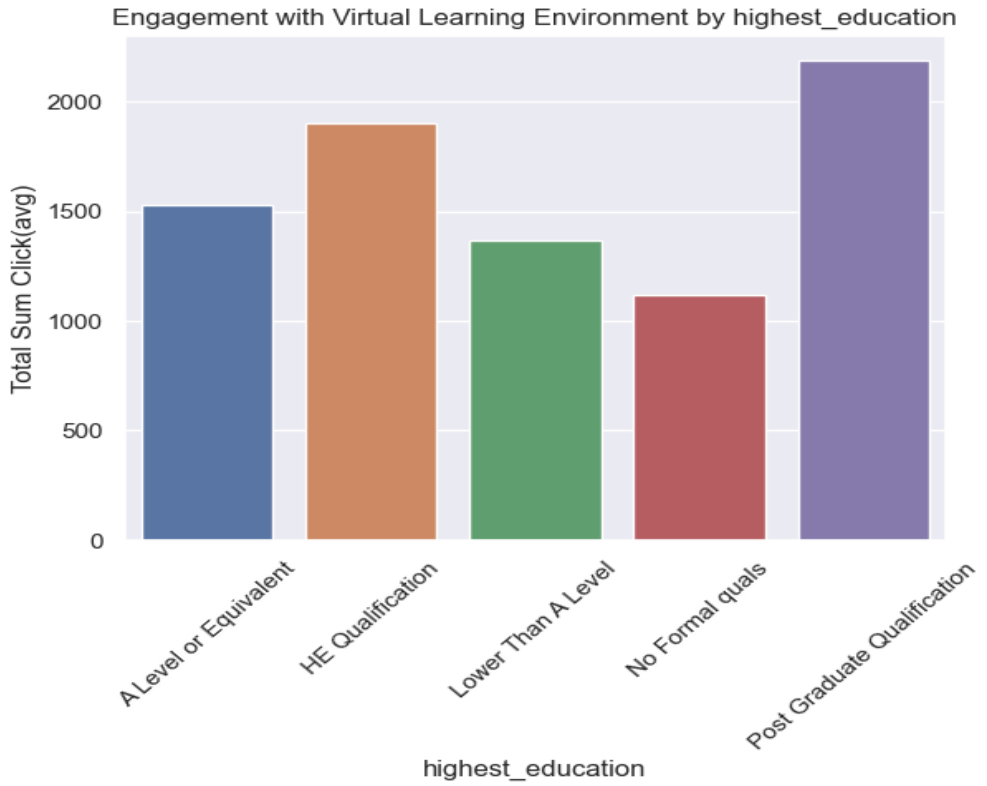


Figure 6: Average interaction by Education.

