

Education data analytics for personalised learning and wellbeing

LEARNING STORY – GREECE

Author: Antoine Selim Bilgin, European Schoolnet

30 June 2025

Summary

An ICT teacher in Athens, Greece, utilizes free and open-source tools for data analytics in her classroom. She employs Moodle, an open-source Learning Management System (LMS), for various data analytics tasks. She analyses student activity and engagement patterns to improve teaching practices and ensure student well-being. She monitors students' online behaviour, adjusts assignments, and coordinates with colleagues based on data insights. Additionally, she employs tools like H5P and Playpos.it for interactive learning experiences. Data analysis helps her identify misconceptions, assess teaching strategies, and track students' progress in flipped classrooms. She also emphasizes digital well-being, integrating data literacy into her lessons and encouraging students to reflect on their screen time. Collaboration with colleagues and ethical considerations are integral to her approach.

Quick reference sheet

| | |
|------------------------------------|--|
| Country | Greece |
| For whom is the learning story? | Teachers |
| What is it about? | Inspecting student data during class, out-of-school and flipped classroom activities to promote personalised learning, wellbeing and data literacy |
| Target group in the learning story | Secondary education |
| The focus of the learning story | Data use for teaching and data literacy activities with students |
| Keywords | Education data analytics, digital wellbeing, data literacy, open-source |

Background

There are many EdTech companies offering paid services to schools such as adaptive learning technologies and teacher dashboards. However, teachers can do many things with free and open-source tools.

Sofia is teaching ICT to 12–14-year-old students at the [1st Experimental School of Athens](#). She is also a PhD student at the University of Piraeus and works at the experimental school of Athens. The school accepts students on the condition of passing an entry exam. The school has contributed to various EU-funded projects in the past. She was a contributor to the MOOC that has been developed by the [Learn2Analyze project](#), co-funded by the European Commission through the Erasmus+ Program of the European Union. She is also the first author for the book "[Educational Data Analytics for Teachers and School Leaders](#)". The book is open-source and free for download.

The project developed a MOOC to learn about education data analytics, and infographics, for instance, to describe [a teacher using a flipped classroom approach supported by data analytics](#).

Moodle learning platform has been adopted as the school's Learning Management System (LMS). Moodle is free and open source, and allows educators to create a private space online, filled with tools that easily create courses and various activities, all optimised for collaborative learning.

Sofia is mainly engaged in three data analytics activities:

1. Analysing scores, both overall and by question, from online tests performed in the Moodle platform, to pinpoint areas where students struggle and perform poorly. This allows her to intervene by adjusting the learning activities.
2. Recording timestamps indicating when students submit assignments. For example, if several students appear to stay up late to submit their assignments, she talks with other colleagues to discuss and better coordinate and alleviate the overall workload for students at home.
3. In the classes/modules where she implements a flipped classroom approach, she tracks students' study progress to ascertain whether they have prepared the material at home. This data is collected from [H5P](#) interactive videos with questions within [Moodle](#), other tools like [Playpos.it](#), or external platforms such as Khan Academy, Code.org.

The Implementation¹

Using online trace data and timestamps

The school runs its own Moodle server. Sofia downloads reports from Moodle and inspects them in Excel. She monitors the timestamps when students are logged on Moodle. She thinks that students should not be doing assignments beyond 23:00 in the evening (Figure 1), because they are 12-14 years old, and they need to sleep well for their wellbeing. When she notices a student who is spending a long time late on the platform, she asks the student on the day after, why this was the case and whether they need any help. Since Moodle shows the time that the teacher has graded assignments, she also needs to avoid grading at a late hour to be a role model.

She also speaks to her colleagues, to manage the workload. For instance, to diminish time spent on assignments at home, she transfers some activities to be done in the classroom. If many students stay up late for submitting the assignments, the teacher council should discuss to ease the workload by reorganising the assignments' deadlines. If it is limited to a few students, the teacher can explore the reasons behind the problem (e.g., social media or online video gaming overuse).

¹ This learning story is further explored in the [Agile EDU MOOC](#) under section 2.3.

