ADAPTING TO CHANGE: A STUDY OF STUDENT ENGAGEMENT AND PERFORMANCE IN A MOODLE-ENHANCED ENGLISH SYNTAX COURSE

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Abstract: *In 2022, a blended learning approach was introduced to enhance the English syntax course through a Moodle-based platform. The course aimed to improve students' language skills, digital literacy, and time management. It included PDF lectures, scanned materials, exercises, and online assignments with feedback. Afterwards, a questionnaire was used to evaluate students' views on the course, highlighting the benefits and challenges of using digital tools in language education.*

In 2023, following the outcomes of the questionnaire survey, the original Moodle course underwent adjustments and improvements based on student feedback. The enhancements included incorporating URL links to websites for revision, engaging activities such as online games, quizzes, and online tests that were automatically graded, and additional YouTube videos offering diverse perspectives on course topics. The paper presents the outcomes of the Moodle course analysis, encompassing course reports and logs, outline reports, and course statistics, often referred to as "course analytics" or "learning analytics." This involves systematically examining and interpreting data related to student engagement, performance, and interactions within the Moodle course. The primary goal was to determine whether students utilised the updated features and options designed to enhance the Moodle course, how frequently they accessed them, and which features they used.

Keywords: *Moodle course English syntax; questionnaire survey; Moodle course analytics; data mining;*

I. Introduction

Moodle (Modular Object-Oriented Dynamic Learning Environment) is a widely used Learning Management System (LMS) for creating and delivering engaging online courses. In Slovakia, universities have adopted Moodle as their primary platform for e-learning, benefiting from its flexibility, enhanced student-instructor interaction, and accessibility. It often complements in-person courses by providing access to materials, assignments, and collaboration tools.

Universities customise Moodle to meet specific needs, incorporating features like multimedia content, online assessments, and grading tools to create engaging learning experiences. Key tools in Moodle include *Activities* that enhance engagement through assignments, quizzes, forums, video conferencing (BigBlueButton), collaborative tools (Wikis, Glossaries), interactive content (H5P, SCORM), and *Resources* that support learning by

organizing and sharing materials via files, folders, web pages, and external links (URLs).

II. Literature Review

Researchers have explored various aspects of Moodle's use in higher education, revealing key trends and developments in its application.

Zoran and Rozman (2010) explored students' experiences using Moodle alongside traditional face-to-face learning at a professional higher education institution, particularly for developing communicative speech-writing skills in their first and second languages. The study found that while students valued Moodle for organisation, they faced language and technology challenges and hesitated to use its social networking tools. The authors emphasise that education providers must ensure the platform is accessible and user-friendly to improve outcomes. Instructors play a key role in creating interactive, level-appropriate materials to leverage Moodle's features fully. Moodle can enhance class management, foster idea sharing, encourage interactive activities, and improve learning outcomes when used effectively.

Etxebarria, Garay, and Romero (2012) examined the social strategies used by second-language students on the Moodle e-learning platform. Moodle's constructivist foundation, designed to encourage cooperative learning, is particularly relevant for studying social strategies. A group of students from the University of the Basque Country participated, and a questionnaire was developed focusing on four types of social strategies: asking, cooperating, empathising, and practising. The research authors stated that Moodle was a bridge between autonomous learning and group cooperation guided by a teacher, supporting second-language learning through strategy development. It enabled social strategies - actions like asking, empathising, cooperating, and practising - that help students better understand and learn a second language by fostering feedback and interaction. While Moodle offered tools such as forums, wikis, chats, and questionnaires to support these strategies, their usage remains limited. To address this, teachers and students needed clear guidance on how each tool could develop specific learning strategies. The platform could better support a learning process centred on social strategies by effectively utilising Moodle's features.

Bošković, Gajić, and Tomić (2014) analysed the use of Moodle in English language teaching, focusing on its strengths and weaknesses. They examined the platform's features for teaching vocabulary and developing the four language skills (listening, reading, writing, and speaking). The goal was to evaluate Moodle's potential as a supplementary tool for enhancing regular lectures through online learning.