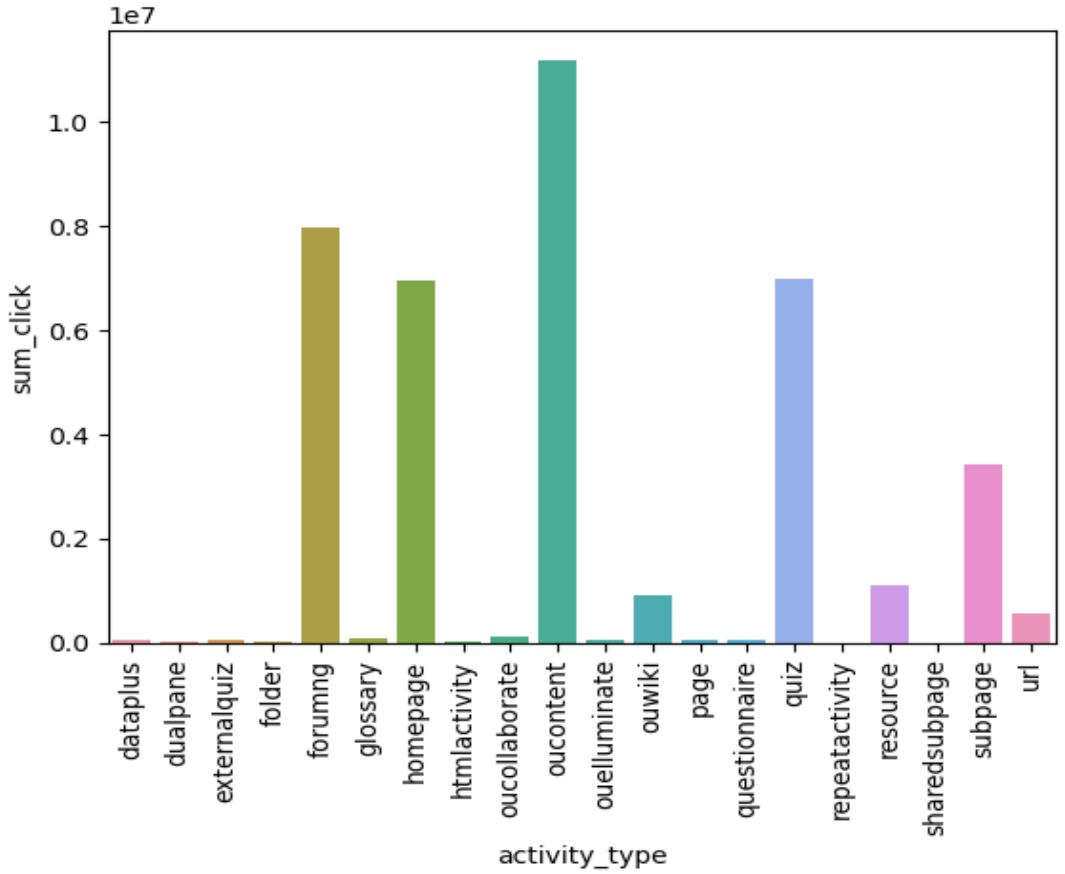


Figure 7: Student Engagement with the Activity types on VLE

2. Factors affecting Students' Final Results

2.1 Studied credits and Final Results of Students

This study revealed that studied credits had an impact on student performance as it was observed that students with the highest studied credit load are more likely to withdraw from the course. Additionally, students who failed the course have a slightly higher studied credit load compared to those who achieved a Pass and Distinction as their final result. This suggests that studied credit load may indeed have some impact on student performance. However, it is essential to exercise caution when drawing definitive conclusions based solely on this plot. There could be other factors at play that influence both studied credit load and student performance. It is possible that other variables, such as students' study habits, personal circumstances, level of engagement, and access to support systems, also contribute significantly to their performance in the course.