Moodle assignment

| Επιλογή | Εικόνα χρήστη | Μαθητή/Βασιστικό όνομα / Επίσημο | Κατάσταση | Βαθμολογία | Επιχειρήσια | ΕΚΔΟΣΙΑΚΗ τροποποίηση (υποβολή) | Υποβολές αρχών | Σχόλια υποβολής | ΕΚΔΟΣΙΑΚΗ τροποποίηση (βαθμολόγηση) | Σχόλια ανατροφοδότησης |
|--------------------------|---------------|----------------------------------|----------------------------|------------|---------------|-------------------------------------|---|-----------------|-------------------------------------|--|
| <input type="checkbox"/> | | [Redacted] | Υποβλήθηκε για βαθμολόγηση | 100.00 | Επιχειρήσια * | Tuesday, 17 October 2023, 10:18 AM | 1 Η μηχανή ενigma (100.00pts) | Σχόλια (0) | Tuesday, 24 October 2023, 10:05 AM | Μητρώβ: [Redacted] Έκανε εξαιρετική δουλειά. Πολύ παρατετακή παρουσίαση. Σύντομο και επιγραμματικά μεταφέρει την πληροφορία της ηρώης. |
| <input type="checkbox"/> | | [Redacted] | Υποβλήθηκε για βαθμολόγηση | 100.00 | Επιχειρήσια * | Tuesday, 17 October 2023, 10:17 AM | 1 Η μηχανή ενigma (100.00pts) | Σχόλια (0) | Saturday, 21 October 2023, 4:10 PM | Πολύ ωραίο έργο! Σε μία διαφανή το κείμενο γίνεται έμφαση από τα όρια της διαφάνειας. Αυτό θα πρέπει να το προσέχεις γιατί οι θεσμοί ... |
| <input type="checkbox"/> | | [Redacted] | Υποβλήθηκε για βαθμολόγηση | 100.00 | Επιχειρήσια * | Tuesday, 17 October 2023, 10:17 AM | 1 ΕΠΙΓΡΑΦΕΣ | Σχόλια (0) | Saturday, 21 October 2023, 4:07 PM | Πολύ ωραίο έργο! Σε σου έδωσαν κάποια πολύ λίγα ορθογραφικά λάθη που δεν είναι καλό να εμφανίζονται σε μια παρουσίαση. Μπορείς ... |
| <input type="checkbox"/> | | [Redacted] | Υποβλήθηκε για βαθμολόγηση | 100.00 | Επιχειρήσια * | Tuesday, 17 October 2023, 10:16 AM | 1 ΜΗΘΙΑΝΗ ΕΠΙΓΡΑΦΕΣ | Σχόλια (0) | Tuesday, 17 October 2023, 10:23 AM | |
| <input type="checkbox"/> | | [Redacted] | Υποβλήθηκε για βαθμολόγηση | 100.00 | Επιχειρήσια * | Tuesday, 17 October 2023, 10:15 AM | 1 ΜΗΘΙΑΝΕΣ ΕΠΙΓΡΑΦΕΣ | Σχόλια (0) | Tuesday, 17 October 2023, 10:24 AM | |
| <input type="checkbox"/> | | [Redacted] | Υποβλήθηκε για βαθμολόγηση | 100.00 | Επιχειρήσια * | Monday, 16 October 2023, 9:34 PM | 1 Νέος φάκελος (1) 1 Μηχανή ενigma (16.10.pts) 1 Νέος φάκελος (1) | Σχόλια (0) | Saturday, 21 October 2023, 4:59 PM | Μητρώβ: [Redacted] Σέ τιμωρε πολύ την εργασία σου. Προσπάθησε να βάλεις λιγότερα λήγια στις διαφάνειες. |
| <input type="checkbox"/> | | [Redacted] | Υποβλήθηκε για βαθμολόγηση | 100.00 | Επιχειρήσια * | Sunday, 15 October 2023, 11:02 PM | 1 Ενigma (100.00pts) | Σχόλια (0) | Friday, 20 October 2023, 8:50 AM | |
| <input type="checkbox"/> | | [Redacted] | Υποβλήθηκε για βαθμολόγηση | 100.00 | Επιχειρήσια * | Sunday, 15 October 2023, 8:10 PM | 1 ενigma 2 (1) (1)pts | Σχόλια (0) | Friday, 20 October 2023, 8:49 AM | |
| <input type="checkbox"/> | | [Redacted] | Υποβλήθηκε για βαθμολόγηση | 100.00 | Επιχειρήσια * | Saturday, 14 October 2023, 12:56 PM | 1 Μηχανή Ενigma 03 (7)pts | Σχόλια (0) | Tuesday, 17 October 2023, 1:01 PM | |
| <input type="checkbox"/> | | [Redacted] | Υποβλήθηκε για βαθμολόγηση | 100.00 | Επιχειρήσια * | Friday, 13 October 2023, 11:52 AM | 1 ενigma (100.00pts) | Σχόλια (0) | Friday, 20 October 2023, 8:46 AM | Εξαιρετικό |

Figure 1 Student (encircled in red) who was logged in on Sunday past 11:00 PM.

