Project title:AI based algorithms for teaching method selection. Using cooperative learning in mathematics.

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**RESEARCH PLAN**

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| Ime, priimek in podpis odgovorne osebe vzorca raziskave |  | Datum |
| Ime, priimek in podpis izvajalca raziskave |  | Datum |

**Keywords:**

Assessment, education, machine learning, tandem learning, data mining, teching methods

# Background and objectives

The main objective of higher education institutions is to provide quality education to its students. One way to achieve this is is by introducing various teaching methods, one of which is tandem learning. Not everyone responds well to a one-size-fits-all method, and therefore, uncovering insights for predictive model selection tailored to individual students or classrooms becomes imperative for teaching institutions. The knowledge is hidden among the educational data set and is extractable through data mining techniques. The aim of this study is to evaluate the performance of machine learning algorithms for predicting student response to tandem learning, and identify the most important variables.

# Methods

A sample of high school students and 13 predictor variables will be used following causal non-experimental method of pedagogical research. The outcome of interest will be a three state variable indicating whether the student responded well to implementation of tandem learning into education environment or not. Predictor variables will be selected using feature extraction algorithms and dimenionality reduction techniques will be applied. Classification of outcome of interest will be made using machine learning algorithms and their performance will be evaluated using stratified folds.

Teachers in the selected classes will integrate tandem learning into one section of their subject for a defined period, following which students will be invited to complete a questionnaire pertaining to their experience.

# Research scope and focus areas

Question themes:

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| --- | --- | --- |
| Variable | Description | Variable type |
| Successness of method | TARGET VARIABLE | TARGET VARIABLE |
| Gender |  | A priori state |
| Class |  | A priori state |
| Teacher |  | A priori state |
| Previous grade |  | A priori state |
| Extroversion score | From personality test | Psychological background |
| Sensing / intuition | From personality test | Psychological background |
| Thinking / feeling | From personality test | Psychological background |
| Judging / perceiving | From personality test | Psychological background |
| Mathematical anxiety | Separate test (AMAS) | Psychological background |
| Motivation to learning mathematics | Separate test | Psychological background |
| Qualitative interaction |  | Tandem learning |
| Quantitative interaction |  | Tandem learning |
| Outperforming partner |  | Tandem learning |