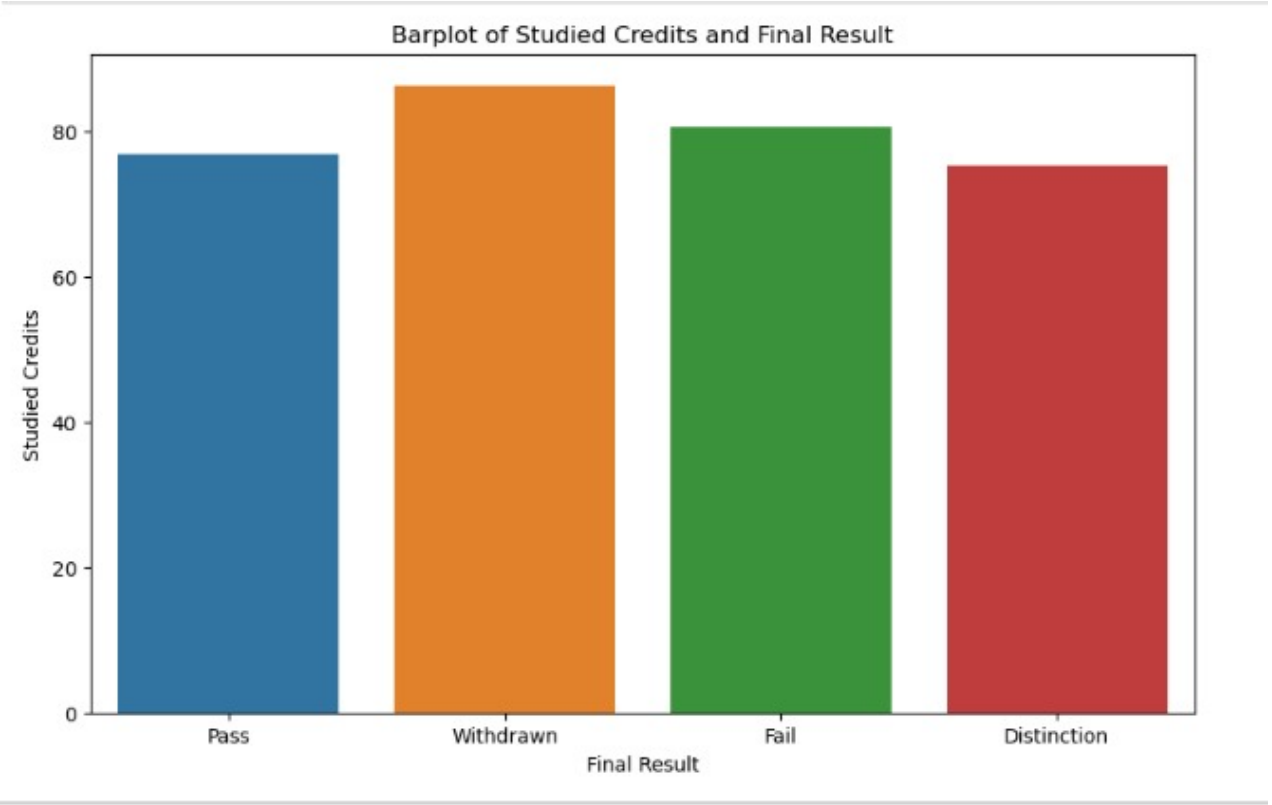


Figure 8: Effect of Studied Credits on Students' Final results

2.2 Final Result and Highest Educational Level

Students whose highest education qualification is 'A level or equivalent' had higher number of 'pass' and 'distinction'. Students with qualifications lower than A level recorded the highest number of 'fail'. Although students with Postgraduate qualifications had higher engagement on the VLE, it wasn't reflected in their results.

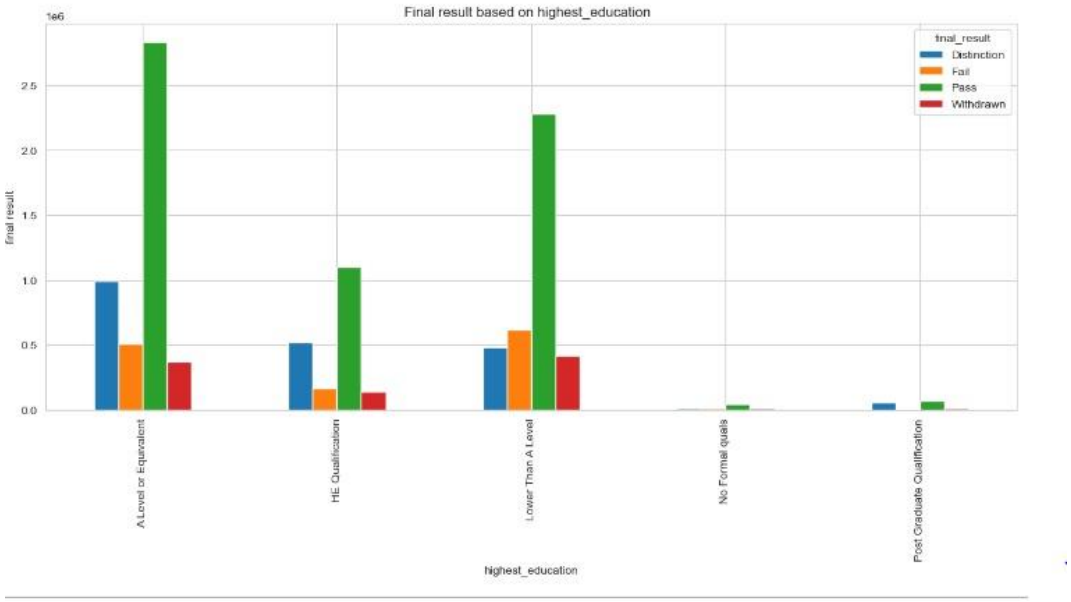


Figure 9: Students' highest educational level and Final results

2.3 Final results and IMD band

The study revealed that there was no direct relationship between IMD band and the final results of students. Although students who come from areas with high IMD bands had higher engagement with the VLE, the trend differed with regards to their results.

