Deliverable Report

Extending Design Thinking with Emerging Digital Technologies

Grant Agreement Number 101060231

HORIZON-CL2-2021-TRANSFORMATIONS-01-05

(Integration of emerging new technologies into education and training)

Deliverable 9.2
RP1 Ethics Board Report

Due date of deliverable: Month 19 – 31 March 2024
Actual submission date: Month 20 – 2 April 2024

Exten(DT)^2 identifier	D9.2 RP1 Ethics Board Report
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Final editorial review	Shamim Patel (LNU)
Work Package/Task no.	WP9 / T9.3
Work Package lead	Trinity College Dublin
Document status	Final
Confidentiality	Public

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1 Abbreviations

Abbreviation	Definition
AI	Artificial Intelligence
ALA	Authorable Learning Analytics
DBR	Design Based Research
DMP	Data Management Plan
DPIA	Data Protection Impact Assessment
DPO	Data Protection Officer
DT	Design Thinking
EAB	Ethics Advisory Board
Exten(DT)^2	Extending Design Thinking with Emerging Digital Technologies
IRB	Institutional Review Board – with the power to grant ethical approval for research studies, typically operating at an institutional level
LA	Learning Analytics
LNU	Linnaeus University
OMT	Operational Management Team
OU	Open University
REC	Research Ethics Committee - with the power to grant ethical approval for research studies, typically operating at a department or school level within a university.
RP1	Reporting Period 1
RRI	Responsible Research and Innovation
TCD	Trinity College Dublin
VSD	Value Sensitive Design
WP	Work Package

2 Summary

This report presents the internal processes through which ethical issues have been engaged with, in the first reporting period of the project, following on from Deliverable 9.1. It presents the ethical issues discussed and resolved within the project, thus far, focusing on informed consent and the Authorable Learning Analytics (ALA). It demonstrates how ethical issues are mitigated through technical design and how the project team continue to reflect on their own practices and those of the wider project, in relation to ethics. Overall, the Exten(DT)2 project team is committed to addressing the ethical challenges of working with emerging technologies in education and is taking proactive steps to ensure that its practices not only align with the highest ethical standards but provide guidance for teachers, technologists and other researchers who need to address similarly complex ethical questions.

3 Introduction

The use of emerging technologies in classrooms with young people raises important questions regarding data collection, storage, analysis, use, sharing and the potential for misuse, or perceived misuse of data (discussed in D9.1). This is a particularly pertinent issue in Year 2 of the project as the emerging technologies are utilised to extend existing project technologies and in the creation of the ALA Dashboard.

This deliverable reports on the outcomes of Task 9.3, which is a periodic review of project developments, with a particular focus on data collected through automated tools and approaches to gain informed consent and assent. The review is undertaken by the EAB, led by Dr Carina Girvan (TCD), with the independent Ethics Expert, Prof Adam Hedgecoe (Cardiff University) and members of the LNU, NKUA and UCL teams involved in WP4.

3.1 Interrelation of the deliverable with other WPs

Deliverable 9.2 provides inputs into the Data Management Plan (DMP) in WP1, reviews and responds to the data collected through the automated tools (WP4) and reviews the approaches used to gain informed consent and assent (WP7).

3.2 Structure of the deliverable

This deliverable begins with a review of the ethical issues surrounding automated data collection through project tools (WP4) and is followed by a response to the review of Year 1 and Year 2 informed consent/assent and data collection procedures in WP7.

4 Automated Data Collection

4.1 Overview

Automated data collection occurs through the ExtenDT2 platform and is visualised for the teachers in the dashboard. The main goal of the dashboard is to provide an overview of learners' performance, emphasising 21st-century skills, by analysing the user interactions (event-based data) with learning tools (such as Malt2, ChoiCo and SorBET). In the dashboard (see Figure 1), teachers can view the table of their learning activities with their name, the learning tool used in the activity, the total number of learners, the start date of the data collection, and two actions: select and view the dashboard of a learning activity (see Figure 2) and access the learning analytics (LA) raw data. The learning activities presented in the table are ordered in the descending order meaning that the latest activities are displayed first (on the first page). It is also possible to search the learning activity in the table by its name.

