Integrating Industry-based problems in Performance Testing and Optimization Course: an experience report

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Applying authentic assessments for attainment of learning outcomes.

Students are taught theoretical knowledge and importantly, how to apply them.

- The module “Performance Testing and Optimization” ICT3102 is a level 3000 module compulsory for Year 3 students of the ICT Software Engineering Program.

- It is offered in the fall trimester, September to December.

- Some of the learning outcomes for the module include:
  - To describe and distinguish the different factors that affect the performance of a computer system.
  - To analyse trade-offs and make correct decisions on whether to conduct optimisations.
  - To recommend, apply and evaluate improvements to the performance of a computer system.

- To ensure that students achieve these learning outcomes, several authentic assessments have been incorporated into the module’s curriculum.

- Authentic assessment evaluates if students can successfully transfer the knowledge and skills gained in the classroom to real—world complex problem.

Assessments are split into four portions.

Students have multiple opportunities for formative feedback.

- Wiggins' (1998) formative tasks: educative assessment is intended to inform and improve student learning.
  - Multiple opportunities are provided to give students feedback over twelve weeks.

Analytical	Developmental	Assessment	Presentation
Students are provided with a computer system to analyse. They will test the computer system for performance. Deliverables will be a report based on the computer system.	Based on analytical report, to resolve the bottlenecks. Deliver a report based on the optimizations.	Students are asked to critique on the work of other teams.	Students will make the presentation of their project.
Week 6	Week 12	Week 13	Week 13

Wiggins, Grant. (1998). Ensuring authentic performance.

Study to determine if integrating industry-based problems enhances student learning.

Collaboration with SIT@NYP Living Lab.

- Team-based assignment was designed to determine whether students can establish performance requirement and develop relevant performance metrics for a real industry application.
- The industry problem was derived from an on-going applied research project, in line with the vision of applied learning-research nexus at the university [5].
- The industry application has been deployed as part of the SIT@NYP Living Lab, and faces real-life performance issues such as speed and concurrent access, commonly found in most real-life deployed solutions.
- In total there were 17 teams.
- Each team has five members.

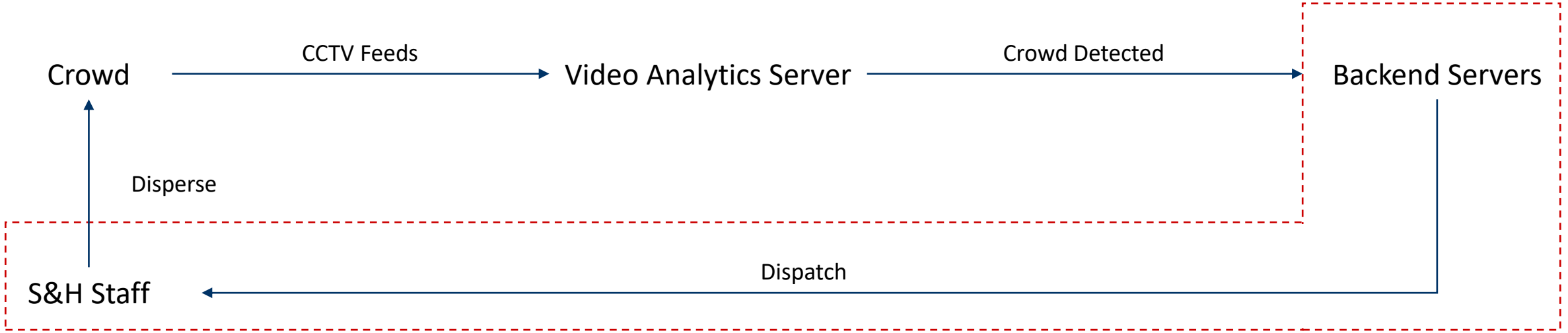
Real World Problem Statement: Using Video Analytics to monitor social distancing.

Problem statement is part of an ongoing project with an industry partner.

- Purpose
  - Disperse students crowding at corridor and classroom.

- Current operations
  - S&H staff randomly goes around campus for patrolling.

- Problem
  - Manpower for patrolling is very high.



Four assessments are created using Fink's four step approach.