Zainuddin, Idrus, and Jamal (2016) explored using Moodle to support postgraduate open and distance learning courses at Universiti Sains Islam

Malaysia (USIM). Using a questionnaire, they analysed Moodle's functionalities and usage among 18 postgraduate students and 4 lecturers. Findings reveal that Moodle is primarily used as a material repository, though lecturers acknowledge the need to utilize more of its features to enhance the teaching and learning process.

Amer and Daher (2019) examined college students' acceptance of Moodle for an English for Academic Purposes (EAP) course enriched with quizzes. A total of 129 students from special education and early childhood programs participated. Using the Technology Acceptance Model, the study found that students rated their experience above average. Key factors influencing acceptance were perceived usefulness, computer self-efficacy, and ease of use, shaping students' attitudes toward future use as both learners and educators. Additionally, intrinsic and extrinsic motivation significantly correlated with Moodle acceptance components for the EAP course.

Abdullah, Talib, and Iskandar (2021) aimed to develop a Moodle-based hybrid learning model and instructional materials for Linguistics courses to enhance students' knowledge, skills, and understanding, particularly in the English Department. The study identified student needs using a research and development approach and created course materials tailored to hybrid learning. Participants included students from the English Education and Literature Department at Universitas Negeri Makassar. The results produced a Moodle-based hybrid model featuring a syllabus, course design, instructional materials, and student exercises. This model promotes active, interactive, and communicative learning while incorporating flexible strategies to meet modern curriculum demands. It is designed to improve students' knowledge, attitudes, and skills through structured learning procedures, materials, and outcome assessments.

Horváthová (2023a) evaluated the students' attitudes towards the Moodle course on English Syntax to determine whether incorporating digital technologies simplified or complicated the teaching of this subject. The research method employed was a questionnaire survey. Students' perceptions of the Moodle course on English Syntax revealed varying linguistic competence. The course positively impacted writing skills, grammar accuracy, and comprehension, but improvements are needed. Students showed digital skills and provided valuable suggestions for accessibility and interactivity. Time management challenges arose despite many students meeting deadlines. The course provided self-assessment and feedback, but weaknesses were found in assignment management and limited teacher feedback. Creating and administering the Moodle course presented challenges in various areas for the teacher, but valuable benefits were gained. Researching and organising materials deepened subject understanding. Although the online assessment was challenging, student feedback guided course modifications.

Horváthová (2023b) explored the use of LMS Moodle in philological fields such as linguistics, translation, culture, literature, and didactics by analysing courses from the Department of English Language and Literature at Trnava University's Faculty of Education. The study examined course structure, content, materials, assessment, feedback, and use of communication, collaboration, and multimedia tools. Results showed limited use of features like Book, Label, and activities such as asynchronous Chats, Group Choice, Database, and Wiki, which indicated a need for broader use of Moodle's tools to improve teaching and learning.

It can be summarised that reviewed research consistently highlights Moodle's potential as a platform for enhancing teaching and learning. A recurring theme is that, despite its capabilities, Moodle's advanced features are often underutilised. Significant challenges for teachers in creating and managing courses were identified, particularly in providing enhanced feedback and ensuring interactivity. The lack of communication and collaboration tool usage highlights an important aspect of Moodle's constructivist design, which is its focus on promoting social and cooperative learning. Additionally, interactive content, such as quizzes and exercises, plays a crucial role in boosting student engagement and performance. Finally, Moodle's data analytics capabilities provide valuable opportunities for monitoring and supporting students.

III. Research Methodology

Data mining analyses large datasets to uncover new insights and generate valuable information (Manjarres, Sandoval, and Suárez, 2018). Within this broad field, Educational Data Mining (EDM) has emerged as a specialised discipline that focuses on applying data mining techniques to educational environments. Its goal is to better understand students' behaviours, interests, and academic outcomes by exploring extensive educational data (Manjarres, Sandoval, and Suárez, 2018).

The application of data mining in higher education is a relatively recent but rapidly growing area of research. This growing interest stems from its significant potential to enhance the operations of educational institutions and improve learning outcomes. For instance, educational data mining can be employed within platforms like Moodle to analyse student interactions, optimise course design, and support personalised learning experiences. These data mining techniques can be applied individually or combined into hybrid systems for more comprehensive insights (Kumar and Chadha, 2011).