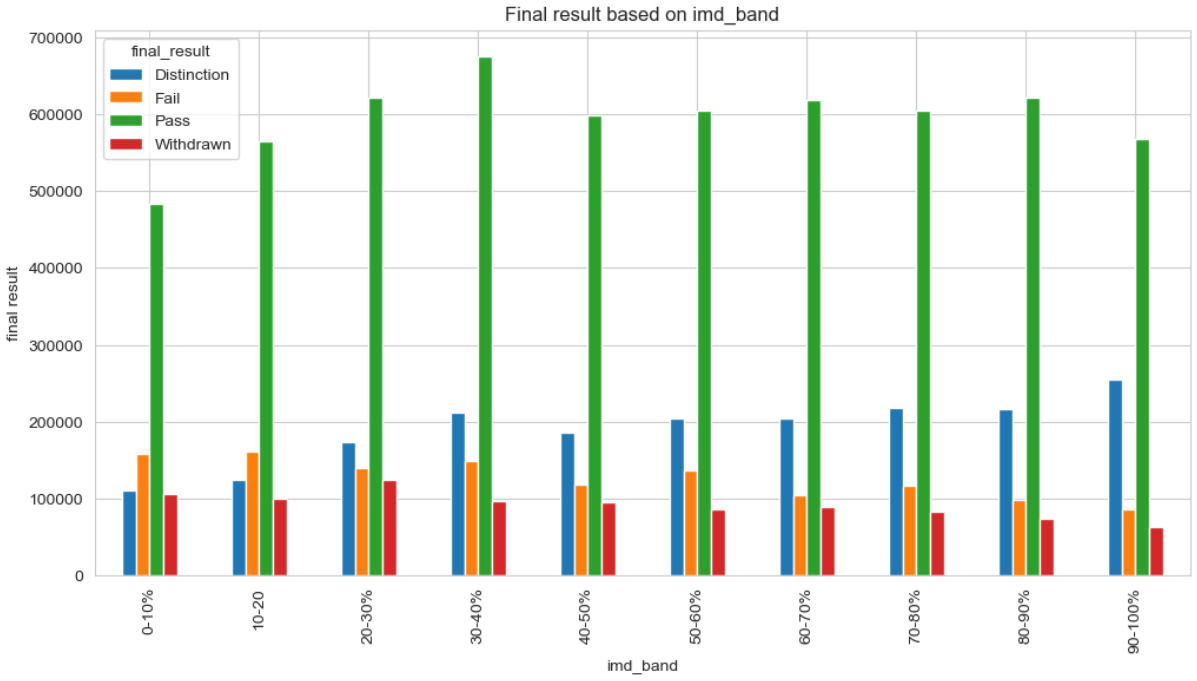


Figure 10: Students' Results by IMD Band

2.4 Activity Type and Final Results

The activity type students interacted with on the VLE had an influence on performance. Oucontent, Forumng, Quiz and Homepage were found to be significant activities that fostered interaction on the VLE, and this also reflected in their performance. Further investigation into the activity types that

had the best performance revealed that female students engaged more in Forumng, while male students interacted more with oucontent and Quiz (Figure 11a).

Among the activity types considered, "oucontent" and " Forumng" emerged as the most impactful on students with “pass” and “distinction” as their final result. "oucontent" comprises of study materials in HTML format, including course materials and assignments. Students who interacted with oucontent displayed notably improved academic outcomes, positioning it as the most effective activity type. Similarly, students who actively engaged with forumng also had high academic performance. Forumng constitutes an online discussion forum which serves as a space where students can collaborate, share insights, and address problems collectively. This might be the reason why female students interacted more with the forumng. Other activity types such as “quiz”, “homepage” and "subpage" also contributed significantly to students' final results. "Quiz" denotes students engaging with quizzes, the "homepage" serves as the initial screen of every course, guiding students through the VLE structure and "Subpage" provides insights into students' navigation paths within the VLE.

