# *Bridging Asynchronicity and Engagement: Data-Driven Insights Into Flipped Learning*

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The Asian Conference on Education 2023
Official Conference Proceedings

**Abstract**
Advocates of flipped and blended learning have reported on how these models encourage students to actively engage and become agents in their own learning. There is, however, limited evidence on the extent to which asynchronous online learning materials developed for flipped learning programmes support students to actively engage in their learning. Using back-end data analytics, this study aims to demonstrate the behaviour patterns exhibited by students in a programme where 30% of the flipped learning curriculum design is delivered asynchronously online. A cross-sectional case study research design within a quantitative framework was used. Online content used to teach foundational year students (n=3957) English for Academic Purposes at a British-Asian university in China was analysed. This included teacher-generated videos, comprehension quizzes, and activities linked to subsequent in-person sessions. A prominent finding of this study is that students do in fact take advantage of the unrestricted access to online materials, although overall asynchronous student engagement still needs in-class teacher action to be supported. In summary, data-led investigations into students' online behaviour can advance the pedagogical design and underpinnings of flipped learning along with enhancing educators' adeptness in navigating blended learning environments.

Keywords: EAP, EMI, VLE, Data Tracking, Learning Analytics

## Introduction

Blended learning, an instructional methodology merging conventional in-person teaching with online educational components, has entrenched itself as a ubiquitous feature of contemporary higher education. Evidently, the pervasiveness of this approach is exemplified by the fact that 98% of U.K. universities embraced blended or hybrid learning courses by 2020 (Stacey, 2020). Within the context of the School of Languages (SOL) at Xi'an Jiaotong-Liverpool University (XJTLU), a discernible shift toward the adoption of blended learning has emerged, notably accentuated after the successful pivot to online education amidst the COVID-19 pandemic. This inclination became particularly conspicuous during the 2021/2022 iteration of the Year 1 English for Academic Purposes (EAP) modules, where a delivery model integrated approximately 3 hours per week of self-directed asynchronous online tasks with 6 hours of face-to-face learning. This deliberate hybrid approach aimed to optimize learning outcomes by synergizing traditional classroom experiences with innovative online pedagogy.

Moreover, the increasing internationalization of higher education in China has spurred the rapid expansion of English as a medium of instruction (EMI) institutions and programs, recognizing the critical need for bilingual teaching (Gill & Kirkpatrick, 2013) in order to prepare students for a globalized economy. XJTLU stands as an exemplar of this trend, operating as a transnational institution emphasizing bilingual teaching methodologies. The strategic integration of EAP courses within EMI universities in China, like XJTLU, reflects the recognition of the vital role EAP plays in equipping students with academic English language proficiency. This strategic inclusion is essential in enabling students to navigate academic conventions within specific disciplines, thereby enhancing their preparedness for international exchanges and bolstering their prospects in the global job market (Gao & Bartlett, 2014; Sun & Xu, 2012).

Furthermore, the evolution of education delivery in response to globalization has ushered in a paradigm shift toward virtual learning environments (VLEs) and English-medium instruction. VLEs encompass a spectrum of instructional methodologies that intertwine traditional pedagogical practices with innovative digital tools and asynchronous learning platforms (Smith et al., 2022). As institutions like XJTLU increasingly embrace these digital landscapes, the treasure trove of data generated by student interactions within these environments holds immense promise. By leveraging modern data tracking and analytics tools, educators gain invaluable insights into students' engagement levels, learning preferences, and utilization patterns within these dynamic learning ecosystems (Podgorelec & Kuhar, 2011). This transformative capability not only empowers course designers and instructors to tailor educational materials more effectively but also to optimize student learning experiences within the complex context of virtual education (Huggins-Manley et al., 2019; Smith et al., 2022).

Recognizing the potentially transformational role of data analytics in shaping contemporary educational paradigms, this paper embarks on a comprehensive exploration into the intricate landscape of data tracking within the context of XJTLU's blended learning environments and English-medium instruction. The increasing emphasis on VLE and the integration of EAP into curricular frameworks necessitates authentic case analyses of how data tracking mechanisms can be harnessed to optimize student learning experiences. Consequently, this study aims to utilize data tracking methodologies to investigate the dynamics of asynchronous educational delivery within XJTLU's context, aiming to elucidate its impact on

enhancing pedagogical strategies, facilitating student engagement, and fortifying the efficacy of later EMI learning.