Data mining involves three primary steps: data preparation, data reduction, and extracting valuable information (Jun Lee and Siau, 2001). This

process employs techniques, including association, classification, clustering, decision trees, prediction, and neural networks (Osman, 2019).

The research methodology applied in the current study analyses the Moodle course *English Syntax* offered by the Department of English Language and Literature at Trnava University's Faculty of Education. The methodology involved using course reports and logs, outline reports, and course statistics, commonly called "course analytics" or "learning analytics." Educational data mining techniques were applied to systematically examine and interpret data related to student engagement, performance, and interactions within the Moodle course.

Research Aim and Research Questions

The primary goal of this study is to explore and determine whether students utilised the updated features and options designed to enhance the Moodle course, how frequently they engaged with them, and which features they used. To achieve this, the following research questions will be addressed:

1. Which updated resources and activities in the Moodle course are the most and least utilised by students, and how frequently are they accessed?
2. What factors may influence students' engagement across different resources and activities?

Course Context and Integration

The data for the analysis were collected from a compulsory course offered within the bachelor study programs *English Language and Literature* and *English Language and Anglophone Cultures* at the Faculty of Education, Trnava University. The course combines theoretical knowledge of English syntax - including sentence architecture, word order, sentence patterns, coordination, subordination, and the passive voice - with practical applications through exercises, quizzes, tests, and games. Delivered in a blended format, the course consisted of one face-to-face academic hour and one Moodle module per week.

Assignments were compulsory, submitted biweekly, and factored into the final evaluation. In contrast, online quizzes, games, and tests were voluntary and unrestricted, offering students additional opportunities to reinforce their knowledge. The course targeted second-year bachelor's degree students (*N=90*), though it was also attended by third-year students retaking it (*N=14*).

Data Collection and Application of Data Mining Techniques
Initially, course log information for all participants was retrieved from the "Activity Report" section in Course Administration. The dataset was then refined by excluding logs outside the observation period (September 15, 2023, to September 15, 2024). The refined Moodle log data were categorised into seven groups to facilitate targeted analysis. The data from student logs, including *13 PDF-format lectures, 5 pre-recorded audio lectures, 15 online quizzes, games, and tests, 5 compulsory assignments with their corresponding keys, 6 self-study materials, and 32 compulsory material downloads for face-to-face classes*, were analysed following the three primary steps of data mining:
- Data preparation: the collected logs were organised and cleaned to ensure they were relevant to the study objectives.
- Data reduction: redundant or irrelevant data were eliminated, reducing the dataset to essential information that supported analysis.
- **Extraction of valuable information:** using techniques such as association, classification, and clustering, insights were drawn about student engagement and the factors influencing their interactions with Moodle features.

Association techniques identified relationships between student engagement levels and specific course features (e.g., frequent access to PDF lectures and low usage of audio lectures). *Classification* categorised students into groups based on their interaction patterns (e.g., high, moderate, or low engagement). *Clustering* helped group similar resources based on usage trends (e.g., foundational materials like PDF lectures showing consistently higher engagement).

Ethics
Ethical approval and informed consent were not necessary as the study analysed publicly available Moodle course data. Privacy and confidentiality were maintained, with no personal information disclosed.

IV. Research Results
This section offers a summary of student engagement with the different learning features in the English Syntax Moodle course, including *the number of students* who accessed each feature and *the total number of views*.
The counted learning features include *PDF-format lectures, pre-recorded audio lectures, online quizzes, games and tests, self-study materials, material downloads, submitted assignments,* and *assignment keys*.
The information is organised into tables, each focusing on a specific course feature. Detailed comments accompany each table. The examined cohort consisted of 104 students enrolled in the Moodle course. The tables present

student engagement data with Moodle course learning features mentioned above.

Table 1 summarises the PDF and pre-recorded audio lectures accessed, detailing the number of students and views.