Students are taught theoretical knowledge and importantly, how to apply them.

Step One – Identify a good forward-looking assessment.

- Relatable: project is relating to the Covid-19 endemic.
- Realistic : project is part of an actual project with an industrial firm.

Step Two – Identify appropriate criteria and standards.

- No single correct solution to the problem.
- Students are assessed on their overall thinking process and how they apply their classroom knowledge.
- Students are provided with rubrics what they will be accessed against.

Step Three – Provide multiple opportunities for self-assessment.

- Feedback on analytical report.
- Industry practitioners were invited as guest lecturers and students get to experience hands-on lab session.
- Critique amongst other teams to learn from one another.

Step Four – Provide FIDeLity [Frequent, Immediate, Discriminating, and done Lovingly] feedback.

- After the critical analytical phase, all teams are provided with feedback how their previous report can be improved.
- One of the weaker teams was provided the luxury of a weekly meeting. The performance of the team was one of the best in the cohort.

Fink 2013: Creating Significant Learning Experiences: An Integrated Approach to Designing College Courses, Revised and Updated

Assessing authentic assessments.

There is no single correct solution to the problem.

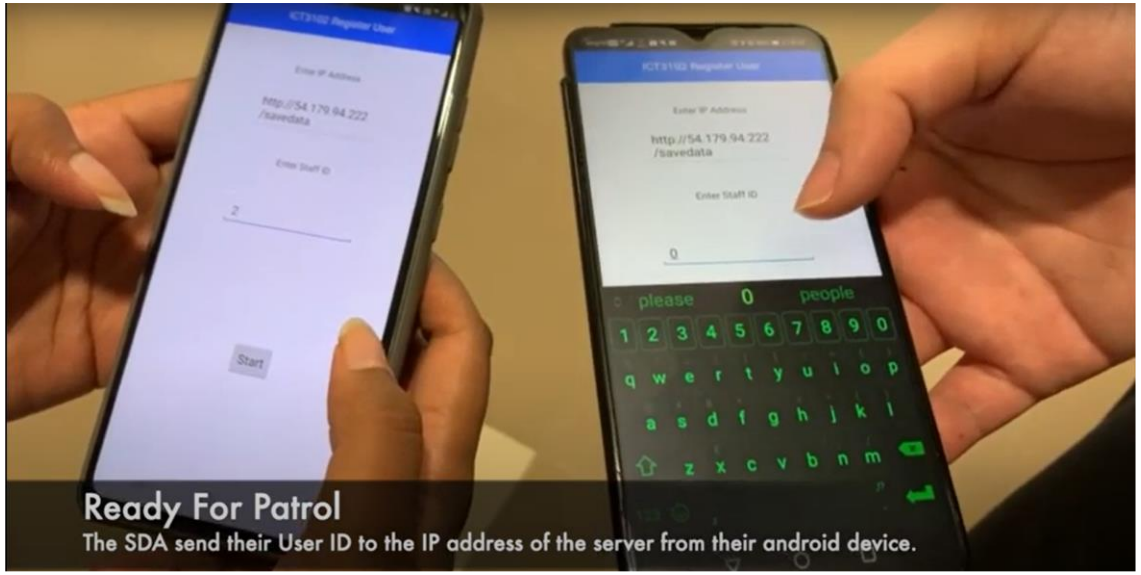
- Student solutions were evaluated based on criteria such as expected workload, performance requirements, architectural diagram and results of the performance tests.