When the teacher clicks on the “Dashboard” button they get an overview of the five main descriptors of learners (see Figure 2): Motivation, Experimentation, Understanding, Interaction with Technology, and Originality tab. Each category is represented as a button with a question related to it, overall score (in %), and associated 21st century skills to each category. In order to see a specific category, the teacher needs to click on it, and the category page will be shown (see Figure 3).

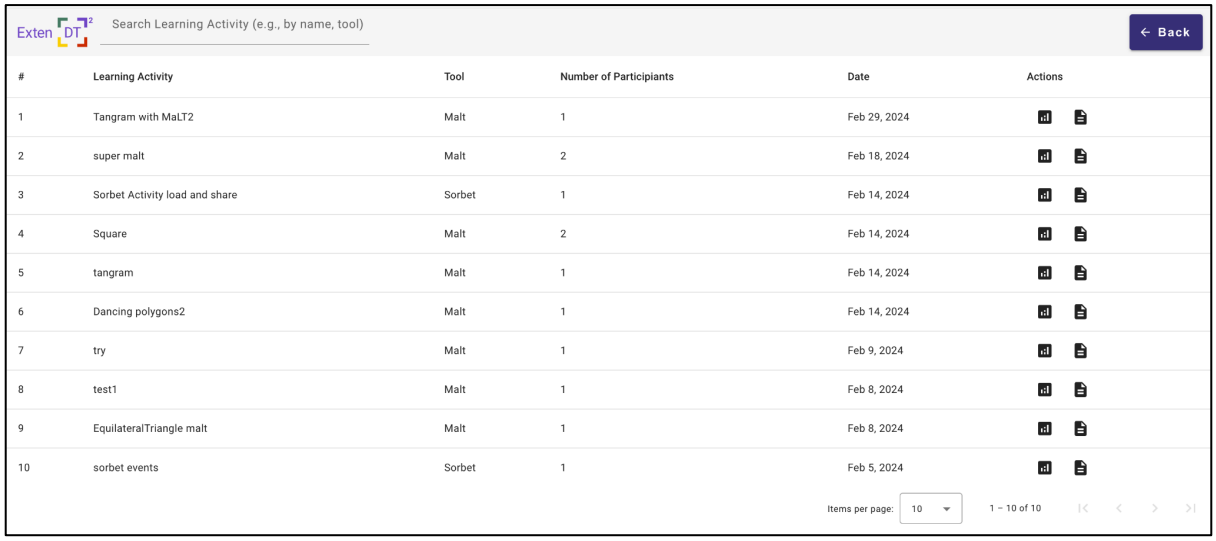

Figure 1. List of learning activities

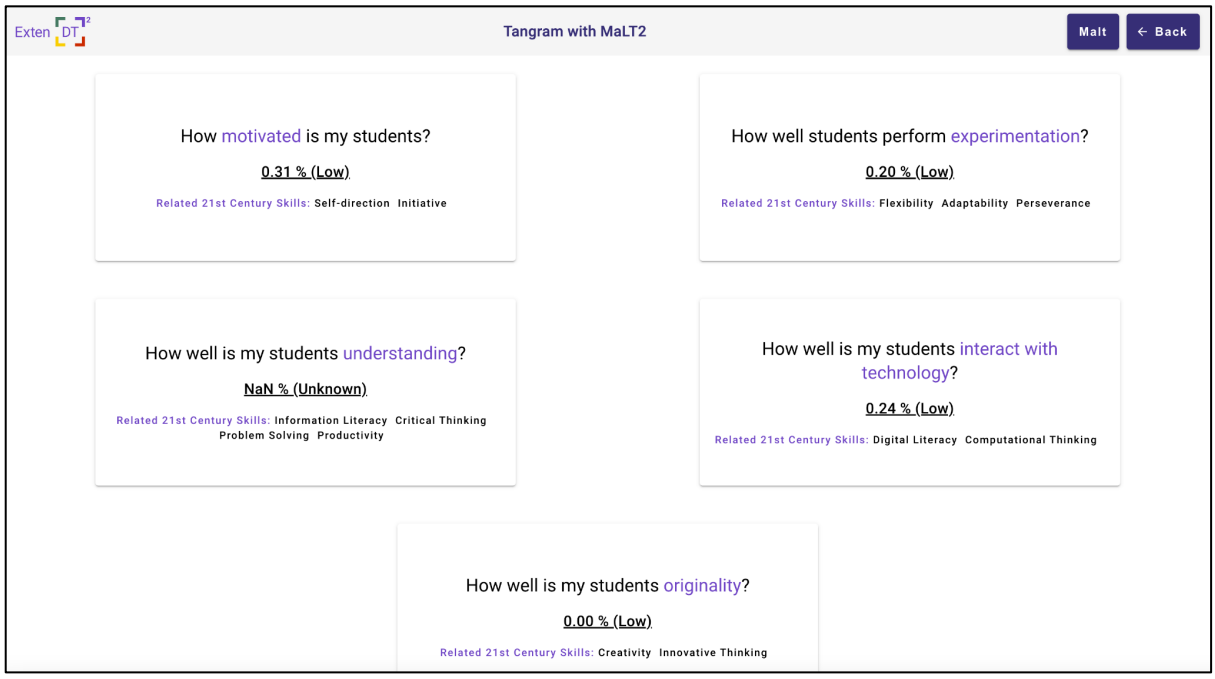

Figure 2. Overview of five descriptors of learners

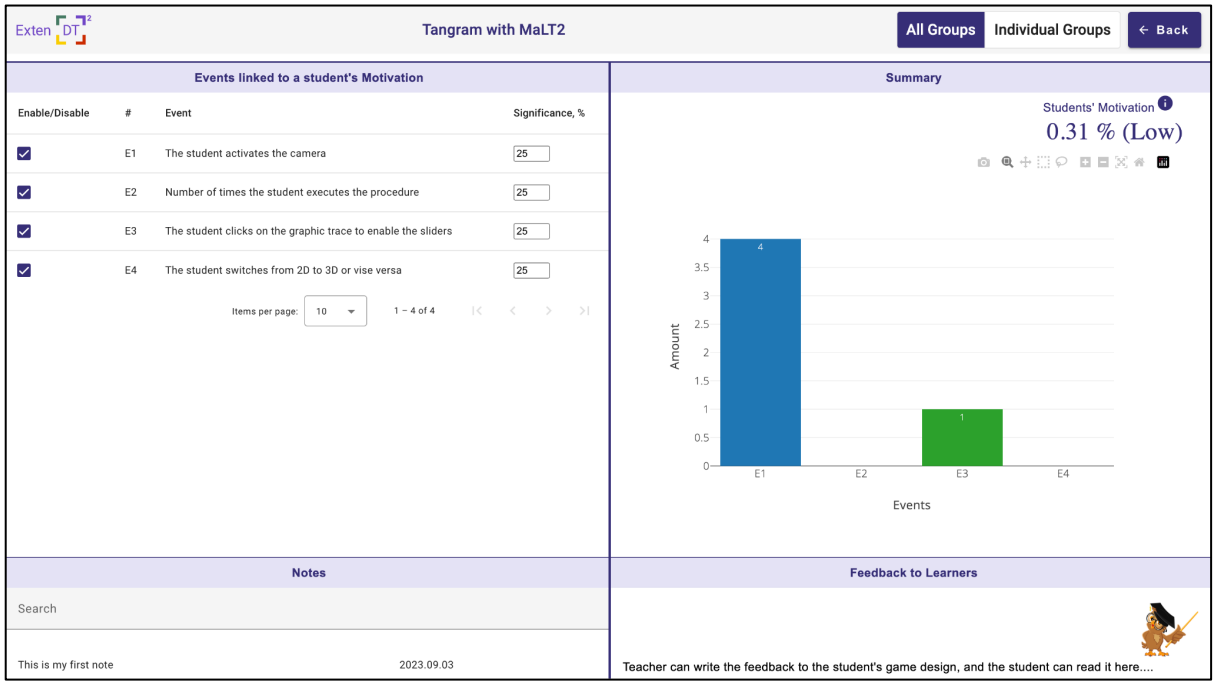

Figure 3. Motivation category overview

Each sub-dashboard contains a compilation of events (gathered through learning analytics) linked to that specific descriptor. As shown in Figure 3 (Motivation), a teacher can enable/disable an event belonging to a certain descriptor or change the significance of the event (in %). This flexibility allows teachers to determine for each learning activity which events are important and to what extent. Teachers, by interacting with the event table (e.g. enabling/disabling action and significance (%)), influence the visualization and overall score. In addition, the dashboard supports two levels of visualization: all groups or individual groups. The descriptor summary plot visualizes the number of events that occurred per event as a bar chart. The overall score is calculated using the following arithmetic formula:

$$Score_{category} = \frac{\sum_{i=1}^{M} (e_i \times w_i)}{M}$$

where *M* is the number of events in the category, *e* is the number of times the event occurred, and *w* is the weight (significance) specified in the event table (between 0 and 100).

There are two types of events: *count-based* (the number of times a certain event occurred), and *input-based* (the teacher provides an input, and the program counts/compares the learner's solution). For instance, the following event, "*The student types the keywords set by the teacher*" has an input parameter to be provided by the teacher in the dashboard. The dashboard then counts the number of events/learners containing the keywords in the code specified by the teacher.

As shown in Figure 2, in the upper right-hand corner, there is a button with a tool name, e.g., "Malt" which is a specific dashboard for each tool. This provides more information about the learning analytics data gathered for a specific tool. For example, Malt requires students to programme, which is also gathered by LA, and teachers can view the history of the code and annotate a specific code line with feedback. In addition, they can also view the groups' behaviour with a slider and camera objects in MaLT2 tool. In the future, we plan to implement a timeline overview of the learning activity in respect to understanding, motivation, etc.

4.2 Ethical issues

The EAB discussed the ALA dashboard and the potential issues in relation to data collection for research purposes. Two main concerns (reported in D9.1) were: 1) the recoding of teachers' screens for the purpose of understanding teachers' use of the dashboard and thus recording data from students who do not have consent to participate in the research; and 2) filtering out non-consenting students from the raw data which is accessed by the researchers for the purpose of developing the analytics.

4.2.1 Recording teachers' screens

In Cycle/Year 2 of the project, students only engage with the dashboard in groups. Each group has a single login which uses an anonymous ID and nickname. There is no way for anyone other than the teacher to know who is in a group if they have not consented to be part of the

research. Thus the membership of each group is anonymous, and this is a non-issue in the current project year/Cycle.
However, this is an ethical issue which will be returned to at subsequent EAB meetings with the WP4 team as there is an expectation that students will have individual logins in Cycle/Year 3 of the project.

4.2.2 Filtering out non-consenting students

The need to filter out non-consenting students from the platform data that is shared with researchers was identified as an issue that could easily be addressed through the design of the dashboard and group formation.

Researchers will make it clear to teachers that students who do not have informed consent to participate in the research should not (where possible) be put in groups with students that do have consent to participate. This ensures that at a group-level all students either have or have not given consent to participate in the research (as far as possible) and that the opportunities to use data are maximised.

Figure 4 presents a table of LA raw data for teachers with a researcher role to view and download the data.

