Who Did What? Assessing Individual Contributions to Group Projects

Aim and Context

- secondary vocational school, focus on business and digital technologies
- frequent multidisciplinary team projects
- question: how to assess the **product and process of group work** fairly?

Collaborative Peer Assessment

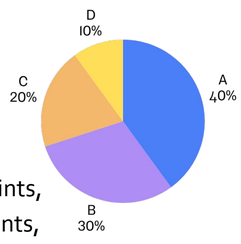
- team members assess each other's contribution to the group project using a pie chart
- 100% represents the total work done on the project
- the final pie chart is decided based on agreement within the team

Process:

1. teacher-led team discussion
2. individual pie charts
3. final collaborative pie chart

Grade Calculation

This example scenario shows how each member's grade is calculated:
A four-member team has earned 100 points on their assignment. If they were to be graded equally, each member would receive 100 points. Therefore, the total amount of points for the group is 100 * 4 = 400, which is represented by the entire pie chart. Assuming that the team decides to divide the pie chart in the following way:



Member A receives 400 * 0.40 = 160 points,
Member B receives 400 * 0.30 = 120 points,
Member C receives 400 * 0.20 = 80 points,
Member D receives 400 * 0.10 = 40 points.

Data Collection and Analysis

Collaborative peer assessment was implemented in **4 group projects** during the **2024/2025 and 2025/2026 school years**. These projects were multidisciplinary with an informatics component (such as Micro:bit hardware, graphic design, video editing etc.).

Both **qualitative and quantitative data were collected**. Quantitative data were collected from the peer assessment web application and from student **questionnaires**. Qualitative data were collected from qualitative items of the questionnaire, from teacher **interviews** and **field notes** recorded throughout the study.

Quantitative data were analyzed using descriptive statistics. Two measures were calculated from the data: each student's **self-bias,** and each team's level of differentiation. Qualitative data were analyzed using an inductive coding approach.

Development of the Peer Assessment Web Application

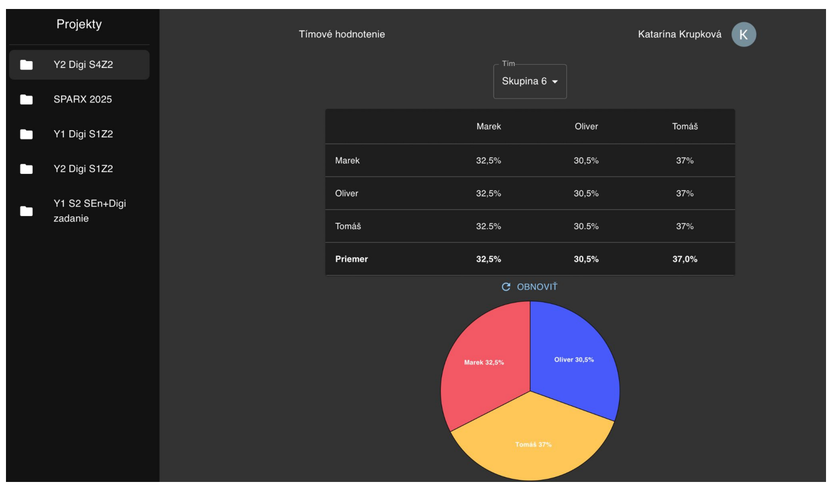
Requirements:

- Google Workspace user authentication
- Intuitive for students and teachers
- Dynamic pie chart as main component of the web app

Technologies used:

- React, Material UI Framework
- Google Firebase for backend

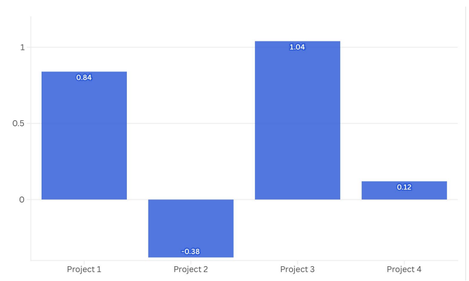




Results

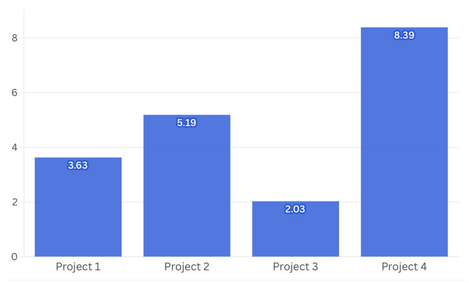
Self-bias

- calculated as the **difference between a student's self-assessment and the average assessment received** from all team members
- **low overall,** with a tendency towards overestimation in all but one project
- supported by questionnaire data - students believe they carried out more work than teammates



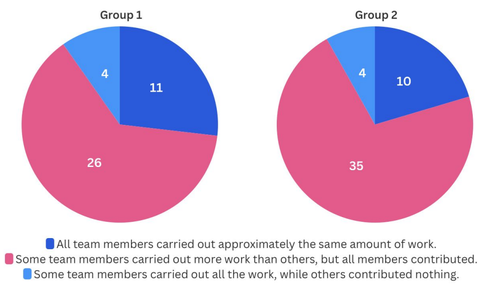
Differentiation Between Team Members

- a measure of **how much percentages of team members differed**
- calculated for each team as standard deviation of team members' percentages (from final pie chart)
- four categories: perfect equality (SD = 0), low differentiation (SD ≤ 3.22), moderate differentiation (3.22 < SD ≤ 6.53), high differentiation (SD > 6.53)
- **first-year students had higher differentiation compared to second-year students**



Student Perceptions

- **students believe they carried out the same amount of work or slightly more work than their teammates**
- collaborative peer assessment **led to fairer grades**
- students considered both **soft and hard skills** in the assessment process
- concerns around social dynamics and personal relationships affecting the assessment



Teacher Perceptions

- **positive experience** with the assessment process and the web application
- **social dynamics** and **students' confidence** may influence the assessment process
- teacher intervention was sometimes necessary in case of conflicts
- conditions for successful implementation of collaborative peer assessment:
  - **long-term implementation** rather than one-off use
  - **open communication** among students and teachers
  - teachers' **prior experience in facilitating** similar projects
- collaborative peer assessment is useful in various projects in informatics courses that require group work

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