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RELEVANT ASSESSMENT AND PEDAGOGIES FOR INCLUSIVE DIGITAL EDUCATION

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REPORT ON ASSESSMENT IN FLIPPED CLASSROOM APPROACHES

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1. ASSESSMENT IN GENERAL

Assessment is an essential part of learning. Meaningful assessment can lead student learning and positively influence the fulfilment of planned learning outcomes, but also vice versa. In that respect, teachers have to use assessment methods directly related to the planned learning outcomes, as advised by constructive alignment (Biggs & Tang, 2007).

In the context of flipped classroom (FC) approaches, where teacher-student interaction needs to be facilitated, peer-evaluation should be especially ensured. At the same time, assessment has to support a deep approach to learning. Terms and concepts of deep and superficial learning were introduced and developed by Marton and Säljö (1976), and appropriately developed for higher education by Entwistle and Ramsden (2015).

Council conclusions on countering the COVID-19 crisis in education and training (2020/C 212 I/03) stated that one of the greatest challenges since the onset of the pandemic had been how to manage assessment and grading.

Moreover, in pilot research performed as part of a needs analysis (FOI, SoM, UNIZG, 2020) students pointed out that we should work even more to prevent cheating on exams. As a rule, assessment tasks that are relevant and interesting are more difficult to copy/cheat, because students are also inclined to create such tasks independently. However, the teacher needs to put more effort into preparing and evaluating them. Assessment methods that can be reliably conducted online, without extended additional teacher control over the situation available when the assessment is conducted live, are also those that are designed so that tasks are focused on the essential, relevant, interesting and require an in-depth approach to learning. When we conduct online assessment of some routine tasks, then it is necessary to introduce additional measures to prevent cheating (use of AI), and tasks are generated for each individual student from the task database.

2. MODELS OF ASSESSMENT IN FCS

Assessment in FC approaches often includes several elements and a characteristic sequence of assessment tasks. An assessment program is usually based on continuous assessment that includes formative and summative assessment tasks, starting with more simple exercises, such as quizzes with automated feedback that assess students' understanding of the basic concepts and notions. Students can use the feedback to self-assess their comprehension of the introductory content presented in videos, reading materials etc. Students' quiz results also present an input for teachers to design active learning in the classroom, focusing on the aspects which are the least clear to students, but also to create complex, relevant and authentic learning tasks. During active learning sessions, students often learn collaboratively through discussions, problem-solving in teams, as well as work on projects. In addition, various teaching and learning methods can be used to enhance student engagement, teamwork and meta-cognition, such as portfolio preparation or peer-learning. To assess students' acquisition of learning outcomes, artefacts can be assessed by peers or teachers. In order to structure assessment and feedback, rubrics with assessment criteria and achievement levels can be used. This is particularly important in relation to peer-assessment, as it enhances the reliability and validity of peer-assessment. Finally, the feedback from this phase can support students' further

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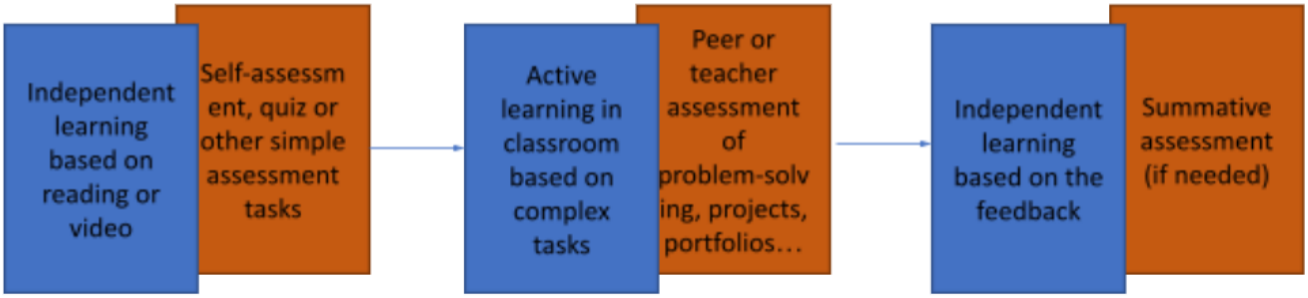
independent learning in preparation for final summative assessment, if planned. The basic assessment model is presented in the following figure.



One interesting variation of this basic model has been presented by Wanner and Palmer (2015), as shown in the figure below.