Table 1. Overview of accessed PDF lectures and audio lectures
Source: Moodle course on English Syntax (by the author)

Lectures in PDF format	Number of students	Number of views	Audio lectures	Number of students	Number of views
Lecture 0_Basic terminology	88 out of 104	388			
Lecture 1_Parts of the Sentence	96 out of 104	462			
Lecture 2_Structure of English Sentence_Verb categories	89 out of 104	358			
Lecture 3_Agreement	91 out of 104	384			
Lecture 4_Declarative sentences (affirmative)	92 out of 104	371	Audio lecture 4_Declarative sentences (affirmative)	30 out of 104	43
Lecture 5_Declarative sentences (negative)	86 out of 104	253	Audio lecture 5_Declarative sentences (negative)	15 out of 104	22
Lecture 6_Interrogative sentences	88 out of 104	294			
Lecture 7_Imperative and exclamatory sentences	87 out of 104	286			
Lecture 8_Types of Sentences (The Compound Sentence)	85 out of 104	298			

Lecture 9_The complex sentence (Noun clauses)	91 out of 104	336			
Lecture 10_The complex sentences (Relative clauses)	88 out of 104	303	Audio lecture 10_The complex sentences (Relative clauses)	14 out of 104	19
Lecture 11_The complex sentences (Adverbial clauses I)	87 out of 104	284	Audio lecture 11_The complex sentences (Adverbial clauses I)	14 out of 104	21
Lecture 12_The complex sentences (Adverbial clauses II)	81 out of 104	206	Audio lecture 12_The complex sentences (Adverbial clauses II)	14 out of 104	16
Lecture 13_The complex sentences (Clauses of Condition)	85 out of 104	257			

About 85-96 students accessed most PDF lectures out of 104 and a proportional number of views (e.g., Lecture 1: 96 students, 462 views), indicating a consistently high engagement rate for PDF materials. This suggests that most students repeatedly refer to these materials. Lecture 4 had the highest number of views (92), while Lecture 12 had the lowest (81). Engagement slightly drops in the later lectures, possibly reflecting diminishing student activity or interest as the course progresses. Higher engagement in earlier lectures (e.g., Lecture 1) aligns with the typical pattern of strong initial motivation. The drop in engagement (e.g., Lecture 12: 81 students, 206 views) may reflect waning interest or course progression challenges.

The audio lectures had significantly lower engagement than the PDFs. For instance, only 30 students accessed the audio version of Lecture 4, which dropped to just 14 for later lectures. There is a sharp decline in the usage of audio materials, possibly indicating a preference for text-based materials or a

lack of time/interest in consuming audio content. The limited number of views indicates minimal revisits.

The preference for PDFs over audio lectures is clear, confirming that students prioritise materials that facilitate reading and re-referencing.

Table 2 presents an overview of student engagement with online quizzes, games, and tests, summarising the extent to which these activities were accessed.

Table 2. Overview of accessed online quizzes, games, and tests
Source: Moodle course on English Syntax (by the author)

Online quizzes, games, and tests	Number of students	Number of views
Noun clauses_online presentation	22 out of 104	34
Where adverbials go in a sentence_online quizzes	38 out of 104	68
Sentence structure and verb patterns_online quizzes	30 out of 104	46
Compound sentences_ online quiz	21 out of 104	34
Noun clauses_online quiz	21 out of 104	30
Noun clauses_online test	25 out of 104	38
Defining relative clauses_online test	20 out of 104	35
Non-defining relative clauses_online test	14 out of 104	24
Conditionals 0, 1 and 2_online tests	38 out of 104	60
Compound sentences_online games	19 out of 104	29
Subject-verb agreement 1_online video and quiz	40 out of 104	64
Subject-verb agreement 2_online video and quiz	27 out of 104	38
Subject-verb agreement 3_online video and quiz	24 out of 104	35
Non-defining relative clauses_online video and quiz	16 out of 104	21
Participle clauses_online video+transcript+online test	17 out of 104	20

The engagement in online quizzes and games was generally low, with most activities seeing participation from around 20 to 40 students. The highest participation (40 students) was in the "Subject-verb agreement 1" quiz, while activities like "Compound Sentences" games and quizzes had minimal engagement (19 students, 29 views). Activities with clear educational value (e.g., "Subject-verb agreement") saw higher engagement, indicating that

students focus on what they perceive as directly useful. The number of views per participant is modest, suggesting one-time participation rather than repeated attempts.

