Investigating the impact of organised orchestration on teaching

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Definitions

■ Educator
  □ Individual(s) disseminating educational content to learners—e.g. lecturers

■ Formal learning space
  □ Learning environment comprising of at least two sets of actors—an educator and learners

■ Orchestration
  □ Real-time management of classroom activities by educators during a typical classroom session

■ Context switching/switchover
  □ Transitional phase between heterogeneous classroom activities during a typical session
Introduction

■ Exploring technology-driven orchestration
  □ Understand whether and/or how organisation of activities influences educators’ effectiveness

■ Thesis goals
  □ Investigate the impact of an orchestration workbench on teaching
  □ Devise orchestration workbench framework
  □ Investigate successful use of workbench
Motivation

- Supporting educators considered one of the most effective ways of improving quality of education
- However, contemporary orchestration is ad hoc and challenging
  - Timing constraints—typical lecture sessions lasts 45 minutes
  - Homogeneous activities take place within sessions— instructional and otherwise
  - Sequencing of activities is an issue due to context switches involved
  - Specialised tools and services for managing activities
Inspiration: developer IDEs

- Target group—Developers
- Focus—Software development
- Core functionality—Integrated development environment
- Examples—Eclipse, Kate, Kile, Netbeans
Inspiration: scientific workbenches

- Target group—Scientists
- Focus—Scientific workflows
- Core functionality—Scientific workflow management
- Examples—Taverna, Project Trident
We are proposing an educator orchestration workbench
- Facilitate sequencing of session activities
- Organisation of session activities
- Seamless multi-tool integration
Research questions

- Does a teacher orchestration workbench enable teachers to become more effective in the classroom?
  - Applicability of orchestration workbench
  - Impact of orchestration workbench

- What is the impact of an orchestration workbench on the teaching experience?
  - Impact of orchestration workbench on teaching experience
Experimental plan: methods

- **Video analysis**
  - Public UCT recorded lecture sessions
  - Uncover potentially interesting non-workbench orchestration trends

- **Case studies**
  - Implications of using technique in a real-world setting
  - Help in answering RQ #1 and #2

- **Controlled experiments**
  - Large-scale online experiment
  - Randomised controlled study
  - Help in answering RQ #1 and #2
Preliminary study: pilot (1)

- Flipped classroom learning model
  - Second year Computer Architecture course
  - 175 registered students

- Study objectives
  - Feasibility of using orchestration tool
  - Tool effect on learning experience
  - Orchestration activities

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<th>Orchestration</th>
<th>Activity level</th>
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<td>Live demonstrations</td>
<td>Class</td>
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<tr>
<td>Discussion</td>
<td>Interactive discussions</td>
<td>Class/Individual</td>
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<td>Timed quiz</td>
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<td>Individual</td>
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Preliminary study: pilot (2)
### Preliminary study: pilot (3)

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Preliminary study: pilot (4)

- 71 participants recruited

- Key findings
  - Feasibility of approach ascertained
  - Prototype features found desirable by learners
  - Demographic responses noticeably similar to overall trend
Future directions

■ Establish effectiveness of orchestration workbench framework
  □ Controlled experiments to gather sufficient data
  □ Help answer RQ #1 and #2

■ Demonstrate applicability of orchestration workbench framework
  □ Conduct case studies in real-world settings
  □ Evaluate impact of orchestration workbench in real-world settings

■ Establish trends in non-workbench orchestrated environments
  □ Video archive analysis
  □ Educator surveys


Questions?
Appendix I: thesis contribution

- Framework for achieving effective technology-driven in-classroom orchestration
- Working prototype of a teacher orchestration workbench
- Case studies demonstrating the use of the classroom orchestration workbench
- Analysis and results of experiments conducted to demonstrate the effect of the orchestration workbench on teaching and learning
Appendix II: orchestration in perspective

Opening Phase

Instruction Phase

Closing Phase

Individual

Individual Level Orchestration

Group

Group Level Orchestration

Class

Class Level Orchestration
Appendix III: learner survey questionnaire

- Paper-based questionnaire was distributed amongst participants on the last day of class

1. (Demographic) Lecture sessions attended
   - 1–3, 4–6, 7–9, 10–13

2. (Demographic) Prior final mark
   - 75+, 60–74, 50–59, 0–49

3. (Subjective) Agreement with tool use—five-point Likert scale
   - 3.1 Tool helped organise lecture sessions
   - 3.2 Timer before lecture sessions helped
   - 3.3 Activities listing was useful

4. Do you have any general comments
Appendix IV: learner survey demographics

- Timer feature
- Organisation
- Activity listing

Attendance: 10–13 Lectures
Past Exam Score: 60–74 %
Past Exam Score: 75–100 %