However, it is essential to acknowledge that certain activity types, such as "dataplus," "dataplane," "HtmlActivity," "repeatedactivity," "sharedsubpage," “externalquiz”, “glossary”, “oucollaborate”, “ouelluminate”, “page”, “questionnaire” and "folder," did not demonstrate a significant impact on students' final result. These activity types, while still valuable components of the educational experience, did not appear to be correlated with students' academic performance. Students also had low engagement with these activity types as seen in Figure 7.

Fostering active student engagement through activity types like "oucontent", "Forumng", “quiz”, “homepage” and "subpage" can contribute significantly to improved academic outcomes, leading to a higher number of students achieving pass and distinction as their final result.

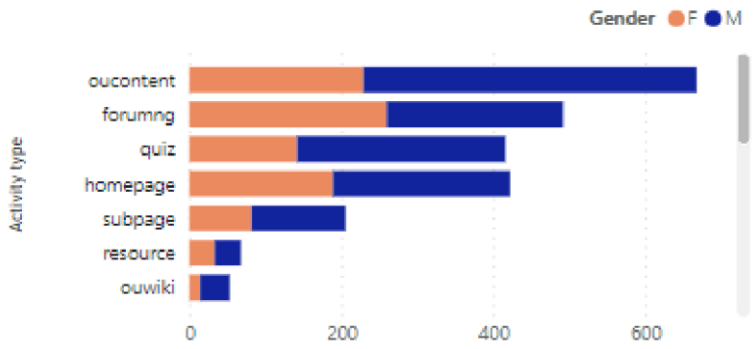


Figure 11a: Average Activity Interaction by Gender

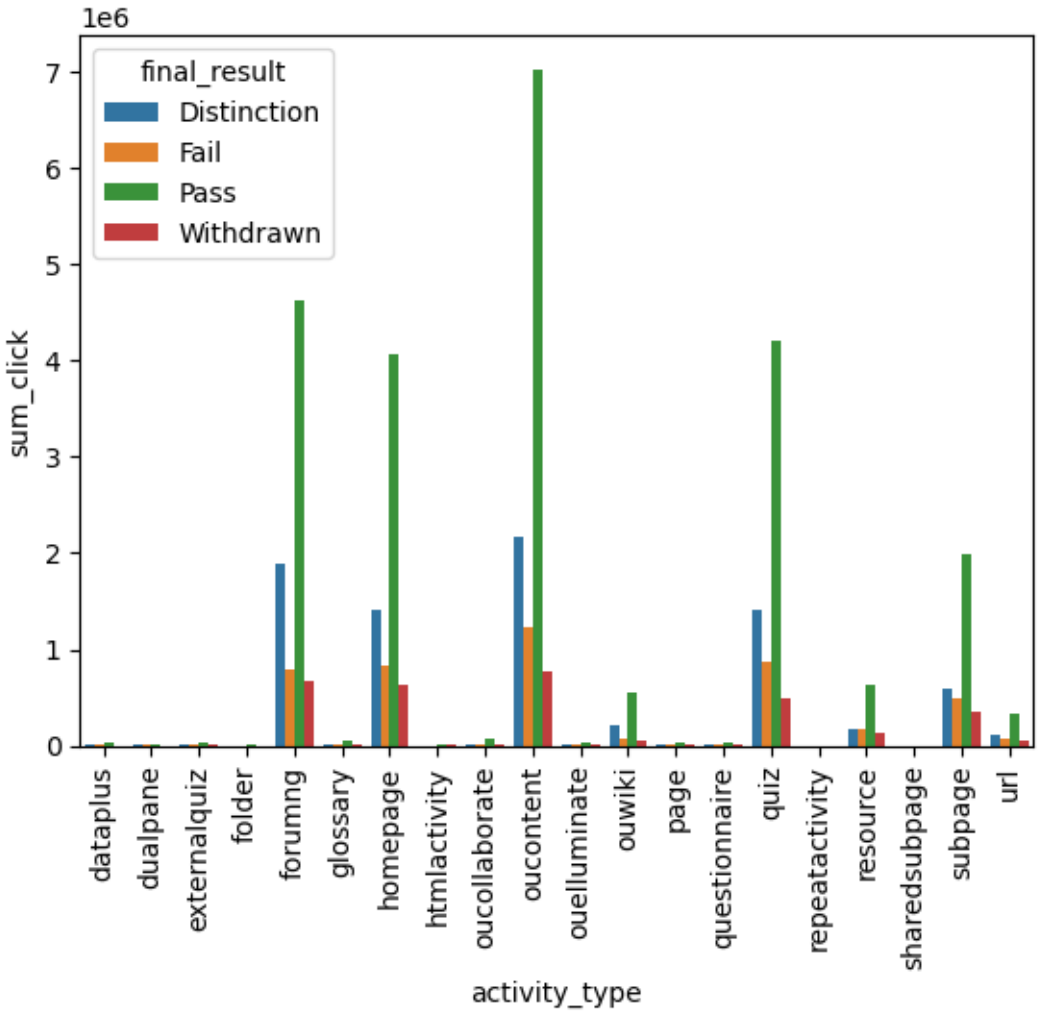


Figure 11b: Activity types and Students' Final Results