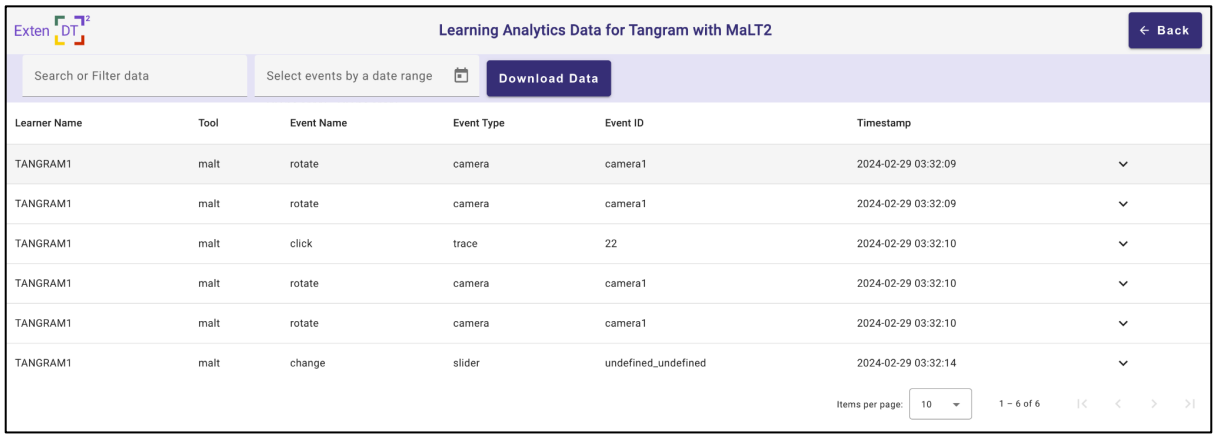

Figure 4. Table overview of LA raw data for teachers with research role

Teachers can provide researchers with access to data from the dashboard, via a Download button. When teachers click on it, they see the dialog shown in Figure 5. In the download dialog, teachers can deselect learner groups which do not have consent to participate in the research. Then press the download button at the bottom and select JSON or CSV format. The file does not contain the learner group names, only their ids.

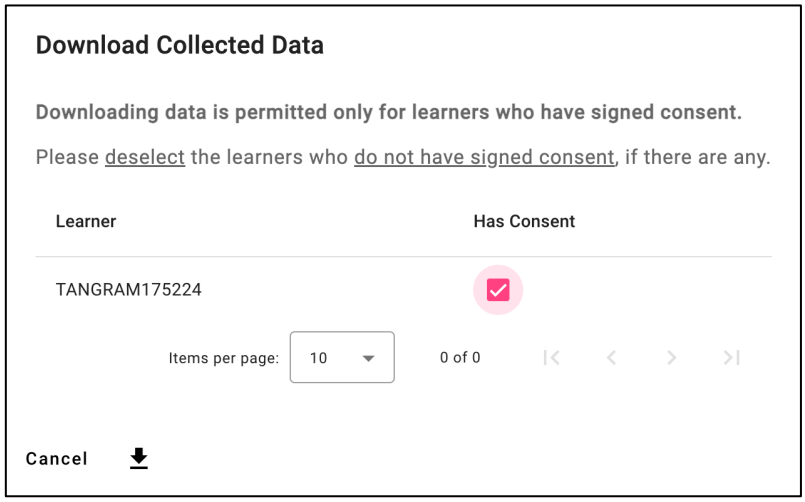

Figure 5. Download dialog for raw LA data

4.3 nQuire

While the primary concern regarding learner analytics has focused on the dashboard, it raises points pertinent to the nQuire platform. Although nQuire does not provide learner analytics, the dashboard does provide an overview to teachers of the progress of students as they create their nQuire Mission. The functionality to remove groups' data prior to it being exported and shared with researchers is currently being addressed by the OU.

nQuire for students is a password protected online platform used by students to create, pilot, and manage research studies, including collecting data from other students, within and beyond their school, who are registered with the platform. Students are organised under classes and specific schools. Teachers are those creating student accounts and organising students within a class. When a study is on pilot, this is only visible to students within a class (so they can provide feedback) while when it is launched, this is visible to anyone logged into the platform (to take part in the study). In terms of personal information, students can choose whether they want to display their real name or a nickname, when authoring a study. In Year 2 of the project, students will be working in groups to create a study so we expect that they will use their group name as the display name. Students' user ID is auto generated by the platform and thus is fully anonymised. Students have the option to add an image to their profile. It will be the teachers' responsibility to prohibit use of images showing the face of students and encourage the use of a photo that relates to the topic of the study.

In terms of data that can feed into the learning analytics dashboard, this will relate to number of studies (or missions) on pilot, draft, launched or ended as well as number of studies pending approval by the teacher. Also, it will display information related to last log in time, the status of a mission, the number of comments a mission has received as well as number of contributions. Information about when a mission has been created and has been last updated will also be visible. The teacher will also be able to see who, from the students, did not create any missions yet. When these data are extracted from the platform for research purposes,

display names of consented students (in the case of individual studies) will be anonymised and then shared with the research team. Information about students who did not consent will not be shared with researchers and will not be used in data analysis in accordance with the OU's ethics requirements.