Observe changes in behaviour patterns

Sofia pays attention to differences in behaviour patterns in remote and in-class learning. Some students might be better in classroom activities, but less good in online activities. A possible cause can be limited or no access to computer due to financial problems. In that case she can find ways to help them overcome the barrier, e.g., have some spare tablets that students can borrow. It can also indicate that the student expresses themselves less in the classroom but is in fact doing better in remote learning settings.

She also pays attention to extreme online behaviours. She can investigate this together with each student by inspecting the smartphone app statistics. For instance, a student spending too much time on YouTube or game applications might be experience school anxiety. Spending long time on class assignments might indicate perfectionism.

Using data to reflect on teaching practices

Sofia analyses online quiz score statistics, overall and per question to revise a problematic quiz question and see how she can better address it with new learning activities.

Sofia also evaluates a teaching strategy or intervention; she performs hypothesis testing to see whether an intervention has an effect on the group of interest. She conducts a *t-test* to compare the means of the intervention group with a reference group.

For instance, Sofia conducted classroom research where there were two experimental conditions. She wanted to know whether students from a non-Science/Technology track would benefit from a digital platform that guides their learning about *if-then-else* logic in programming. The problem she wanted to address is that students can have misconceptions about if-then-else statements. E.g., they have difficulty understanding how conditions are evaluated by the code or make mistakes with nested conditions (if x then y, elseif w then z...).

One group of 27 students was used as a control group, while 81 students, where the intervention was applied using the five designed learning objects, served as the experimental group. In both groups students were encouraged to work in pairs or groups. The experiment evaluated the effectiveness of the digital learning platform with interactive learning objects in teaching programming, focusing on conditional statements (if-then-else).

Sofia evaluated students' knowledge at the end of the intervention and also asked them to fill out a feedback survey. Experimental group students scored only slightly higher in the evaluation. The survey results showed that although they found the digital platform useful, some students were not interested in using the platform at home.

Monitoring flipped classroom activities

Sofia uses data to track students' study progress in flipped classroom activities (out-of-class activities) to check whether they have studied the material at home. [H5P](#) allows asking questions to students while they are watching a video, a free tool that enables interactive videos without the need of a paid tool such as EdPuzzle. At the beginning of class activities students can compare their progress with that of their classmates and discuss the difficulties they encountered.

[Playpos.it](#), [Khan Academy](#) and [Code.org](#) are other tools that can be used for creating interactive videos. For Khan Academy students can enter with a code if they are under 12, and do not need to create an account. Khan Academy has also gamification features and adapts to the students' skill level.

Questions to spot typical mistakes

It is important that quiz questions are at an appropriate difficulty level. On Moodle, teachers can inspect this easily with the visualization of student scores; a histogram² of student assignment

² A histogram is a graphical representation of the distribution of numerical data. It consists of a series of adjacent columns, each representing a range or interval of values. The height of each bar corresponds to the frequency or relative frequency of data points within that range (in this case, the number of students). The taller the column, the more frequently data points fall within that particular interval. Histograms are commonly used in statistics to visually summarize the distribution of data and identify patterns or trends, making them a powerful tool for data analysis and interpretation.

grades for a single classroom or students from all classrooms (Figure 2). Sofia looks at the histogram of quiz scores (e.g., Moodle or other tools can produce such a graph in their dashboards) to inspect the distribution of scores in the classroom. It is important that a quiz is neither too easy nor too difficult to get a good summative assessment or detect many misconceptions for formative assessment. If the quiz is too easy as in the image, there are many students scoring high. A bell curve like distribution would be more ideal in this case. This visualisation can help adjusting the difficulty level of question banks for quizzes for future lessons and cohorts.

The quiz answers should help identify students that have misconceptions about the topic. For instance, a typically difficult task in block-based programming is to create loops within loops in [Scratch](#). When students are asked to determine the number of repetitions in nested loops in a sequence of Scratch blocks, many tend to add the number of individual repetitions instead of multiplying them. A question that differentiates students who have this misconception from others, is a reliable question that can be used in future classrooms.