## Literature Review

### *Asynchronous EAP Learning Environments*

In asynchronous EAP learning environments, various instructional methods are employed to facilitate language acquisition and academic skill development. These approaches often encompass multimedia resources, interactive activities, and self-paced modules (Gill & Kirkpatrick, 2013). Multimedia resources, such as videos, recorded lectures, and authentic materials like TED Talks, are frequently utilized to expose students to real-life language use and enhance their engagement (Sun & Xu, 2012). These resources serve to simulate authentic academic contexts, enabling students to comprehend academic conventions while improving language proficiency (Hadijah & Shalawati, 2021).

Furthermore, asynchronous EAP courses incorporate interactive activities like online discussions, forums, and collaborative tasks, aiming to foster communication skills and critical thinking within a virtual academic community (Gao & Bartlett, 2014). These activities often encourage student participation, facilitating language practice and creating opportunities for peer learning (Alves, 2015). The diverse array of instructional methods in asynchronous EAP learning environments caters to various learning styles and promotes autonomous learning experiences among students (Gao & Bartlett, 2014). Through these methods, students gain exposure to authentic academic language, engage in interactive learning activities, and develop crucial language and academic skills necessary for their academic journey.

### *Exemplar Videos*

Exemplar videos can play a valuable role in the instructional design of EAP courses, offering diverse and comprehensive resources to enhance language learning. These videos serve as models for effective presentations, language use, and academic discourse, aiming to acquaint students with the common features of academic language and communication. TED Talks and authentic video materials often form the basis of these exemplar videos (Achaleke, 2021). They are carefully selected to illustrate essential presentation elements, storytelling techniques, effective use of signposting language, and appropriate integration of visuals and text (Shalawati et al., 2021).

Through these exemplar videos, students not only gain exposure to natural language use but also witness effective communication strategies demonstrated by expert speakers (Achaleke, 2021). The deliberate selection of videos aligned with specific course objectives aids in reinforcing academic skills while fostering an understanding of diverse communication styles and contexts (Wang, 2014). Exemplar videos are strategically integrated into the curriculum, encouraging students to analyse and emulate effective communication patterns and presentation techniques in their own academic endeavours. By engaging with these exemplars, students gain valuable insights into authentic academic communication, which in turn enhances their proficiency and confidence in using academic language (Hadijah & Shalawati, 2021). These videos serve as powerful pedagogical tools, providing tangible examples that aid in the development of students' language and presentation skills within the EAP context."

### *Instructional Videos and Student Engagement*

Instructional videos within EAP courses serve as dynamic resources, fostering heightened student engagement and interaction with course content. Chen and Wu (2015) highlighted the efficacy of video lectures and screencasts in facilitating learning by offering visual and auditory stimuli that cater to diverse learning preferences. These videos not only present course material but also provide a personalized learning experience (Lowenthal, 2021). Lyons et al. (2012) noted that the inclusion of talking head presentations alongside slide presentations exhibited no significant difference in learning performance but showcased preferences among students for the instructor's face presence.

The flexibility of instructional videos in accommodating varied learning paces and preferences augments student control over their learning (Cohen, 2022). Students benefit from the convenience of accessing pre-recorded videos, allowing them to revisit and review materials as needed, fostering a sense of agency through pause, play, and rewind functionalities (Cohen, 2022). However, the effectiveness of these videos depends not only on their content but also on their relevance and context to the audience. Wood et al. (2020) emphasized that purpose-developed recorded videos specifically tailored for online students significantly enhanced their learning experience compared to repurposed lecture captures.

Furthermore, the integration of instructional videos aligns with contemporary student learning behaviours, promoting active participation and creativity (Boisvert, 2015; Stone, 2019). Digital video projects and online videos have been found to not only improve speaking abilities but also encourage creativity and diverse modes of expression (Boisvert, 2015; Jati, Saukah, & Suryati, 2019). These findings underscore the value of instructional videos in engaging students within the EAP context, providing a multifaceted approach to language learning and fostering active student involvement.

### *Data Tracking in VLEs*

The significance of data tracking within VLEs cannot be overstated in the context of EAP. VLEs serve as expansive repositories of student interactions, offering a wealth of data that, when appropriately analysed, can yield profound insights into student learning behaviours, preferences, and needs (Hardy et al., 2004). The data generated within VLEs encompass a broad spectrum, ranging from user engagement metrics, time spent on specific tasks, to patterns in resource utilization (Huggins-Manley et al., 2019).

