

Research and Teaching

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Neat Software Designs

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General outline:

- Introduction
- Research interests
- Teaching
- Questions

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Introduction

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Introduction

20 years work experience:

- 9 years – Research
- 5 years – Teaching
- 9 years – Engineering

Introduction

- Research:
 - Formal verification
 - Model checking
 - Control systems
 - Machine translation
- Teaching:
 - Mathematics
 - Formal methods
 - Programming languages
 - Data bases
 - Software development
- Engineering:
 - User requirements
 - Specification and docs.
 - Design and Architecture
 - Testing and development
 - Product ownership

Introduction

Experience with languages:

- C/C++
- UML
- C#
- Java
- SQL
- JavaScript
- Bash
- MATLAB
- Mathematica
- Python
- R

Research interests

Research interests: Earlier

Static program analysis:

- Information stream quality
- Hoare-based verification of C

Model Checking Markov Chains:

- Statistical model checking CTL
- Steady-state detection

Statistical Machine translation:

- Distributed Machine Translation Infr.

Cyber physical systems:

- Computable CTL* model checking
- Symbolic regression for BDD controllers

Research interests: Recent

Deep learning for control:

- Neural Networks as Correct-By-Design Controllers:
 - Performance
 - Representations
 - Verifiability
- Compact control law representations.
 - Data science models?

Model driven engineering:

- Runtime guarantees by verifying OCL constraints on DMs.

Research interests: Future

Artificial Intelligence:

- True artificial intelligence
 - Self-motivated
 - Unsupervised learning
- Model checking
 - Design, training, robustness?
- Static program analysis
 - -//-

Domain specific languages:

- Evolution of DSL meta models
 - Backwards compatibility
- Designs for DSL implementations
 - Extendible and maintainable
- Runtime guarantees via static constrains

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Teaching

Teaching preferences: Earlier

Novosibirsk State University:

- Introduction to UML
- Unified Modeling Language UML
- Introduction to C# language

TU Twente (assistant):

- Formal Methods for Software Engineering

RWTH Aachen (assistant):

- Advanced Model Checking

Teaching preferences: Recent

Discrete Mathematics:

- Linear Algebra
- Regular Languages
- Grammars and Finite State Automata's
- Set theory and propositional logic

Software engineering:

- C# ASPX .NET
- Java Enterprise
- Database Optimizations
- Operating systems
- Quality, Testing, and V-Model
- SQL and Data modeling for RD

Teaching approach: Classification

Various common teaching and learning models

(from: Thurgau Department of Education, 2013, p.9; based on an unpublished script by Keller, 2009)

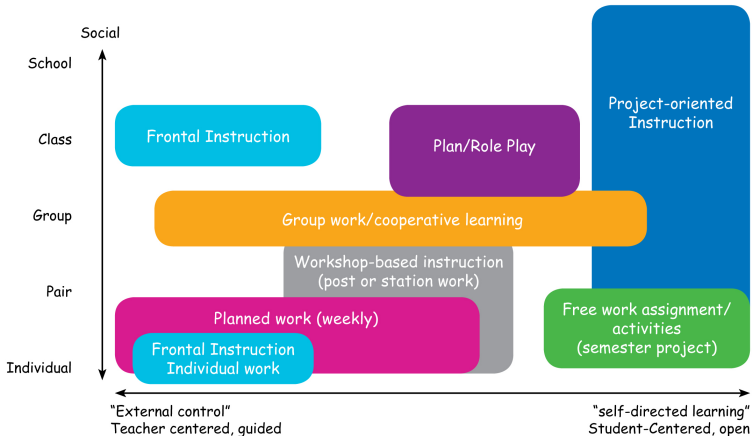


Figure 1: Teaching approaches

Teaching approach: Basics

Connect:

- Be personal
- Use Humor
- Be assertive

Motivate:

- Create interest
- Challenge
- Track engagement

Guide:

- Help if needed
- Keep challenging

Started on BKO @ Fontys, did not have time to finish.

Questions

Teaching:

- What does 80% of teaching include?
- What choice for teaching is there?
- Who creates the lecture materials?

Research:

- What does 20% of research include?
- What are the research topic bounds?

General:

- Is BKO required?
 - Is there time given for it?
- What are the criteria for extension?