5 Informed Consent

Feedback from the External Expert on the DMP raised questions about the storage of informed consent documents. The assumption of the EAB was that all consent was recorded on paper and stored at respective partner institutions in accordance with GDPR. However, in conversation with partners at the EAB meeting, it became clear that when engaging with schools at distance, the storage of informed consent documents and sharing of these with the research team was more problematic. Through discussion, the EAB identified reasonable guidance for inclusion in the DMP for communication to the project partners:

Considering the practical aspects, especially when consent forms are gathered by teachers (rather than researchers) when partners work with schools at distance. We (Exten(DT)2 partners) should establish clear procedures and coordinate with project partners to maintain consistent data collection and storage practices.

In the DMP, guidelines will be created specifically for cases where researchers collect consent forms remotely, via teachers. In addressing the handling of consent forms, we recognize the need for clarity and consistency:

1. **Clear communication and guidance on proper consent procedures with teachers**: Teachers must understand the purpose of consent forms and their importance. We emphasize transparency and the need for adherence to the process and to provide teachers with training on proper consent procedures. Teachers should be well-equipped to explain the consent process to parents or guardians and always work in partnership with the researchers.
2. **Exten(DT)2 develop standardized consent forms**: Develop standardized information sheets and consent forms that all teachers can use.
3. **Using a secured platform for electronic options**: Consider electronic methods for collecting consent forms, especially when teachers are remote. Secure platforms can facilitate electronic signatures.
4. **Parent communication and record keeping**: Where teachers directly communicate with parents or guardians to obtain consent, they may offer either paper-based or electronic options. Teachers must maintain accurate records of received consent forms and keep track of any follow-up communication with parents.
5. **Teachers' submission and storage of consent forms**: Establish clear procedures for teachers to share completed consent forms with researchers. Decide whether forms will be submitted electronically or physically. Ensure secure storage prior to sending consent forms and destruction of physical consent forms once electronic versions have been received. If physical copies are to be sent to researchers, this should be through secure and tracked postal services.

6. **Reminders and feedback loop**: Set deadlines for form submission and send timely reminders to teachers. Establish a feedback channel for teachers to report challenges or issues encountered during the consent process. Promptly address any concerns (this is very important).

These guidelines address data management consistency and ethical considerations while accommodating the unique circumstances faced by different partners.

6 Conclusion

This report has presented the key ethical issues following on from D9.1 and their resolution, in relation to the ALA dashboard and data, as well as procedures around and including storage of informed consent forms. It raises the importance of ongoing monitoring and engagement of project developments, particularly in relation to the development of the ALA dashboard, data storage and transfer. These issues will be picked up in future meetings of the EAB, the next to be held at the end of Cycle 2.

Appendix A: Minutes of the EAB Meeting

Date: 29 February 2024
Location: Video Conference

Attending:

EAB members

Dr Carina Girvan (TCD) EAB Chair & WP7 lead
Prof. Adam Hedgecoe (Cardiff University) External Ethics Advisor
Johanna Velander (LNU) – EAB Member

Guests

Dr Alisa Lincke (LNU) WP4 & Platform development
Dr Ahmed Taiye Mohamed (LNU) WP1 & DMP
Dr Marianthi Grizioti (NKUA) WP5 & Learning tool development
Prof Christothea Heredotou (OU) WP3, WP8 & NQuire development
Prof Manolis Mavrikis (UCL)