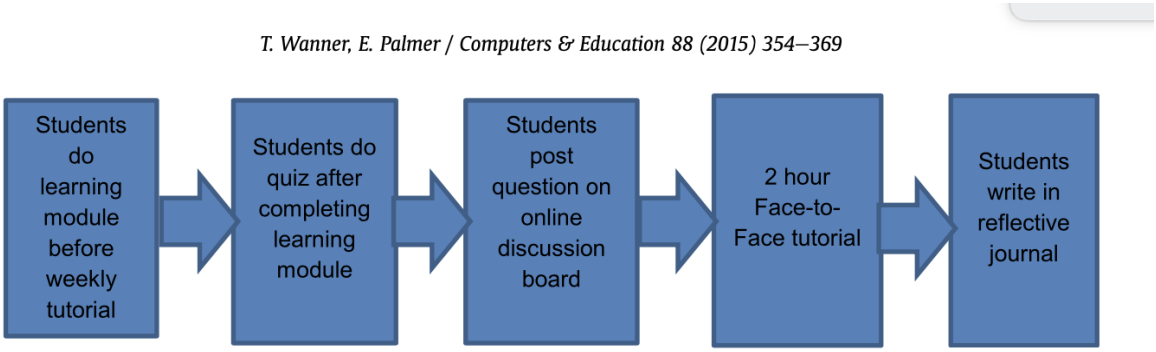


Fig. 1. Learning sequence for the students.

Another model has been presented by Mojtahedi et al. (2020). In the model, the assessment tasks and corresponding contribution to the final grade include the following: (1) pre-class activities including an online multiple-choice question quiz (0% of the grade), followed by in-class face-to-face activities; (2) interactive tutorial discussion sessions in active learning spaces (team work) (10%); (3) post-class, students performing peer-assessment of other teams' work and providing critical feedback (using a rubric) (10%); (4) in-class online quizzes (20%); (5) interactive online lessons including holistic adaptive tutorials enabling students to assess their knowledge, with a possibility to undertake a question several times (0%); (6) a 2h paper-based final exam as summative assessment (30%); (7) a case-based group assignment, with a self-directed learning approach, submitted 1 week after the final exam - collecting data and answering questions (30%).

Further, in the FC approach presented by Jensen et al. (2018), following each pre-class assignment, (1) students took *Explore Assessment* - short online quizzes at low levels of Bloom's taxonomy (mostly Remember and Understand), without notes; (2) after the first attempt without notes, they could repeat unlimitedly with notes if they wanted; (3) every 2 weeks they took *Apply Assessments* through the LMS, at a variety of Bloom's levels (mostly Apply and above), open-note, with one attempt, 1h; (4) comprehensive final (summative) assessment in class or proctored testing centre, 2h, with one page of notes allowed.

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Moreover, the approach by Llamas-Nistal et al. (2019) combined the FC and the Intensive Continuous Assessment model. Here, students are supposed to watch videos every week, have the opportunity to ask questions during reduced class-time and then solve short assessment tasks (10-15 minutes). Students submit the results into the Blended e-Assessment (BeA) supporting technological tool that allows students to submit their pen-paper solutions and teachers to correct them in the system.

In the approach presented by Wang (2017), formative assessment items comprised classroom performance, homework assignments, quizzes, and midterm exams, whereas summative assessment items included final exams and final projects. Achievement is the final grade that is based on a certain proportion of the outcomes of the formative assessments and the summative assessments.

Finally, in their approach integrating the FC, Arruabarrena et al. (2019) used peer-assessment to assess student-generated content (videos, questions, ...). The overall methodology included (1) students' access to previous student generated content; (2) peer-assessment by following guidelines; (3) co-creation of new content that adds to the previous; (4) peer-assessment - collaborative reflection on the evaluations and the generated content; (5) incorporation on the content to the knowledge base of the subject.

3. CONTEMPORARY FINDINGS

An analysis of relevant research papers related to assessment in FCs in online or blended learning environments has demonstrated several additional interesting results.

In their FC approach, Wanner and Palmer (2015) included flexible assessment, meaning students could negotiate when to submit two major assignments, had choices of assessment types (report or essay) and had to do three assessments for an e-portfolio. Students had to submit their own Personal Assessment Plan and indicate what kind of feedback they preferred to receive and what aspects the feedback should concentrate on. They could include personal learning difficulties. The findings showed that students overall enjoyed and wanted more personalised learning through the FC and flexible assessment. Students want their personalised learning not only in the form of online activities, but predominantly interactive, collaborative, well-structured activities in face-to-face. Although students like flexibility, they still want a set structure for the course and assessment format and processes. The personalisation of teaching and learning needs to include the personalisation of assessment.