Through data tracking and analysis, educators can gain information of how students interact with course materials. Alves (2015) and Kuzilek et al. (2018) emphasized the pivotal role of tracking student activities within VLEs, enabling educators to model student dropout rates and monitor performance trends. Podgorelec & Kuhar (2011) extended this by highlighting the potential for advanced data analysis within VLEs to monitor student performance comprehensively.

Moreover, the use of data mining techniques within VLEs has shown promise in identifying not just the engagement levels but also learning patterns and misconceptions among students (Podgorelec & Kuhar, 2011). This information equips educators with the insights needed to tailor instructional strategies, identify areas requiring additional support, and even predict student outcomes.

## Research Questions

Given the multifaceted potential of data tracking within VLEs in optimizing EAP course delivery, this study aims to use data tracking methods within the context of Year 1 EAP at XJTLU to investigate student engagement with the provided asynchronous materials. To narrow our focus and harness the insights gleaned from data tracking methodologies, the following research questions are posed:

1. How does data tracking provided by Moodle provide insight into student engagement with asynchronous learning materials?
2. What specific insights can be gained from student engagement data in XJTLU's Y1 EAP context?

## Methodology

### *Student Numbers/Characteristics*

The study was conducted on a Year 1 Undergraduate EAP module with 3,957 students during semester 2. The course was mandatory for all Y1 students and the required course exit was CEFR Low B2. Learning outcomes cover all four macro skills listening, reading, speaking and writing and it is taught across three 100-minute sessions a week in smaller groups up to 27 students.

### *Asynchronous VLE Design Approach*

The module of this size requires a large number of EAP lecturers and due to COVID-19 pandemic, it was challenging to provide the required number of staff to support the delivery. The number of full-load lecturers needed to teach on the module had to be reduced from 80 to 53. The decision was made to create a blended curriculum with two independent, online asynchronous lessons per week to reduce the strain on staffing.

### *The structure of the Integrated Syllabus*

The weekly lesson structure comprised two online lessons (D1: 80-100 minutes and D4: 50 minutes) and three 100-minute onsite lessons. Online lessons introduced a particular skill with set homework and onsite lessons served as reinforcement and skills practice. The weekly structure can be seen in Figure 1 below.

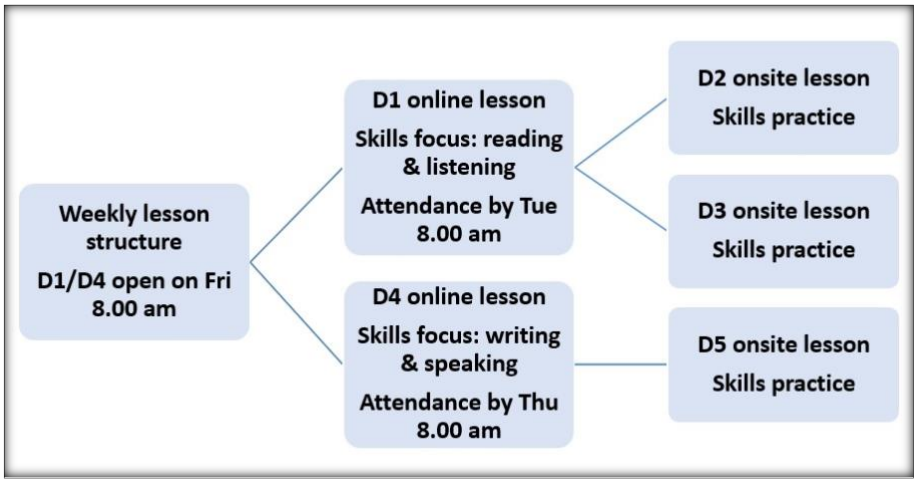


Figure 1: Weekly Lesson Structure

Individual online lessons consisted of an instructional video introducing a skill with lecturer face and subtitles, a video comprehension quiz, and 1-2 practice quizzes depending on the number of individual skills practised. Each lesson was rounded off with a homework task sheet – usually a writing or a speaking preparation assessed in the corresponding synchronous class.

A Moodle attendance plugin was used to automatically take attendance for asynchronous lessons upon completion. A number of activity completion restrictions were used to ensure students only got attendance if they completed a whole lesson. For example, a student would only have access to the following activity if the previous one was completed. In case of Moodle quizzes, the completion requirement was 40% accuracy in responses to questions.