3. Other Analysis

3.1 Interaction Patterns over an Academic Session

Figure 12 shows that the interaction experienced oscillatory movement over the analysed period, with a pattern resembling an up and down movement across a 50-day interval. The highest interaction occurred within the first 40 days, peaking between days 16 and 18, with an average of 400,000 total clicks by 12,000 students per day. Additionally, there was a rise in interaction between days 200 and 250, which can be attributed to the proximity of assessments and exam deadlines during that period.

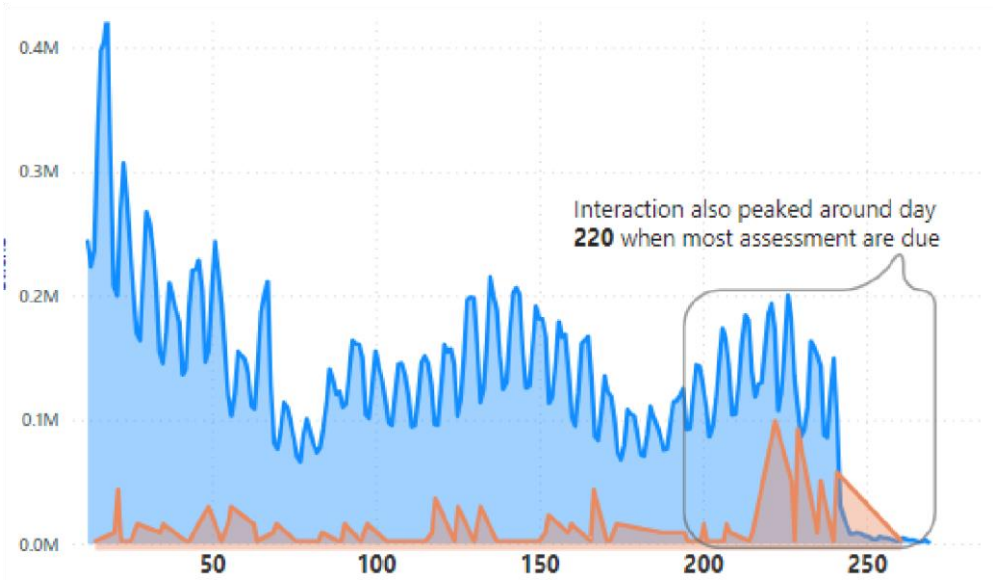


Figure 12: Distribution Plot of Interaction across Days and Assessment Deadline

3.2 Student Interaction Distribution

The frequency of students' interactions with the learning environment is displayed in Figure 13. The result shows that an average student interacted with VLE 1520 times. The distribution of interactions highlights the presence of outliers, as 95% of students engaged with the VLE 3860 times or fewer.

