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### INTRODUCTION

LMS (Learning Management Systems) are « blind », providing an identical course to each student.

We explore here the combination of various indicators, such as performance, behavioral engagement, and emotional engagement, to detect students facing academic challenges.

We used authentic data collected in a French engineering school during the 2022-2023 academic year.

We identified correlations between positive emotional states and improved academic outcomes. These initial findings underscore the significance of emotions in distinguishing between high and low-performing students.

### DATA COLLECTION

Creation of a real dataset linking learning traces and student images in accordance with the GDPR:

- **Obtain student agreement:** Validate a consent form with a lawyer.
- **Obtain photos:** Retrieve images from an open-source module and store them on a secure server. Obtain the corresponding emotion for each picture.
- **Link data:** Link the photo-taking module and the LMS in a dataset.



### SAMPLE & MATERIALS

- 77 students in engineering school (eq. Master 1).
- All students use Moodle and have a computer with a webcam.
- Emotion analysis is done locally with a pre-trained model predicting Valence and Arousal.

### CHALLENGES

- **Technical:** Capture students in studying with a webcam and a laptop.
- **General Data Protection Regulation (GDPR) :** Obtain student's agreement.
- **LMS database:** Understand the link between modules in the open-source app Moodle.
- **Matching captured facial images:** Matching a captured facial image to the specific question the student is answering at that moment adds complexity.
- **Data cleaning.** Eliminating images without faces, those with occlusions, lack of contrast, or those where the face detection algorithm failed to locate a face.

### FUTURE WORKS

- We plan to expand our data collection efforts to gather more comprehensive datasets.
- We also intend to explore other dimensions, such as awareness of emotional and social engagement, to improve our understanding of factors that influence student success.
- We intend to integrate our work into a STIA interface to make the educational journey personalized to each student based on their profiles and emotions.

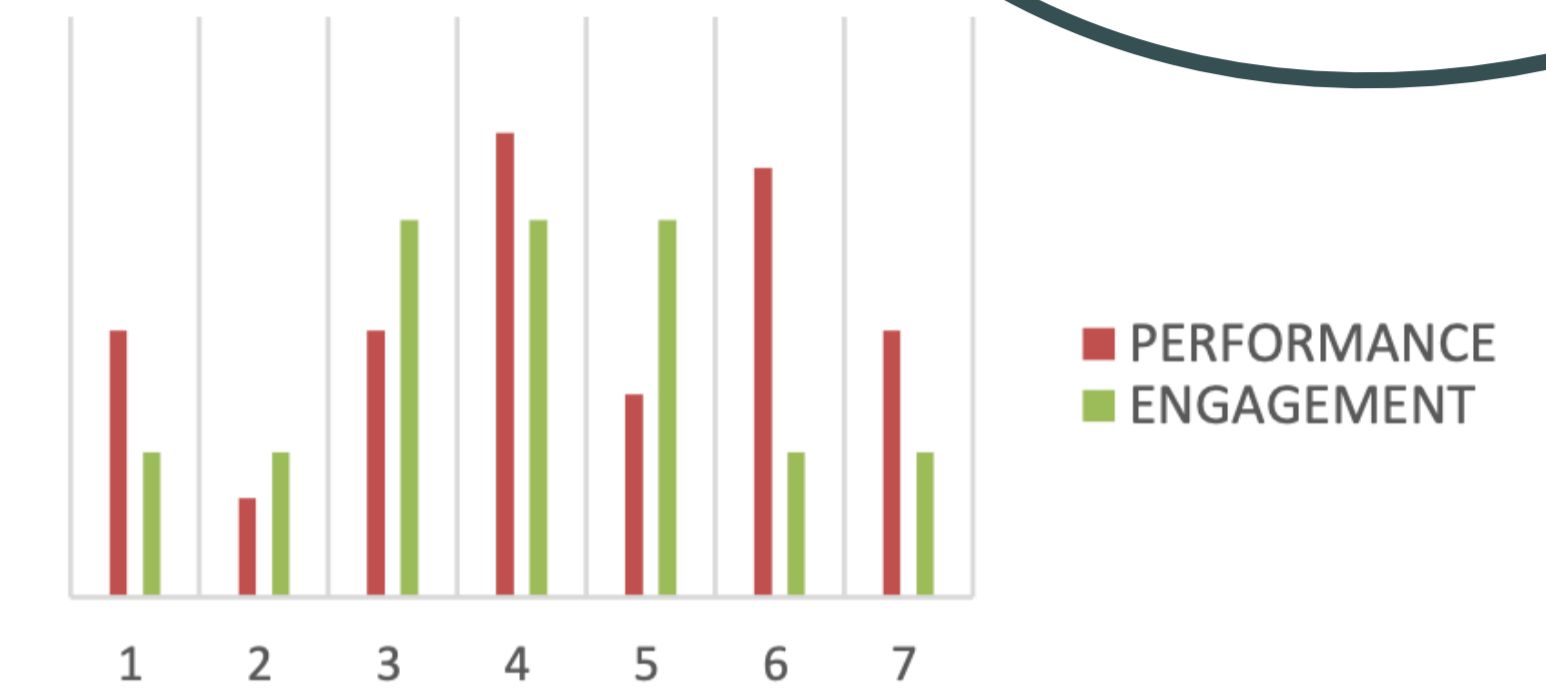


Figure 1. Performance and behavioral engagement scores for student 3859 on Quiz 2.