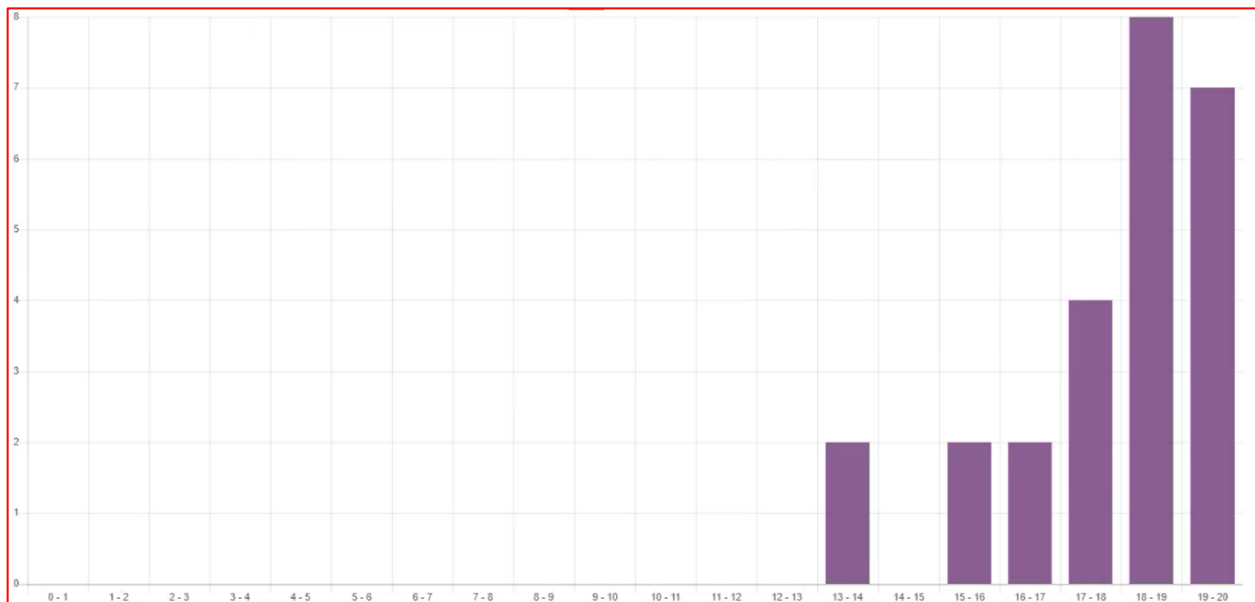


Figure 2 With a skew towards the right of the graph, most students seem to get a score between 17 out of 20.

Ethics and learning analytics

Sofia collaborates with another ICT teacher colleague on revising course content. She talks to other colleagues about data ethics. A common issue is following rules for publishing students' photos on the Internet, e.g., sometimes teachers want to showcase work done in the classroom

and ask for a classroom picture to be put on the school's website. In that case, they need to obtain consent from students and their parents/guardians.

Data analytics helped Sofia understand some students better and change her mind about them. Some students are shy and appear as not participating in the classroom. But Sofia noticed that those students are handing in assignments on time and are doing fairly good with them. Some students are more open to participating with digital platforms.

Sofia conducts surveys with students, e.g., about video gaming, internet use. Students check the digital wellbeing apps' data on their smartphone (they can monitor time spent on apps). They then can type in their app use over weeks on a collaborative Google sheet. For instance, that is how Sofia noticed that some students use YouTube up to 9 hours per day.

Data literacy and wellbeing

Sofia encourages students to inspect and interpret data graphs. For instance, she asks students to interpret a scatterplot (Figure 3) that indicates a correlation between screen time and wellbeing.



Figure 3 Scatterplot indicating the relationship between wellbeing (y-axis) and total time spent using the smartphone (x-axis). Lower wellbeing is associated with more screentime.

Conclusion

Sofia makes the most of existing free tools to perform data analytics. Since most of the platforms do not require a student sign-in, student data remains anonymised. As an ICT teacher she also tackles digital wellbeing in her lessons. She actively engages students in the question of digital

wellbeing by collecting survey data about their wellbeing, taking note of their overall app use and screentime and then interpret the overall data. This helps students become more aware of their wellbeing while also developing basic data literacy skills, learning about data visualisation and spreadsheets.

There are many more education data analytics practices explained in Sofia's book and the Learn2Analyze project. For instance, Moodle has plugins for advanced data analytics, such as [SmartKlass](#). SmartKlass is a dashboard for teachers and students. It analyses students' trace and assignment data to help teachers identify the students lagging or students for whom content is not challenging enough. It also allows teachers to compare participation and results to other courses, so the teachers can take action. It also provides a dashboard to students which they can inspect to learn about their performance, individually and compared with the group. However, such Moodle plugins require a good school ICT infrastructure to run without crashing, although it is an open-source platform and free to run.

Sofia sets a good example for basic data analytics and teacher inquiries that can be easily implemented by any teacher, without the need of paid education technologies.



**Co-funded by
the European Union**

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.