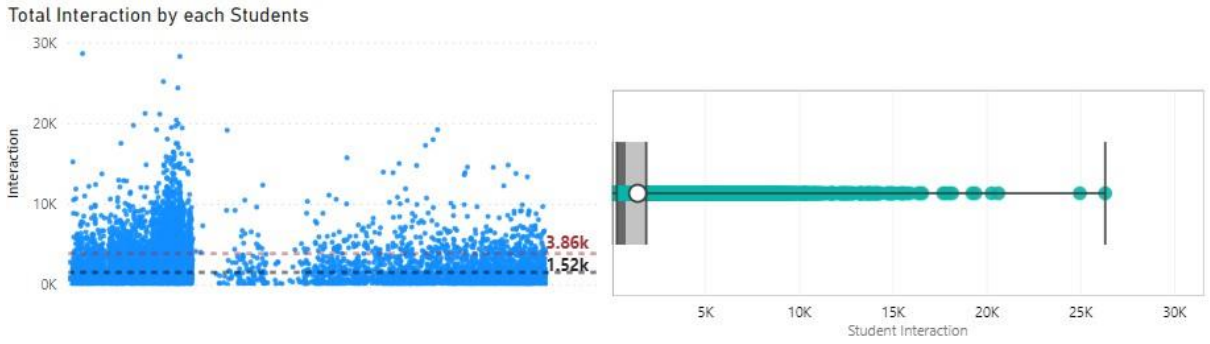


Figure 13: Distribution plot Total interaction by each student

3.3 Most Interactive Course Module

The FFF course material was found to have the highest level of interaction among students, even though the course module BBB had the highest number of registered students. It recorded the highest total interaction compared to other courses. It should be noted that the modules FFF and DDD belong to the STEM domain while BBB belongs to the Social Sciences domain.

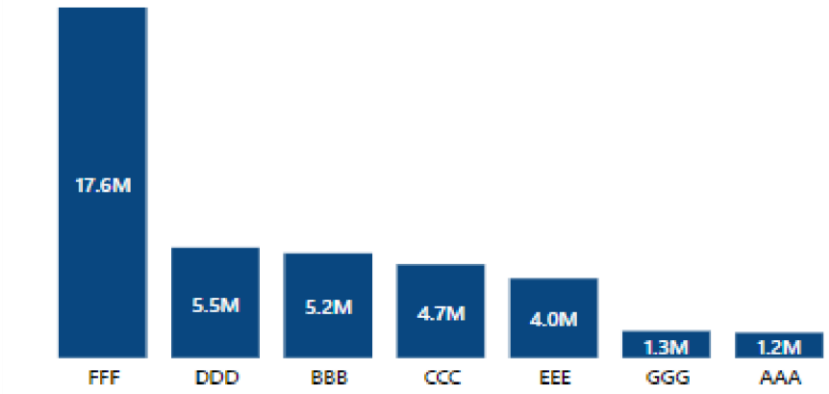


Figure 14: Total interactions by module

3.4 Student Interaction by Semester

While the school observed a year-on-year increase in registration, there was a decline in average interaction per student across the first three academic periods, although it started an upward trajectory in 2014. Moreover, October module presentations exhibited higher interaction levels compared to February presentations.