Q	Grade	DE	DG	TS(s)	Val	ED
1	0	71,64	0	99	-0,23	LOW
2	100	74,49	74,49	27	-0,31	LOW
3	0	55,76	0	46	-0,20	NICE
4	100	79,79	79,79	21	-0,28	NICE
5	100	45,56	45,56	39	-0,33	NICE
6	50	33,66	16,83	519	-0,16	LOW
7	100	45,64	45,64	52	-0,1	LOW

Figure 2. Representative data for student number 3859 across seven questions of Quiz 2.

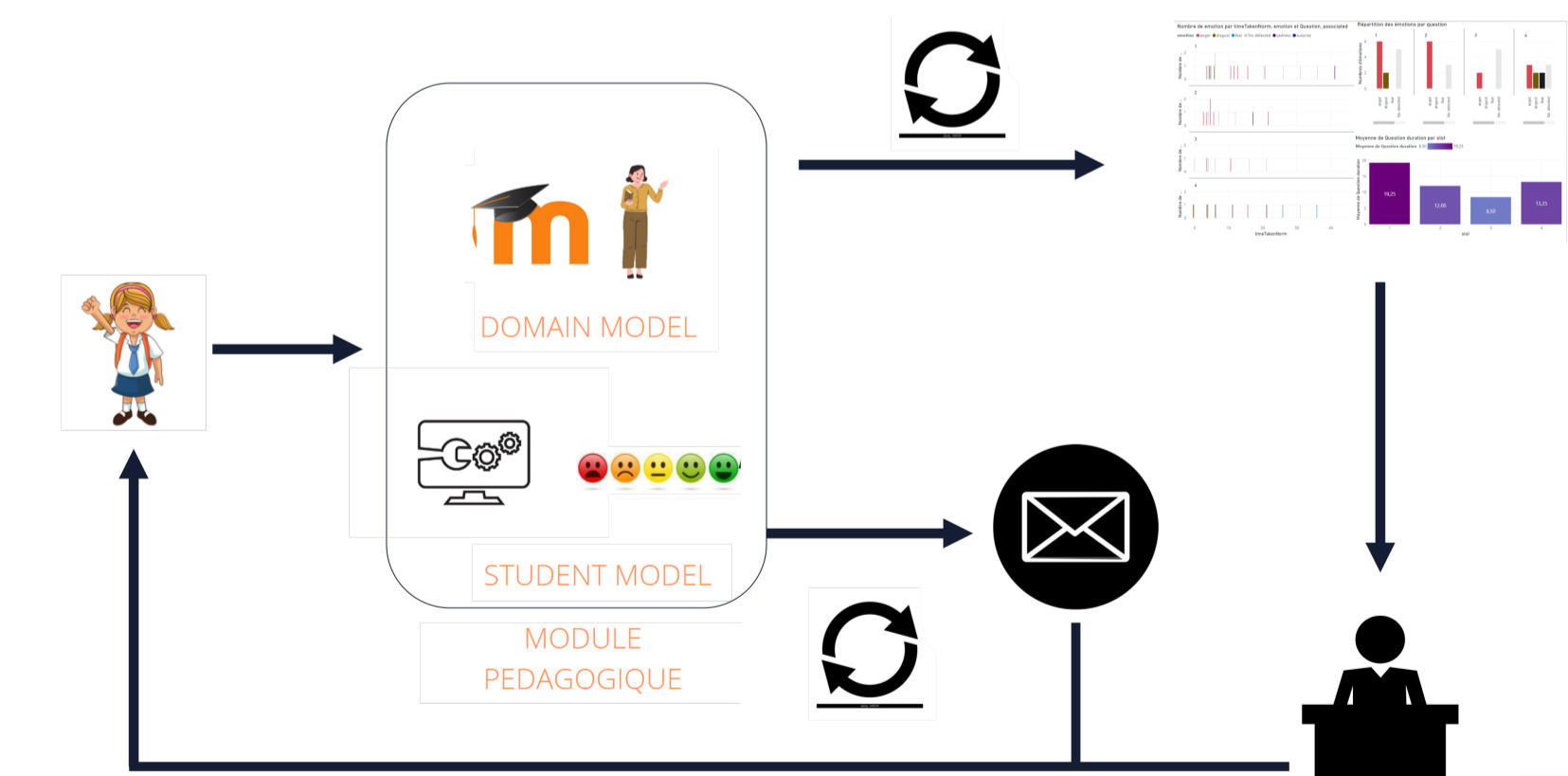


Figure 3. Representation of the STIA designed by the LDR.

### CONCLUSION

- Exploring the connection among academic achievement, behavioral involvement, and emotional engagement.
- Challenges of data collection, analysis, and aligning facial images to the question.
- GDPR compliance.
- Our experimental results underscore the influence of positive emotional states in differentiating between high-achieving and low-achieving students.