**Data Tracking Approach**

The lesson completion and student engagement were consistently tracked on weekly basis throughout the semester via Moodle analytics through several aspects. First, completion reports were generated for timely lesson completion within given timelines for attendance purposes. Secondly, another set of the reports were generated monitoring general student engagement with online content. Further, individual activity completion reports were generated for each week to gain insight into the completion trends within the individual asynchronous lessons. Over the course of the semester, the reports were used to monitor students' engagement and performance, and to follow up with the students with low performance. At the end of the semester all the data provided by Moodle was analysed and studied.

**Results**

The learning analytics revealed, contrary to a predisposed belief, that students' motivation for completing online lessons was not solely driven by getting attendance marked for the lessons. It can be seen in Figure 2 that the completion rate continued increasing after the attendance deadline had passed. Further, the graphs show that the student completion rate was higher for D1 than for D4 lessons. This was surprising considering that D4 lessons were shorter.


Figure 2: Lesson Completion Reports for W4 – 14

Next, we investigated the individual lessons to gauge whether the students were completing whole lessons and, as it can be seen in Figure 3, this was mostly not the case. Students tended to watch the instructional video, but they would not necessarily complete the follow up activities.

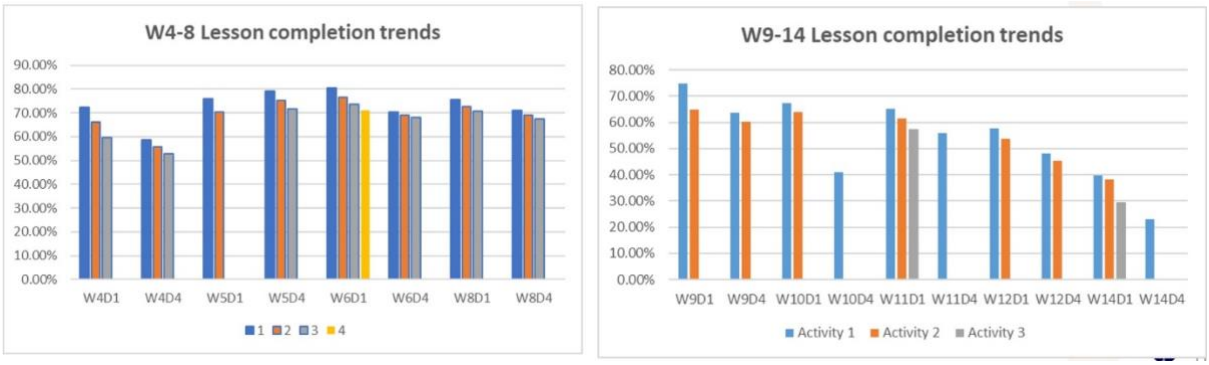


Figure 3: Individual Activity Completion Trends

Given the results above which indicated that the students were more likely to engage with instructional videos, we wanted to look at how students engage with the video content. Since all the video content was uploaded to Moodle via MediaSite, their analytical tools were used to look at video viewing trends. For the purposes of this study, one video was chosen to study the viewing trends namely one of the three provided model presentations which served as a preparation for assessed speaking coursework. MediaSite analytics offered comprehensive data for viewed video content.

MediaSite analytics clearly showed that the video showing the model presentation was viewed 15,794 times by 2,257 students over the semester. This equalled to over 324 hours of viewing for a video of 5 min and 22 seconds.

| | |
|---|---|
| **Total views: S2 AY21/22** | **15,794** |
| **Total time watched** | **324:29:19** |
| **Video duration** | **5:22** |
| **No. of users** | **2,257** |

Table 1: Model Presentation Video Views

Further, we looked at the data showing which video segments were most frequently viewed and the number of the times individual students watched the video. See Figure 5 below.

