CULTIVATING STUDENT UNDERSTANDING ON SOIL PERMEABILITY AND SEEPAGE *via* TEAM-BASED ROLE PLAYING

OVERVIEW

Soil permeability and seepage is a topic in Soil Mechanics which is offered to third year civil engineering student. The topic is essential for planning foundations, earth-retaining structures and water-retaining structures. Understanding the topic requires knowledge background of Solid Mechanics and Fluid Mechanics. However, it is found that many students have a hard time applying and integrating their previous knowledge to the new topics.

OBJECTIVE

1. To cultivate students understanding in soil permeability and seepage
2. To develop student teamwork skill
3. To boost classroom engagement

ACTIVITY

1. Students were divided into groups
2. There were four turns in the play
3. In each turn, each group played a role in a separate construction project
a. Owner role - Providing the scope of work, including type and dimension of the structure
b. Design engineer role - Drawing a flow net and calculating the seepage of water underneath the proposed structure
c. Office engineer role - Checking the completeness of the drawing and calculation
d. Owner's consultant role - Checking the accuracy of the drawing and calculation
4. After finishing their tasks, each group moved to the other's project before starting a new turn
5. At the end of the play, there were different projects which were completed by every team. Each of them had a different role on a different project.

OUTCOME

1. Student demonstrated their better understanding on soil permeability and seepage. Students can accurately apply the concept of flow net in soil seepage problems.
2. By observation, more than 95% of the class actively involved in the play, e.g. brainstorming ideas and sharing information.

Step/Role	Project 1	Project 2	Project 3	Project 4
Step 1: Owner Role Providing the scope of work, including type and dimension of the structure	Team A	Team B	Team C	Team D
Step 2: Design Engineer Role Drawing a flow net and calculating the seepage of water underneath the proposed structure	Team D	Team A	Team B	Team C
Step 3: Office Engineer Role Checking the completeness of the drawing and calculation	Team C	Team D	Team A	Team B
Step 4: Owner's Consultant Role Checking the accuracy of the drawing and calculation	Team B	Team C	Team D	Team A

IMPACT

According to McConville et al. (2017), role-playing game resulted in that students gained knowledge on complex subjects, and both teachers and students had positive experiences. Thus, the learning environment in the classroom can be created.

FUTURE DEVELOPMENT OF PROJECT

1. Currently, works during the play were paper-based. Computer-based with interactive multimedia could be used, so other skills can be developed, e.g. soft skills.
2. An appropriate evaluation of learning outcome should be applied.

REFERENCES

Jennifer R. McConville, Sebastien Rauch, Ida Helgegren, Jaan-Henrik Kain, (2017) "Using role-playing games to broaden engineering education", International Journal of Sustainability in Higher Education, Vol. 18 Issue: 4, pp.594-607.

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