There is a clear drop-off in quiz and test participation, which might reflect students' preference for non-interactive study materials or the optional nature of these quizzes. However, the low overall participation shows an opportunity for better integration and encouragement of these tools.

Table 3 provides an overview of compulsory submitted assignments and the assignment keys accessed by students.

Table 3. Overview of submitted assignments and viewed assignment keys
Source: Moodle course on English Syntax (by the author)

Assignments	Number of students	Number of views	Assignment keys	Number of students	Number of views
Assignment 1_Subject and Verb Agreement	94 out of 104	2969	Assignment 1_Subject and Verb Agreement_key	40 out of 104	70
Assignment 2_ Learning to eliminate short sentences by using compound sentences	90 out of 104	1871	Assignment 2_ Learning to eliminate short sentences by using compound sentences _key	30 out of 104	69
Assignment 3_Noun clauses	81 out of 104	1658	Assignment 3_Noun clauses_key	35 out of 104	52
Assignment 4_Changing independent clauses to relative clauses	88 out of 104	1703	Assignment 4_Changing independent clauses to relative clauses_key	29 out of 104	44
Assignment 5_Adverbial clauses	95 out of 104	1703	Assignment 5_Adverbial clauses_key	17 out of 104	35

Most assignments were completed by over 80 students (81–95 students for assignments), with Assignment 5 (95 students) having the highest submission rate. However, only 17 viewed the corresponding key.

However, fewer students (around 17–40) accessed the assignment keys. Key views are disproportionately low relative to assignment submissions, with only a small subset using keys for self-assessment (e.g., Assignment 1: 94 submissions, 40 key views). While students actively complete assignments, there is less interest in reviewing the provided keys, which could affect learning outcomes, as students may not thoroughly review their work. The low use of keys suggests either a lack of awareness or a disconnect in the perceived utility of these resources, despite the survey indicating that self-assessment tools are valued.

Table 4 presents a summary of the self-study materials accessed by students.

Table 4. Overview of viewed self-study materials
Source: Moodle course on English Syntax (by the author)

Self-study materials	Number of students	Number of views
Verbs, objects and complements_ self-study	78 out of 104	207
Agreement subject and verb 1_self-study	60 out of 104	139
Wh-questions _self-study	43 out of 104	71
The imperative_self-study	66 out of 104	145
Learning to punctuate compound sentences_self-study	75 out of 104	203
Noun clauses_self-study	43 out of 104	80

Usage of self-study materials varies, with the most popular resource being "Verbs, objects, and complements" (78 students, 207 views) and the least used being "Noun clauses" and "Wh-questions" (43 students, 80 views). Self-study materials related to more advanced topics (e.g., noun clauses) tend to have lower engagement, potentially indicating difficulty or lack of student confidence in these areas.

View counts suggest occasional revisits, but not extensive use for revision. Topics perceived as foundational or essential received more attention. This aligns with the questionnaire feedback, emphasising a need for practical and explanatory materials.

Table 5 presents the overview of compulsory materials downloads.

Table 5. Overview of Compulsory Materials Downloads
Source: Moodle course on English Syntax (by the author)

Compulsory materials_downloads	Number of students	Number of views
Sentence word order_download	92 out of 104	353
Simple sentence - verbs with and without object_download	92 out of 104	335
Direct and indirect object_download	90 out of 104	291
Objects and complements_download	95 out of 104	365
Simple subject-verb agreement_download	88 out of 104	301
Compound and collective subject-verb agreement_download	87 out of 104	259
Subject and Verb Agreement Quiz 1_download	59 out of 104	152
The forms of a sentence_download	67 out of 104	177
Additions and responses 1_download	88 out of 104	255
Additions and responses 2_download	88 out of 104	250
Alternative negative forms_download	81 out of 104	179
Negative questions_download	81 out of 104	240
The compound sentence 1_download	92 out of 104	244
The compound sentence 2_download	86 out of 104	186
Noun clauses 1_download	84 out of 104	228
Noun clauses 2_download	83 out of 104	191
Relative pronouns and clauses 1_download	72 out of 104	173
Relative pronouns and clauses 2_download	74 out of 104	143
Defining and non-defining clause 1_download	73 out of 104	165
Defining and non-defining clause 2_download	77 out of 104	141
1. Time, place, manner_download	83 out of 104	165

