Introduction

Empirical investigations represent crucial competence which students can gain during inquiry-based biology education (IBBE). There is a methodological problem with the assessment of student’s performance during the IBBE because the classical summative assessment is not able to capture student’s progress and take into consideration all student’s activities. The formative assessment (FA) can help teachers and students to feel more confident in the partial steps of IBBE and improve their achievements. Thus, the formative assessment methods (FAM) are determined as promising assessing approach.

Theoretical background

The FA can include various methods, from self-assessment, peer-assessment to teacher’s assessment and it can also monitor various aspects of teaching-learning process. These methods have certain common features and their purpose is to help in the learning process. Peer-assessment is one of the FAM. This evaluates the quality of peers’ work or level of his/her performance. Afterwards they decide to which extent the peer has met goals or criteria and guide him to improve his work and get closer to the criteria. Topping (2009, 2013) found out a positive correlation between students’ achievement and peer-assessment as the FAM. Students involved in the peer-assessment process (e.g., point to strengths and weaknesses of peers’ project, suggest the changes etc.) submitted better own works afterwards compared to students who received feedback from teacher and were not involved in the peer-assessment.

The international project of the 7th Framework program called ASSIST-ME (Assess Inquiry in Science, Technology and Mathematics Education) is a high-level research project that will investigate formative and summative assessment methods to support and to improve inquiry-based approaches in European science, technology and mathematics education. The overall aim of this project is to verify the efficacy of the FA as well as to map the situation of this assessing approach in selected European countries and to design a range of appropriate assessment methods which would supplement current assessment tools.

The peer evaluation is a deep-rooted assessing method in the Czech education. This evaluation is limited by grading of peers and it usually does not enable progress of the formative component in assessment. Thus, we focused on this method in our study.

Methods

The peer-assessment as the FAM was implemented into the inquiry biology lessons at primary and lower secondary level at selected schools in the Czech Republic. There were 2 local research groups, first one was focused on integrated science at primary level and the second one on biology at lower secondary level. In total there were 3 local research groups, but the third group was focused on mathematics at primary level and had different research design. The research has 3 rounds and there were performed interviews with the teachers as well as with all students before the start of the research and immediately after finishing it.

In the experimental session, students designed their own experiment and their designs were assessed by their peers (detailed design is described on Figure 1). In total 293 students and 12 teachers at 8 assessment groups in South Bohemia were involved in this research. Students were divided randomly into experimental group (received feedback from their peers) and control group (received feedback from the teacher).

Results

The peer assessment was found as appropriate method for assessing students’ performance in inquiry Biology lessons. Students accepted feedback from their peers but on the other hand they have problems with providing it. They need the guidance how to assess or how to express their ideas. Moreover we were interested in the acceptance of peer-assessment among the students. The students were asked whether they preferred commentaries in the written feedback or the final grade. Three quarters of students chose the commentaries (Fig. 2) as most useful part of the feedback. After that they added these commentaries are better understandable for them and they know what to improve in their next work.

They also stated that the feedback help them to improve their product (independently on the provider of feedback). Both groups, experimental and control, found the written commentaries more helpful than classical grades.

Conclusions

The peer-assessment seems to be a perspective method for assessing students in the inquiry-based lessons in integrated science at primary level and biology at lower secondary level. This assessment method enables to express students’ performance in all steps of inquiry tasks. Although the peer-assessment is said to enable a combination of formative and summative assessment, the formative non-evaluative peer-feedback is the most important component of this assessment method.

The comparison of experimental group (received feedback from peers) and control group (received feedback from teachers) both groups perceived the feedback in the same way. The students prefer written commentaries rather than classical grades and they found them useful for improvement of their product as well as for their future work. Interestingly finding is the fact that students still prefer assessment from teachers because of their presumed quality and credibility.

References


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