

## TYLER RATIONALE

The coherence of any education system lies on the **respect of the Tyler Rationale** [1] which puts the relationship between the **objectives**, the **teaching method** and the **evaluation** forward.

In practice, it means that the evaluation aims at assessing the accomplishment of preliminarily fixed objectives, that the teaching method should be adapted to the accomplishment of these objectives, and that the evaluation assesses what we strove to students to learn.

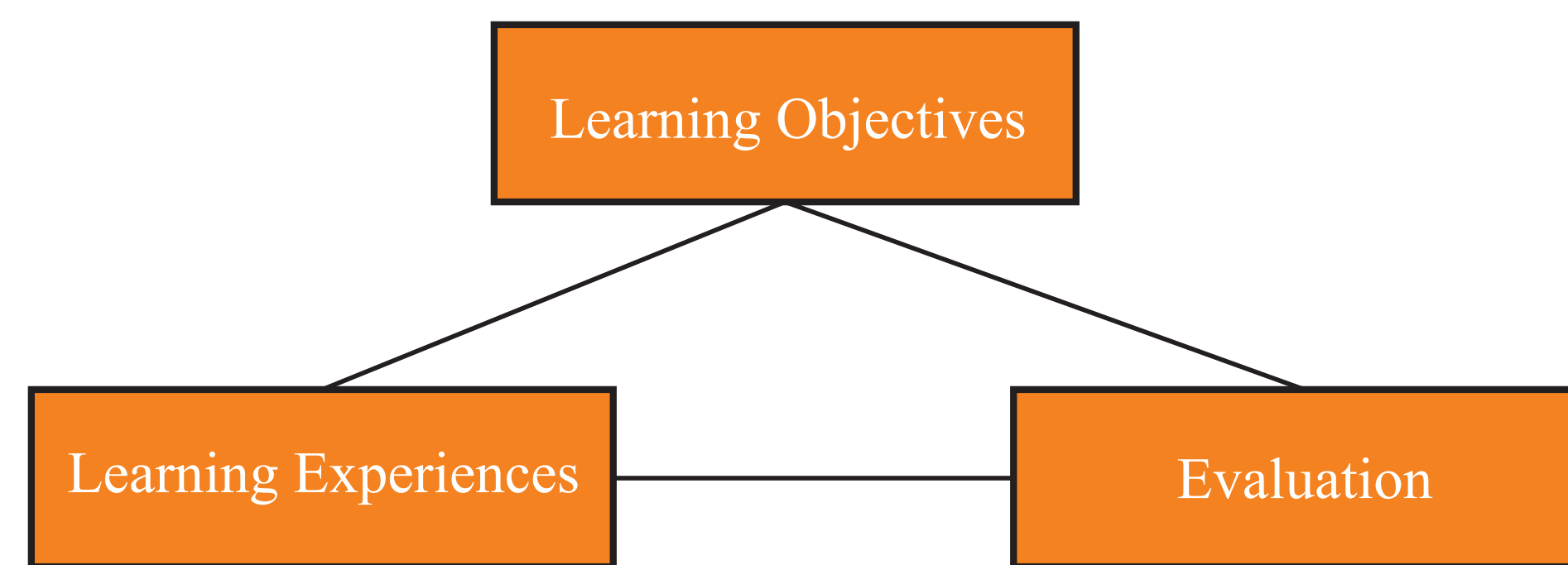
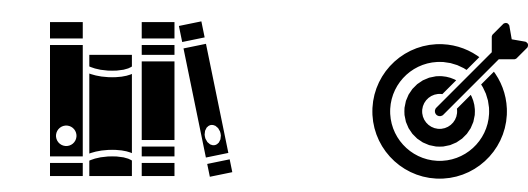


Figure 1: Tyler Rationale

## LEARNING OBJECTIVES

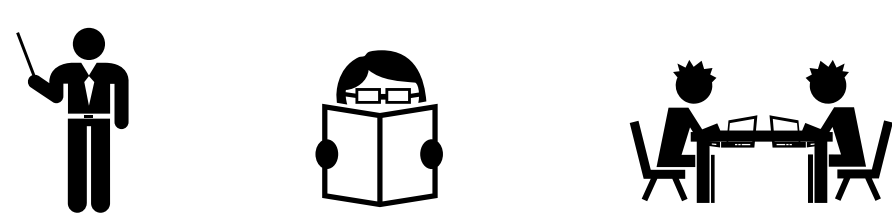


The learning objectives of the course of Geotechnics and Infrastructures are to:

- Master the principles and **fundamental laws of soil mechanics**;
- Select and interpret the appropriate characterization tests for a given purpose;
- **Design** building foundations, **retaining structures** and dams.

