Predictive Analytics Services für Studien-erfolgsmanagement (PASSt)

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PASSt: Scope of the Project

Development of a valid, digital toolset for forecasting and analyzing policies

- Multivariate forecasting models as well as simulation models
- Scenarios and forecasts for the number of graduations, examination activity, study duration, drop out risk, etc.
- Idetifyinfluencing factors for academic success and critical paths in curricula

Cross-university KPIs and models

- Generic as well as university-specific requirements
- Social transformation

Compliance with ethical principles and data protection regulations

- “Code of practice”
- Legal expert opinion

Prototype of a cockpit for visualizing KPIs and prediction values

PASSt at a Glance

Results I: Data Model

Data Model

- Core Variables
  - alwaysavailable
- Optional Variables

Different aggregationlevels

- Regression Model
- Agent basedModel

Results II: Prediction Models

- Reviewed theories on academic success
- Prepared the dataset, including defining key variables
- Developed predictive models for academic success
- Customized models based on specific curricula (e.g., large vs. small study program)
- Compared machine learning methods:
  - Predicted individual study activity
  - Identified predictors explaining variables with a strong impact on study activity
- Utilized supervised machine learning algorithms (e.g., Random Forests) with high predictive accuracy
- Created a scalable prototype
- Optimized output and visualizations

Results III: Simulation Model

- Agent based
- Conducted data analyses with a focus on probabilities
- Study path :: actual study plan
- Position of courses along the study path
  - scenarios and experiments
- Explored “structural studyability” – the ease with which a study plan can be followed
- Conducted capacity analyses to assess the workload and studyability of the curriculum

Results III: Simulation Model

- Data Analysis
- Predictive Models
- Compiled metadata related to the predictive models
- Analyzedsimulationresults

Ergebnisse V: Code of Practice

- Communication – expectations and results
- Issues related to data privacy and discrimination
- Quality and potential bias in technology and data
- University-specific aspects, including application, access, and resulting actions
- Impact of models and their ongoing development, including training programs and monitoring
- Transparency through thorough documentation, understanding data flow, and evaluating model quality

Social Dimension – Data?

- Data model
  - core variables: universities provide social dimension information in system data (age, gender, school type,…)
  - optional variables
    - → Data from UHStatcan be used in descriptive and predictive models
    - → allowadditional datatobeincludedif available (e. g. surveys)
- Data quality and integrity is crucial

Social Dimension: Results?

- Visualization Dashboard includes data on risk factors for dropout or inactivity
- Identify at-risk individuals or groups based on factors such as gender, nationality, education background, social class (optional), and school type
- Recognize challenges faced by individuals from different social classes in various study programs

Social Dimension: Where to go from here?

- Incorporate insights into the process of further developing curricula
  - On structural and individual level
- Tailor support to individuals from diverse backgrounds or with different educational paths
- Implement support or motivational advice (e.g. nudging)
  - Along the student life cycle:
    - → At the beginning: part time students
    - → After 12–18 months: minimal success for students
    - → Towardstheend: motivationboost

Contact

PASSt – Predictive Analytics Services für Studienerfolgsmanagement
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Bundesministerium
Bildung, Wissenschaft
und Forschung

Publications

Präsentation BMBF-Transfertagung April 2021 Predictive Analytics Services für Studienerfolgsmanagement (PASSt)

UnikoForum Digitalisierung "Digitale und soziale Transformation" 2021 Projektposter & Statusupdate

Zeitschrift für Hochschulentwicklung, Bd. 16 Nr. 4 (2021): Studierbarkeit und Studienerfolg – zwischen Konzepten, Analysen und Steuerungspraxis: Analyse von Studierbarkeit mittels Prognose-und Simulationsmodellen

MATHMOD 2022 – Wien: PASSt-A: Agent-based student analytics aimed at improved feasibility and study success

LOTUS Policy Dialogue Workshop on Leading Digitalisation 2022
Dealingwiththeimpactof newtechnologies: The roleof learninganalytics

Zeitschrift für Hochschulentwicklung, Bd.17 Nr. 2 (April 2023): Digitalisierung der Hochschullehre – Projekte österreichischer Hochschulen 2020–2024 (Sonderausgabe): PASSt -Predictive Analytics Services für Studienerfolgsmanagement

9th International Conference on Higher Education Advances (HEAd'23 – Valencia, Juni 2023): The PASSt Project: Predictive Analytics and Simulation of Studies aimed at Quality Management and Curriculum Planning

Consortiumof Higher Education Researchers (35. CHER Konferenz – Wien, August 2023):
Implementing Machine Learning and Agent-Based Simulation for Predictive Analytics in HES

European Higher Education Society (Forum 2023 – Linz, September 2023):
Ready for Educational Analytics? Assessing institutional capacity gaps