2. Time, place, manner_download	84 out of 104	156
3. Reason and contrast_download	84 out of 104	144
4. Reason and contrast_download	83 out of 104	143
5. Purpose, result, comparison_download	80 out of 104	147
6. Purpose, result, comparison_download	79 out of 104	123
1. Conditional sentences_download	84 out of 104	175
2. Conditional sentences_download	66 out of 104	98
3. Conditional sentences_download	62 out of 104	92
4. Conditional sentences_download	61 out of 104	89
5. Conditional sentences_download	63 out of 104	95
6. Conditional sentences_download	34 out of 104	53

Downloads were consistently high for core materials (e.g., 90–95 students downloading materials like "Objects and complements"). However, more advanced topics, like "Relative clauses" and "Conditional sentences," had lower engagement (e.g., 66–74 students, varying view counts).

High download rates reflect students' appreciation for offline access. The gradual decline in downloads for advanced or specific topics may indicate a gap in perceived relevance or the increasing complexity of these materials.

V. Conclusion of the Research
The research findings are summarised by answering the research questions.

To answer the first research question, *"Which updated resources and activities in the Moodle course are the most and least utilised by students, and how frequently are they accessed?"*, **students engaged with the updated resources and activities in the Moodle course at varying frequencies**. The data reveals insights into student preferences and areas needing encouragement. Students' interaction with the updated resources and activities can be categorized into *high frequency, moderate frequency,* and *low frequency of interaction*.

PDF lectures and compulsory material downloads were the most frequently accessed resources, reflecting a strong preference for written

content that is easy to reference, study, and access offline. Additionally, the majority of students completed and submitted assignments, demonstrating regular engagement with this feature. This indicates a preference for materials that support self-paced, individual study.

Self-study materials, categorised under moderate frequency of interaction, were accessed unevenly, with foundational topics receiving more attention than advanced ones.

Audio lectures, interactive online quizzes, and assignment keys saw low interaction frequencies, suggesting that students may prefer static learning resources over interactive or audio-based ones.

The low usage of audio lectures may be due to factors such as a lack of time to listen or perceived inefficiency compared to reading. This suggests that audio formats alone may not meet students' study needs unless combined with visual aids or transcripts.

The low participation in quizzes, games, and interactive tools, despite students' expressed interest in these formats, may reflect a disconnect between design and delivery. If interactive activities lack clear instructions, immediate feedback, or direct relevance to assessment, students may not prioritise them. This highlights the need for better promotion of these tools, perhaps by linking them to course performance or providing incentives for participation.

Engagement with assignment keys was notably low compared to assignment submission rates, even though many students valued them for self-assessment. This gap could indicate issues with awareness or the effort required to use them effectively. Inserting feedback tools directly into the submission workflow or prompting students to review keys after grading could enhance usage. Additionally, the low engagement with assignment keys indicates that students may not fully reflect on their mistakes.

To address the second research question, *"What factors may influence students' engagement across different types of resources and activities?",* the analysed data shows that **the students did utilise the updated features and activities** to varying extents. Their engagement varied significantly depending on the type of resource, showing a strong preference for static, text-based materials resources over interactive ones, and materials that support independent and offline learning, with easily accessible materials being used most frequently, while interactive features saw sporadic use. Further factors influencing engagement include the compulsory or optional nature of certain activities, the perceived complexity, relevance and utility of the content, and waning interest or course progression challenges.

A notable decline in resource engagement towards the end of the course (e.g., later PDF lectures and downloads) suggests waning motivation or increased academic workload over time. This natural drop-off might be

addressed by spreading assessment weight evenly throughout the semester or integrating more engaging end-of-course activities.