## LEARNING EXPERIENCES

The learning experiences are based on both **theoretical** and **practical classes** taught in equal time proportions.



The theoretical part is *ex-cathedra* while the students work actively in the practical classes. Before the exercises classes, some syntheses are given to the students. The resolution of one of the exercises is given after.

## EVALUATION

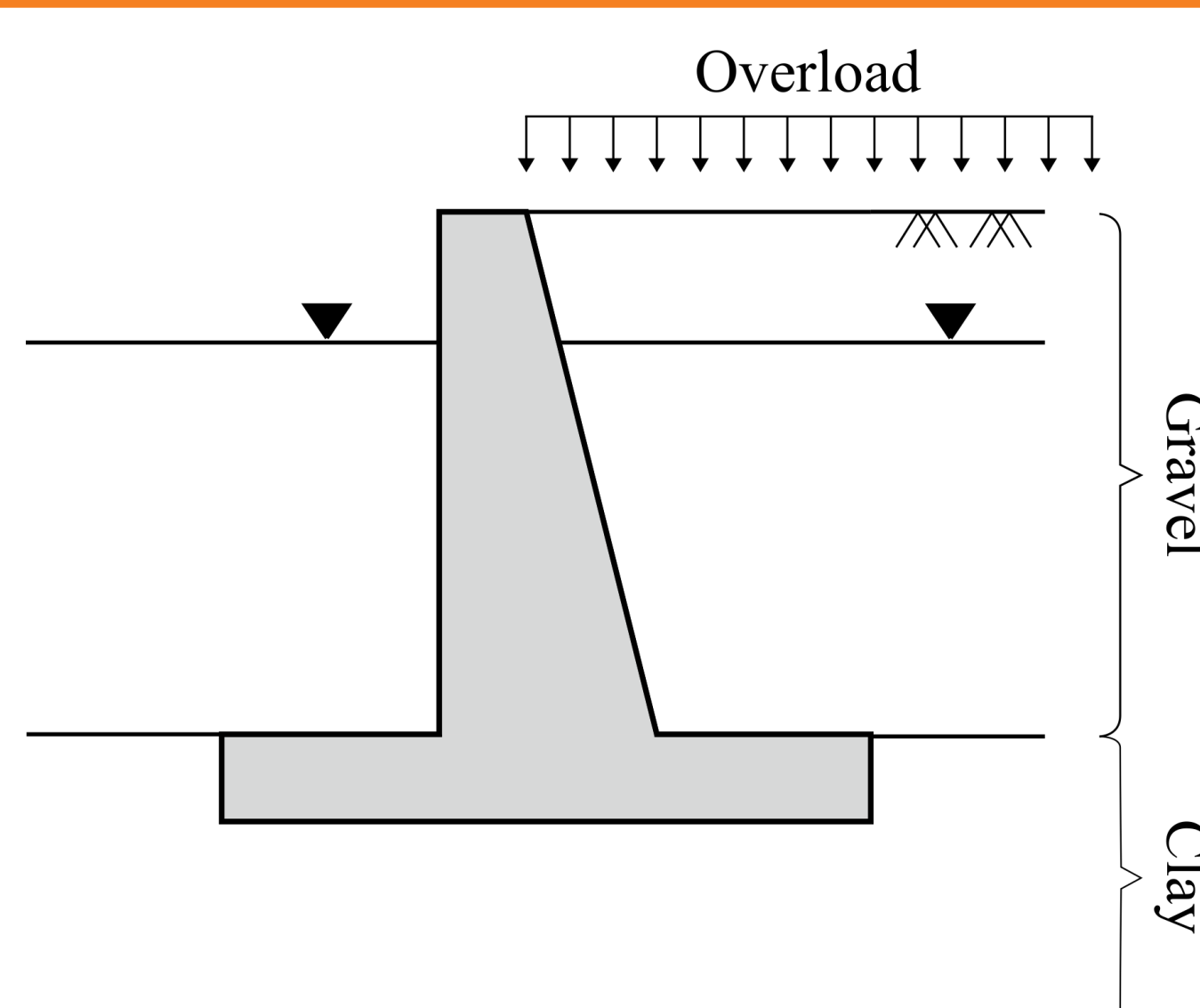
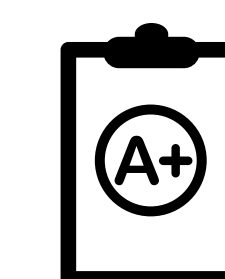