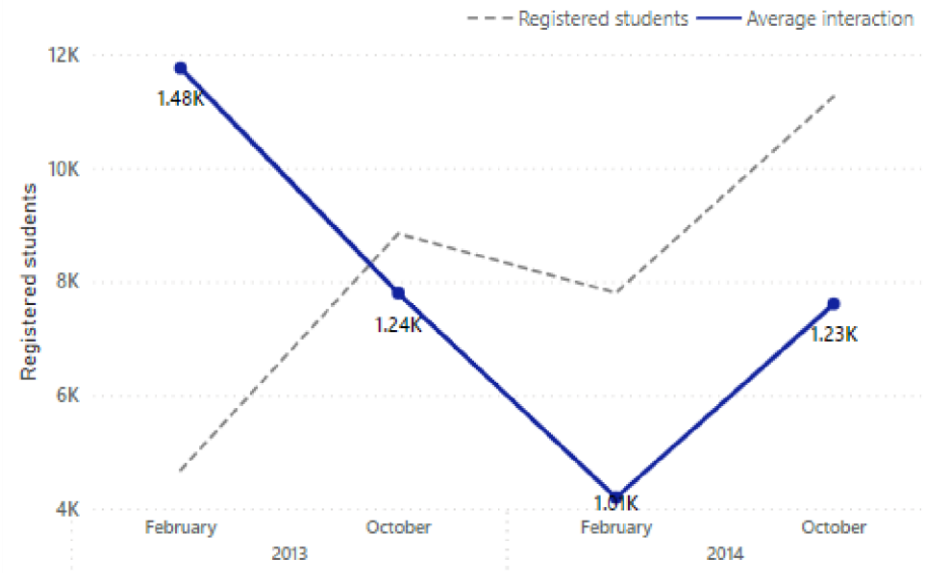


Figure 15: Registered Students and Average Interaction by Semester

CONCLUSION

This study on learning analytics and students' success explored patterns and trends in student engagement with the VLE and identified factors which affect student performance. Age, gender, region, IMD Band, disability status, and educational level influenced the level of student interaction with the VLE. Studied credits and educational level influenced students' final results. The activity type students engaged with also influenced their results. The findings suggest that the FFF course

material drives the most interaction; while the activity types OUcontent, Forumng and Quiz played significant roles in fostering engagement, and consequently, academic performance. Lastly, findings indicate that increased interaction with the VLE has the potential to contribute to improved academic performance.

RECOMMENDATIONS

The recommendations provided are based on the analysis of the available data, and further research and evaluation may be necessary to validate and implement them effectively.

Based on the insights derived from this analysis, it is recommended that the institution focus on the following areas to enhance students' interaction with the Virtual Learning Environment and improve their academic outcomes:

1. **Promote Course Engagement:** Considering that the FFF course material drove the most interaction, it is advisable to identify the factors that make this course engaging and incorporate those elements into other courses as well.
2. **Facilitate Forum Discussions and Quiz:** Given the significance of forum discussions and quizzes in fostering interaction, instructors should encourage active participation in these activities by providing relevant prompts and feedback. Additionally, efforts should be made to bridge the gender gap in activity preferences by promoting diverse engagement across genders.
3. **Targeted Support for Underperforming Periods:** The decline in average interaction per student during the first three academic periods highlights the need for targeted support and interventions during these periods. Identifying the reasons behind this decline and implementing strategies to maintain engagement throughout the academic year will likely improve overall interaction levels.
4. **Student Support in Low IMD Areas:** While no significant correlation was found between location deprivation and academic performance, students from regions with low IMD band had lower interactions with the VLE. Additional support can be provide for students from areas with low IMD bands. This support could include tailored resources, mentorship programs, or access to academic assistance to further enhance their interaction with the VLE.
5. Further investigation should be conducted to understand the reasons for the disparity in engagement across different education levels, and steps should be taken to ensure that students with lower levels of education actively participate in activities on the VLE. This aspect is crucial for the overall performance of the students.
6. **Targeted Support:** The institution should implement targeted support programs to assist students from lower IMD bands, students with no formal qualifications, and students attempting the course multiple times. Such support could include mentoring, additional resources, or personalized guidance to enhance engagement and academic success. Regularly evaluating the effectiveness of these interventions will also help the institution to make data-driven improvements.

7. **Engaging Female Students:** To bridge the gap in engagement between male and female students, the institution should create an inclusive learning environment that promotes equal opportunities and encourages active participation from all genders.
8. **Age-Specific Initiatives:** Understanding the engagement patterns of different age groups is crucial. The institution can design age-specific initiatives and learning strategies to cater to the needs of students in different age bands.
9. **Monitor High Engagement Students:** For students with exceptionally high engagement, the institution should ensure they are appropriately challenged and motivated. Offering research opportunities may keep these students engaged and foster a positive learning experience. This will also serve as a motivation for low performing students to aspire to do better.
10. **Continuous Data Analysis:** The institution should continue to collect and analyze data on student engagement and performance regularly. Ongoing data analysis can provide valuable insights and guide future decision-making to improve the overall learning experience.