

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

CCS → Applied computing → **Education**

Education Recent Papers Switch to Flat View Contact Us	Digital libraries and archives	Computer-assisted instruction	Interactive learning environments
Author Tools Assign This CCS Concept Generate CCS Codes	Collaborative learning	Learning management systems	Distance learning

- 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

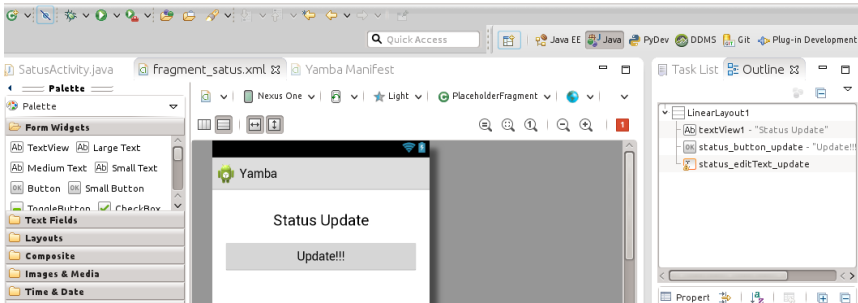
- Supporting educators considered one of the most effective ways of improving quality of education
- However, contemporary orchestration is ad hoc and challenging
 - Timing constraints—typical lecture sessions lasts 45 minutes
 - Homogeneous activities take place within sessions—instructional and otherwise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



Office

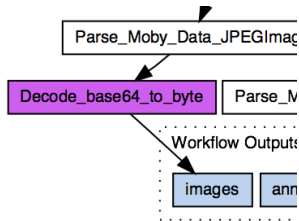
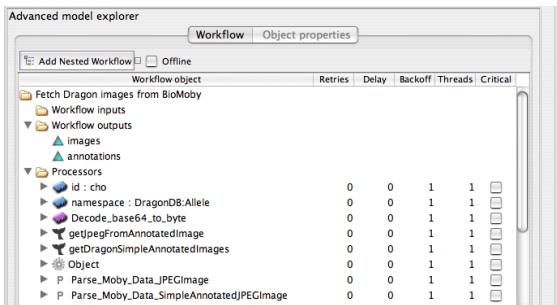


Inspiration: developer IDEs



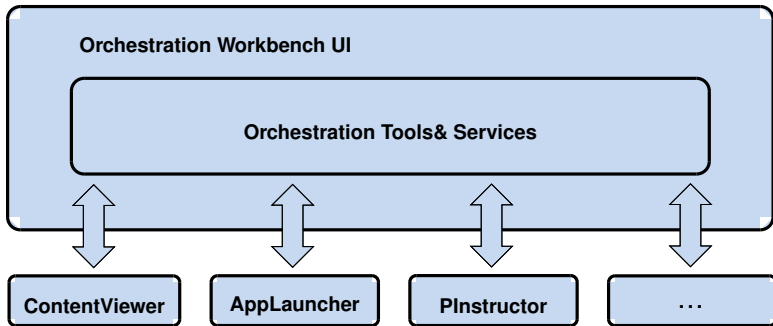
- Target group—Developers
- Focus—Software development
- Core functionality—Integrated development environment
- Examples—Eclipse, Kate, Kile, Netbeans

Inspiration: scientific workbenches



- Target group—Scientists
- Focus—Scientific workflows
- Core functionality—Scientific workflow management
- Examples—Taverna, Project Trident

The workbench concept



- 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 of 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

Activity	Orchestration	Activity level
Demonstration	Live demonstrations	Class
Discussion	Interactive discussions	Class/Individual
Timed quiz	Timed quiz session	Individual

Preliminary study: pilot (2)

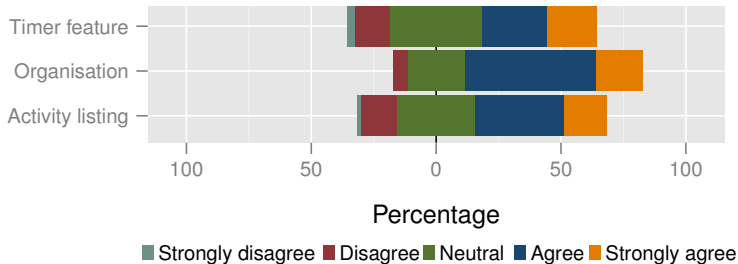


Preliminary study: pilot (3)

Lecture	COW usage	Other applications usage		
#	Duration	Duration	Count	Duration
01	00:39:44	00:18:26	2	00:21:18
02	00:41:58	00:26:13	3	00:15:45
03	00:31:49	00:30:00	1	00:01:49
04	00:31:21	00:31:04	1	00:00:17
05	00:43:08	00:32:57	1	00:10:11
06	00:40:43	00:38:53	3	00:01:50
07	00:41:27	00:38:51	1	00:02:36
08	00:31:56	00:10:07	2	00:21:49
09	00:37:57	00:33:19	2	00:04:38
10	00:34:34	00:33:31	1	00:01:03
11	00:35:58	00:00:00	1	00:35:58

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

Bibliography

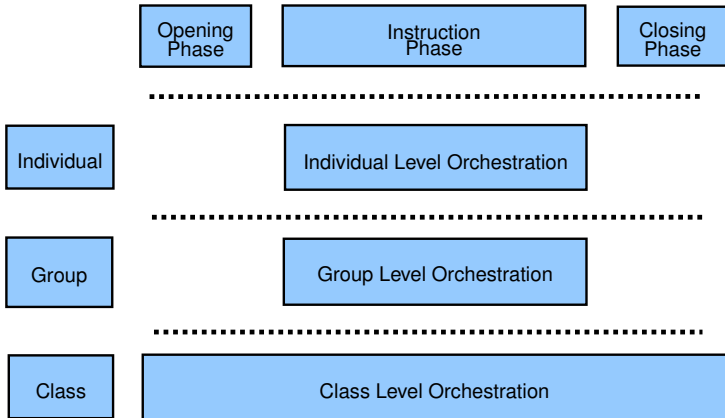
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Questions?

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

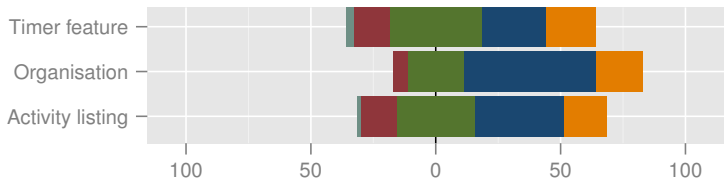
Appendix II: orchestration in perspective



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

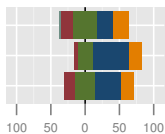
Appendix IV: learner survey demographics



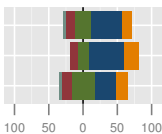
Percentage

Strongly disagree Disagree Neutral Agree Strongly agree

Attendance: 10–13 Lectures



Past Exam Score: 60–74 %



Past Exam Score: 75–100 %