Figure 2: Scheme of a typical examination question

The practical part of the examination of the course of Geotechnics generally includes a retaining wall design problem. The question consists of

- verify the **stability to slipping**;
- calculating the safety coefficient relative to the **soil bearing capacity**.



This exercise assesses most of the skills developed in the course to achieve the learning objectives.

## ANALYSIS



Table 1 lists and classifies the **mistakes** we identified in the student answers for the retaining wall design problem. In this classification, the mistakes specific to geotechnics are distinguished from the ones which are not specific to geotechnics. In this second category, many mistakes reveal a lack of **pre-requisite**.

Geotechnics	Non-Geotechnics
<ul style="list-style-type: none"> <li>• Preliminary data calculations (e.g. <math>\gamma_{sat}</math>)</li> <li>• Wrong <math>\gamma</math> in the stress calculation</li> <li>• <math>K_a/K_p</math> confusion</li> <li>• Horizontal stress calculations <i>via</i> total vertical stress</li> <li>• Sum of horizontal stresses</li> <li>• Inadequate consideration of water</li> <li>• All strengths not considered (e.g. overload)</li> <li>• All terms and coefficients not considered in the soil bearing capacity formula</li> </ul>	<ul style="list-style-type: none"> <li>• Misreading of the statement (e.g. use of a wrong length)</li> <li>• <b>Wrong algebraic handlings</b></li> <li>• <b>Unit conversion (e.g. overload)</b></li> <li>• <b>Calculation of resultant forces (Geometry formula)</b></li> <li>• <b>Calculation of moment arms (Geometry formula)</b></li> <li>• <b>Direction of the forces and moments</b></li> </ul>

Table 1: Classification of the mistakes

Despite the objective of evaluating geotechnical knowledge and not mathematical one, it sometimes appears that some students fail the examination mainly because of a lack of pre-requisite. We think that it is not contradictory with the Tyler Rationale because the pre-requisites have to be known and mastered. However, the difficulty of the examination should stand from geotechnical considerations and not in the calculus. It is the reason why the value of the moment is often given in the statement.



## CONCLUSION

The analysis of the answers given by the students to the retaining wall design problem raised the following questions:

- Which is the main reason for failing the course of Geotechnics? Is it directly linked to geotechnics or not?
- What is finally evaluated in the retaining wall design problem? Is it in accordance with the Tyler Rationale?
- What type of regulation should be envisaged and introduced for the students?



The different types of mistakes have been listed and classified : some mistakes are linked to Geotechnics but others to a lack of pre-requisites. This list allows the teacher to be aware of the most common mistakes so he can insist on **things not to do** during the learning experiences. The classification is also fundamental. Indeed, if a student failed essentially because of a lack of **pre-requisites**, there is no reason he succeed by repeating the course in the same conditions. He should be therefore redirected to a **self-regulating**.

## REFERENCES

- [1] R.W. Tyler. Basic principles of curriculum and instruction. 1949.

## CONTACT INFORMATIONS

Robert.Charlier@ulg.ac.be  
Francois.Bertrand@ulg.ac.be

B.Cerfontaine@ulg.ac.be  
S.Delvoie@ulg.ac.be

AC.Dieudonne@ulg.ac.be