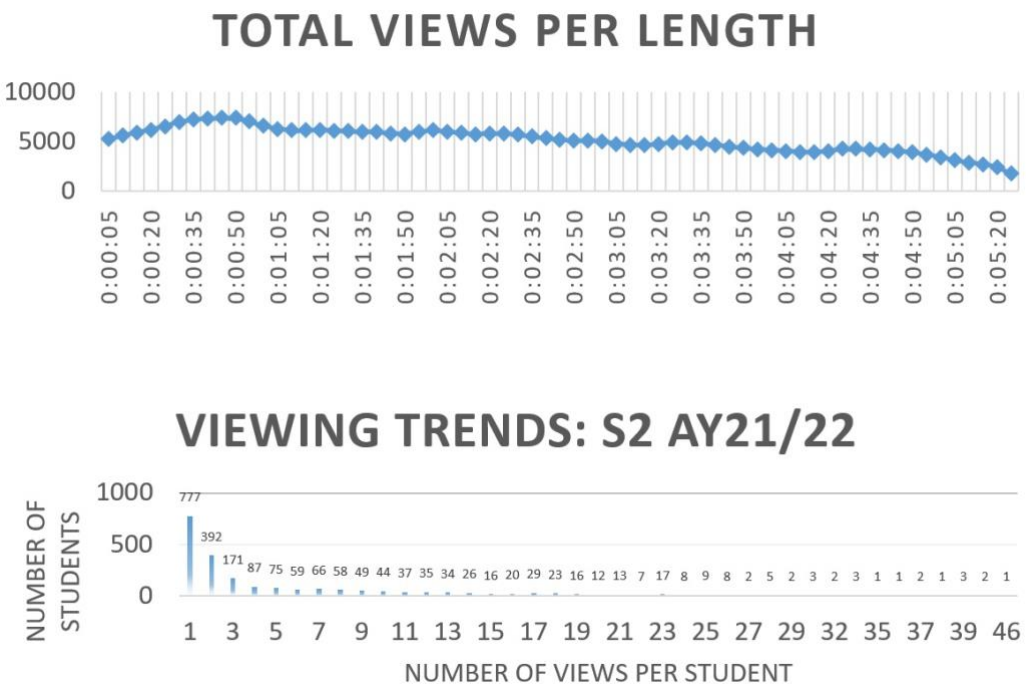


Figure 4: Viewing Trends of the Model Presentation

Finally, one representative student was chosen who viewed the video 23 times and the student's engagement with the video across the semester was analysed. The data was extracted from MediaSite analytics from the student's access logs. The Table 1 below shows the duration and the instances of watching the video in relation to key assessment dates during the semester.

| Week | Access date/time | Time spent watching | Key dates |
|---|---|---|---|
| W1 | 2/21/22 12:04 AM | 10:44 | Sample presentation available |
| W1 | 2/24/22 11:08 PM | 05:22 | |
| W7 | 4/9/22 2:46 AM | 03:02 | Reading week |
| W7 | 4/9/22 3:22 AM | 00:31 | Formative SCW task sheet released in W6 |
| W7 | 4/9/22 3:50 AM | 05:08 | |
| W7 | 4/9/22 11:01 PM | 02:32 | |
| W7 | 4/9/22 11:32 PM | 01:29 | |
| W7 | 4/10/22 11:06 PM | 01:22 | |
| W8 | 4/13/22 12:57 AM | 12:22 | Formative SCW delivery |
| W8 | 4/13/22 9:02 PM | 14:19 | |
| W10 | 4/25/22 11:23 PM | 00:53 | Summative SCW task sheet released |
| W10 | 4/27/22 10:08 PM | 00:08 | |
| W10 | 4/28/22 9:52 PM | 05:22 | |
| W10 | 4/29/22 1:00 PM | 00:04 | |
| W10 | 4/29/22 1:24 PM | 00:05 | |
| W11 | 5/3/22 7:57 PM | 00:02 | |
| W11 | 5/3/22 8:17 PM | 00:08 | |
| W11 | 5/3/22 11:43 PM | 00:34 | |
| W11 | 5/4/22 11:27 PM | 00:01 | |
| W11 | 5/4/22 11:30 PM | 00:02 | |
| W11 | 5/8/22 10:39 PM | 02:35 | |
| W12 | 5/9/22 12:37 AM | 12:07 | Summative SCW rehearsal |
| W13 | 5/15/22 10:16 PM | 12:34 | Assessment week |
| Total | 23 | 1:31:26 | |

Table 2: Student's Viewing Logs

## Discussion

### *VLEs and Asynchronous Learning Design*

The integration of blended learning strategies within EAP courses at XJTLU reflects an evolution responding to the global shift towards VLEs and bilingual instruction (Gill & Kirkpatrick, 2013). Asynchronous EAP learning environments, enriched with multimedia resources and interactive activities (Sun & Xu, 2012), have proven instrumental in nurturing language skills and academic competence among students (Hadijah & Shalawati, 2021). This aligns with the paradigm shift towards digital landscapes in education, underscoring the importance of incorporating innovative pedagogical tools such as exemplar videos (Achaleke, 2021; Shalawati et al., 2021).