Moreover, Bye (2017) proposed four axes of learning central to the teaching approach, C-4: creativity, cooperation, competition, and challenge. The key to success is to be able to facilitate learning by cherry-picking textbook chapters and relevant literature as well as suitable online resources, such as video lectures, self-tests, and coding challenges. The right balance between too rigidly defined learning activities where students are being “spoonfed” and too vaguely defined problem-based learning activities must be found, so that the problems are investigative in nature, with different possible paths towards solutions.

Zainuddin et al. (2021) focused on gamified learning and formative assessments that adopt online flipped approaches, which have shown a positive bearing on learner engagement. The results of this study imply support for the claim that the use of interactive gamified e-quizzes proves to be an innovative means of stimulating student engagement during online classes. Also related to gamification, Lopes et al. (2019)

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emphasized that the application of the attractive components of games and video games in different environments should go beyond attempts to increase student motivation, but rather should be used to solve problems such as inactivity or dispersion, through greater student involvement; the success or failure of a gamified activity is not going to relate exclusively to the tools used, but will also depend on how the gamified task is designed to increase the motivation of the student. In this sense, when students are given an opportunity to participate actively in the learning process, their interest in the subject increases, and they are more motivated to achieve the best possible results. Moreover, the use of Kahoot in class is highly valued by students and helps in the learning process, in a significant way. Moodle is used as an active learning tool, for example in presenting students with voluntary self-assessment tests. It was shown that students are more motivated and the percentage of students passing the subjects has increased.

Furthermore, in the context of a web-based formative assessment system (WBFAS), Yilmaz et al. (2020) proposed a web-based assessment system acceptance scale, consisting of eight dimensions: perceived usefulness, perceived ease of use, computer self-efficacy, social influence, perceived relationship with the course content, perceived enjoyment, interest and behavioral intention. The authors found that social influence is the most important factor effective on behavioral intention enabling students to accept and use WBFAS (peers of students and teachers act as the main social determinants).

Grenfell (2015) found that creating a community of learners involving students with different generational characteristics, technological capacities and aspirations, was forged through unified, collaborative participation in an FC environment.

Further, Luth-Hanssen et al. (2018) found that including students as partners in many parts of the online study programs model, and especially in the assessment model, seems to boost students´ engagement, strengthen understanding of their own learning paths, and lets them take greater responsibility for reaching their learning outcomes criteria.

Mojtahedi et al. (2020) found that pre-class quizzes were perceived by students as the most effective learning activity. Also, over 2/3 students included in their study indicated that presenting in tutorials encouraged them to summarize and construct their understanding of the subject, and 3/4 of students (strongly) agreed that case-based assignments helped enhance skills to locate, evaluate and use relevant information for problem-solving. Peer-assessment was found the least useful in terms of enhancing learning, and some students questioned its effectiveness.

Finally, in a study by Lin (2019), an online peer-assessment strategy was proposed in the mind mapping-based FC. The students followed online assessment scales to assess others' essays via Zuvio online. It was found that students who learned with the online peer-assessment approach showed no significantly better learning achievement than those who learned with the conventional peer-assessment approach. The experimental results also revealed that students who learned with an online peer-assessment approach showed a significantly higher time involvement in flipped learning than the control group. Moreover, students of the experimental group showed positively higher learner autonomy on previewing before the class than those of the control group.

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4. CHALLENGES

An interesting challenge mentioned by several authors (Bye, 2017; Wanner & Palmer, 2015) refers to the dichotomy between the flexibility and independent learning on one hand, and clear structure of the assessment process and demands from students on the other.

Further, some authors are concerned about the question whether the acquisition of learning outcomes is ensured.

Moreover, there are several challenging dimensions which should be considered in assessment implementation, one of which refers to peer-assessment. In this respect, Mojtahedi et al. (2020) claimed that, in relation to their case study, peer-assessment was identified by students as the least useful in terms of enhancing learning. Also, Arruabarrena et al. (2019) argued for a non-anonymous form of peer-review to provide qualitative comments or quantitative values or both. They did not recommend peer-assessment to affect the final grade of evaluated students. Finally, validity and reliability are essential when it comes to peer-assessment, as well as assessment of complex tasks, as suggested by Divjak & Maretić (2017).

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