VI. Discussion

The analysis of the course engagement data and the feedback from the questionnaire survey on students' needs and preferences (Horváthová 2023a) reveal some interesting correlations and potential improvements for the Moodle course on English Syntax which can be put into the following categories: *preferred study materials (PDF vs. other formats),* ***need for more interactive content, desire for explanatory videos and visual aids,*** *use of assignment keys for self-assessment, and l*ow ***use of audio lectures vs. strong interest in online tests.***

The engagement data show that *PDF lectures were the most accessed resource*, with 85-96 students out of 104 viewing the PDF versions of the lectures. This aligns with the feedback from the survey, where 48 students explicitly preferred PDFs due to their ease of use for reading and studying. This suggests that PDFs meet the needs of most students who favour written materials and find it easier to study through reading. The *audio lectures* had a much lower engagement, with only 14-30 students accessing them. This is in line with the feedback from the survey, where only 18 students preferred recorded lectures. The survey indicates that students who preferred recorded presentations liked pausing and re-watching at their own pace, but this feature was not widely used. Therefore, while recorded lectures may benefit a small portion of students, their lower engagement reflects the general student preference for static, text-based materials.

The data also show low participation in ***online quizzes and games***, with only 19-40 students engaging in these activities. However, the questionnaire indicates that students ask for **more online exercises, quizzes, and interactive learning methods**, such as games and automated tests. The discrepancy between what students say they want and what they use suggests that the current quizzes and interactive tools may not be engaging enough, or that they are not effectively integrated into the course in a way that motivates students to use them. The course could benefit from **more engaging, well-integrated online activities**, with better explanations and real-time feedback, as students have specifically requested more interactive and automated tools. Improved accessibility and user experience for these tools could lead to higher engagement.

While only a few students used audio materials or requested recorded lectures, the questionnaire feedback shows a **strong interest in explanatory videos and visual aids**. Since the course data shows **low engagement with audio lectures** and **higher engagement with PDF materials**, **visual aids, or videos that supplement the written lectures** (rather than replace them) could

address students' preferences for multi-modal learning. Providing short, **complementary videos that visually explain concepts** covered in the PDF lectures might address this need, as students are requesting more varied learning formats without moving entirely away from the preferred PDF-based structure.

According to the questionnaire survey, **61 students used *the assignment keys*** for self-assessment, which aligns with the course data, which shows that approximately 17–40 students consistently accessed the assignment keys. The lower course engagement figures compared to the survey feedback could suggest that some students did not access all keys despite using them for some assignments. Since students value the keys as a tool for self-assessment, the **assignment keys could be made more visible or emphasised** in the course interface to encourage more students to access them.

Few students accessed *audio lectures*, but the questionnaire indicates interest in **automated online tests**. This suggests that students may prefer interactive, test-based resources over passive listening. Providing **automated quizzes and tests** with instant feedback could better engage students who prefer active learning.

VII. Conclusion

The paper systematically explored the engagement patterns of students in the English Syntax course by integrating data mining methods.

The course data and student feedback reflect a strong preference for ***written materials (PDFs)*** and a need for more ***engaging, interactive resources***. While students appreciate having diverse learning tools available, they are inclined toward those that are easy to use and align with their study habits. To improve the Moodle course, the instructor could: introduce more ***interactive quizzes and automated tests*** with real-time feedback, supplement written lectures with ***short explanatory videos*** and ***visual aids***, ensure that ***assignment keys are easy to find*** and encourage their use for self-assessment and provide a variety of ***supplementary materials and revision aids*** to cater to different learning preferences.

The analysis of student engagement in the Moodle-enhanced English Syntax course revealed clear patterns in content preferences and usage. However, several limitations should be acknowledged. A key limitation is the reliance on log data, which is useful for tracking access and interaction, but it does not reveal students' motivations, learning strategies, or contextual influences. For example, high PDF view counts may reflect actual study or repeated page loads. These distinctions are not visible in the collected data. The study also focused on a single course at Trnava University, limiting generalisability to other contexts with different teaching methods or student

profiles. Additionally, many features, like quizzes and games, were optional, making it unclear whether low participation was due to disinterest, perceived irrelevance, or limited time. Finally, while the questionnaire used in the study by Horváthová (2023a) provided useful feedback, self-reported data can be affected by response bias and may not fully align with students' actual behaviour.

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