The strategic incorporation of exemplar videos into EAP modules in the Year 1 EAP course at XJTLU signifies an intentional effort to immerse students in authentic academic discourse and presentation styles (Achaleke, 2021). These videos serve as models for effective communication, offering tangible examples of academic language use and presentation techniques (Hadijah & Shalawati, 2021). Furthermore, instructional videos within EAP courses have redefined the learning experience, catering to diverse learning preferences and enhancing student engagement (Chen & Wu, 2015; Lyons et al., 2012). The adaptability of these videos allows students to control their learning pace, fostering active participation and creativity (Boisvert & Rao, 2015; Cohen, 2022).

### *VLEs and Data Tracking*

The transformative potential of VLEs lies not only in their instructional methodologies but also in the wealth of data they generate (Hardy et al., 2004). Data tracking within VLEs, as highlighted by Alves (2015) and Kuzilek et al. (2018), offers invaluable insights into student engagement patterns and performance trends. The comprehensive data analytics facilitated by VLEs enable educators to tailor instructional strategies, predict student outcomes, and identify areas requiring additional support ((Podgorelec & Kuhar, 2011). This resonates deeply with our study's findings regarding the utilization of Moodle analytics to track student engagement within asynchronous EAP lessons.

The data tracking analysis conducted during this study revealed intriguing patterns in student engagement with asynchronous learning materials at XJTLU. Contrary to initial assumptions, students' motivation for lesson completion extended beyond mere attendance marking, evidenced by increasing completion rates post-attendance deadlines (Figure 2). However, an interesting disparity emerged between completion rates for different lessons (Figure 2), indicating a complex engagement pattern that warrants further exploration.

Our study also investigated the depth of student engagement with instructional videos, particularly a model presentation video critical for an assessed speaking coursework. MediaSite analytics provided rich data reflecting extensive viewership and varied patterns of video segment engagement (Figure 5). Notably, one student's comprehensive engagement with the model presentation video, viewing it 23 times, revealed a deep immersion strategy evident around key assessment dates (Table 1).

These findings underscore the complexity of student engagement within asynchronous EAP learning environments and emphasize the multifaceted nature of data tracking within VLEs.

They reaffirm the potential for data analytics to illuminate pathways for enhancing pedagogical strategies and optimizing student learning experiences (Podgorelec & Kuhar, 2011). However, they also highlight the necessity for a more holistic understanding of student engagement patterns to inform future instructional design and interventions effectively, which could be achieved by qualitative and quantitative research methods informed by data tracking based research.

In light of these findings, the research questions posed in this study lay a solid foundation for future investigations into the intricacies of data tracking within VLEs, particularly within the context of EAP at XJTLU. Through the use of data tracking, the complexities of student engagement and learning behaviours within these digital landscapes may be begun to be unravelled, and educators can further refine their pedagogical approaches and harness data-driven insights to foster optimal learning experiences.

## Conclusion

The exploration into data tracking within XJTLU's EAP modules within VLEs has unearthed valuable insights into student engagement and learning behaviours. The findings underscore the transformative potential of leveraging data analytics to optimize pedagogical strategies and enhance student learning experiences.

### *Key Recommendations*

*Enhanced Understanding of Engagement Patterns*: Further studies should investigate further qualitatively into the nature of student engagement within asynchronous EAP lessons. This includes exploring varied completion rates across different lessons and deciphering the motivations driving engagement beyond mandatory attendance marking.

*Fine-Tuning Instructional Video Integration*: Educators can refine instructional video strategies by studying viewer engagement patterns more comprehensively. Tailoring video content and structure to align with students' learning behaviours and key assessment dates can enhance their efficacy.

*Holistic Approach to Data Tracking*: Implementing a holistic approach to data tracking within VLEs, beyond lesson completion rates, can provide further insights into student learning behaviours. Exploring additional metrics and engagement indicators can enrich the insights gained from analytics.

### *Limitations*

*Scope and Generalisation*: This study focuses on a specific EAP module at XJTLU, limiting the generalizability of findings to other contexts. Future studies across diverse modules and institutions could provide a broader perspective.

*Technical Constraints*: The study relies on data generated by Moodle analytics and MediaSite tools, which might have inherent limitations in capturing certain aspects of student engagement and learning behaviours.

*Contextual Specificity*: The nature of student engagement within asynchronous EAP environments may be influenced by context-specific factors, such as cultural backgrounds or prior educational experiences, which this study does not extensively cover.

In conclusion, while this study provides valuable insights into data tracking within VLEs and its impact on student engagement within the EAP context, it also highlights the need for continued exploration and refinement. By embracing data-driven insights and refining instructional methodologies based on observed engagement patterns, educators at XJTLU and beyond can further optimize the delivery of EAP courses and enhance student learning outcomes.

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