Agenda Minutes

#1 Agenda for meeting	• Data Management Plan (DMP) • Authorable Learning Analytics (ALA) • Remaining questions from past meetings/D9.1 • Tasks
#2 Data Management Plan	▪ Reviewed by AH and submitted to the EC. ▪ AH raised issue of consent forms (p23 of DMP, D1.3) regarding physical vs electronic forms. ▪ AH, CH, MM, CG & ATM discussion of current versus best practice regarding schools collecting informed consent on behalf of researchers and the potential opportunities and barriers to introducing electronic only consent. ***Action**:* ATM to update relevant section in DMP and communicate this to all partners.
#3 Authorable Learning Analytics	▪ Presentation on ALA by AL. ▪ AH notes that there is little if no personal data. ▪ AH queries what data is exported to the research team at an individual level ▪ MM notes that teachers make the accounts and researchers only know the identifiers. ▪ CH notes that teachers need to go into the dashboard but will only see group-level information. ▪ MG notes that data on a teachers' screen and data available to researchers will only be at the group level. ▪ Noted next year will involve students having individual logins and so a further meeting is planned to discuss the ethical implication of these developments towards the end of the current project year. ***Action:*** CG follow through. ▪ CG notes that this year, data from the ALA will be validated using linked survey data, so with will be necessary to know the participant ID number of those in each group.

	▪ AH agrees proposed text to be included in consent/assent forms regarding the same. ***Action:*** CG to draft test for information sheets
#4 Filtering out non-consenting students	• AH raises issue on filtering out non-consenting students which was highlighted in D9.1. • MG reminds all of best practice from project Year 1 to group students who have consent to participate in the research together. This enables data to be collected by participating groups only. ***Action:*** AL to add button to allow teacher to identify which groups have not given consent for their data to be shared with the research team. This data will then automatically be removed from any data shared with researchers.
#5 Recording of teachers' screens	• AH reminds the group of the issue previously identified, regarding the recording of teachers' screens (either by screen recording software or video cameras) and questions whether a solution has been found. • This year each group uses an anonymous nickname which does not identify individuals. Therefore it is agreed that this is not an issue in Cycle 2 but needs to be considered in advance of Cycle 3 where individuals' names will be visible.
#6 Tasks, priorities and next meeting	• CG to draft text for information sheets. • AL to add functionality to remove groups that include members who do not have consent to participate in the research. • AL to draft an overview of the platform, ethical issues and the project's response for inclusion in Deliverable 9.2, with input from CH. • ATM to update the relevant section of the DMP regarding informed consent forms, communicate this to all partners and provide for inclusion in D9.2. • CG to draft D9.2. • AH to review D9.2 and write independent report. • Next meeting: in 6 months, date and time tbc.

Minutes circulated to those attending, Filothei Chalvatza (unable to attend) and Shamim Patel (Project Manager)

Appendix B: Report by the Independent Ethics Expert

The initial ethics report suggests that as part of this progress report the EAB would provide:

" - A review of the Data Management Plan, paying particular attention to issues around the transfer of data and the storage (or not) of personal data (such as student names).
- Detailed review of the multimodal LA proposed for this project, paying specific attention to the kind of data being gathered (especially those data that might be seen in personal terms – gestures and movement) and the ways in which the EAB might engage with data analysis. "

In reviewing the DMP I raised a question about how the consent hardcopy forms were dealt with. This led to a discussion about the varying practices including keeping locally, and mailing onto the research team after scanning. It was agreed to amend the DMP to ask teachers to shred hardcopy consent forms after scanning, with longer term plans to swap to electronic consent materials to avoid this issue. The team would also email the partners to check on practice.

In terms of issues around learning analytics, it is clear, from the discussion, there are short term and longer-term issues. In the short term, because students work in groups with non-identifiable names (and because teachers will be asked to group consenting/non-consenting students together) any information transferred to the research team will be anonymised (although it may be linked to other data sets).

Next year data may be recorded on a more individual basis, meaning that studentIDs or nicknames may be transferred to the team. There is nothing stopping the nickname from being a person's actual name. This will require systems to ensure that data from non-consenting students is not transferred.

I am happy that the ethical issues associate with this research have been thought about and dealt with in a well-considered and careful manner. I would like to suggest that in future a slightly different approach to taken to the ordering of report production, submission and meetings. In this case the updated DMP was made available on 21/02/2024 for comment on the 23/02/2024 for submission to the EC on the 28/02/24 in advance of the EAB meeting (29/02/24). The shortness of the commenting time frame for the DMP and the way in which the submission of the DMP was out of sync with the EAB meeting (which probably should have come before submission) perhaps needs revision. Ideally there would be at least 5 working days between a document being made available and the deadline for comment, and for an EAB meeting to come between the deadline and the final submission date.