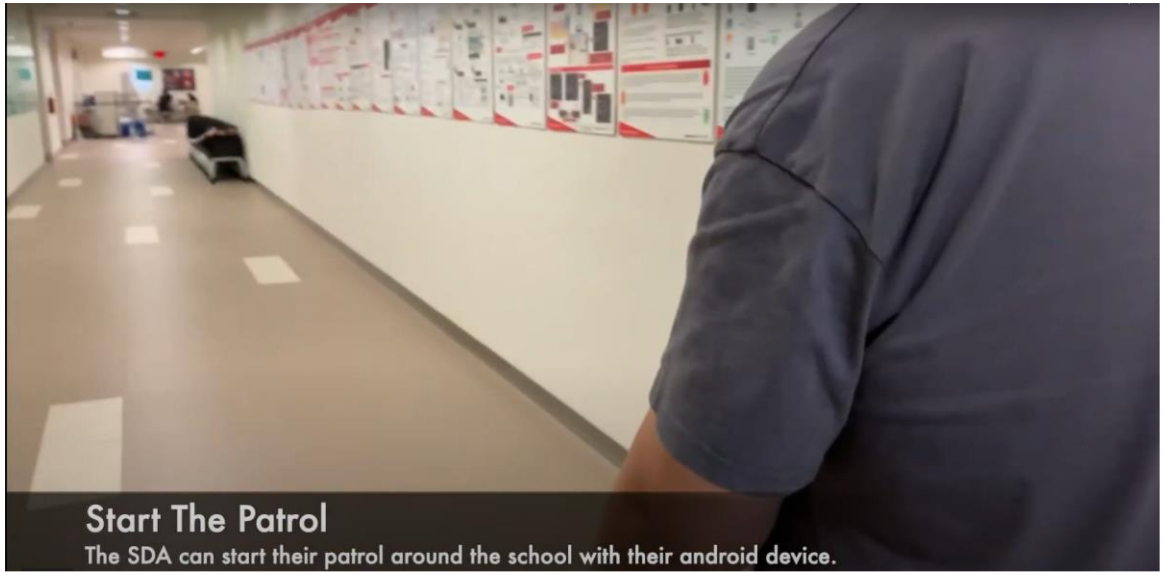
- In line with the characteristics of authentic assessment, **there is no single correct solution to the problem.**

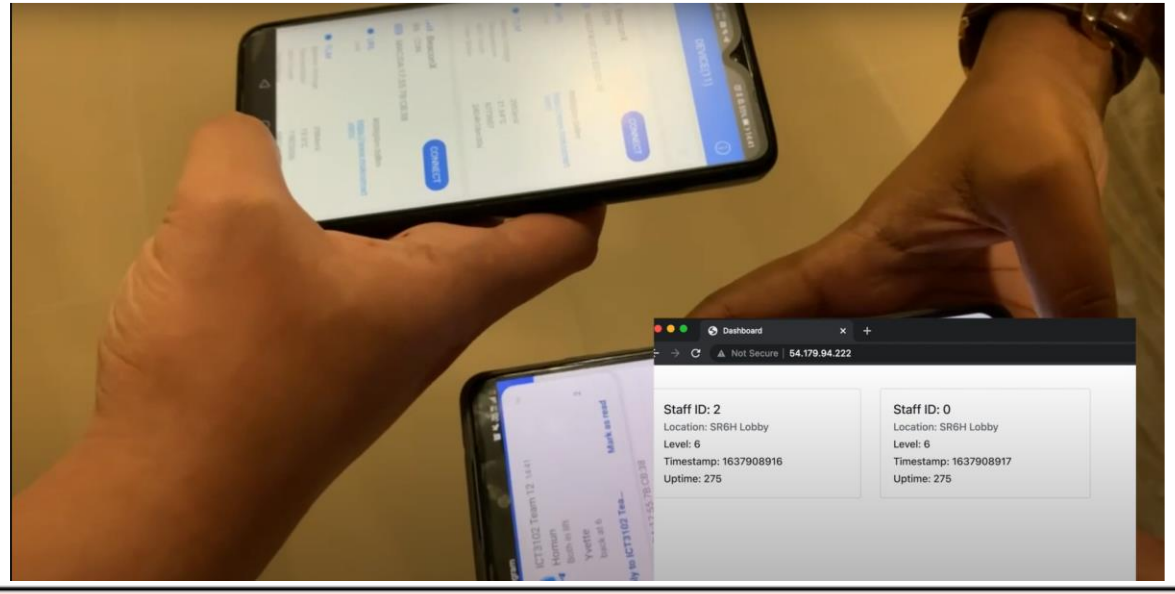
- Students are assessed on their overall thinking process and how they apply their classroom knowledge to the real-world problem.

Student Project Samples.

Quality of submissions was very high.







Survey conducted on week 7-8.

Survey included one of the deliverables with a industry speaker.

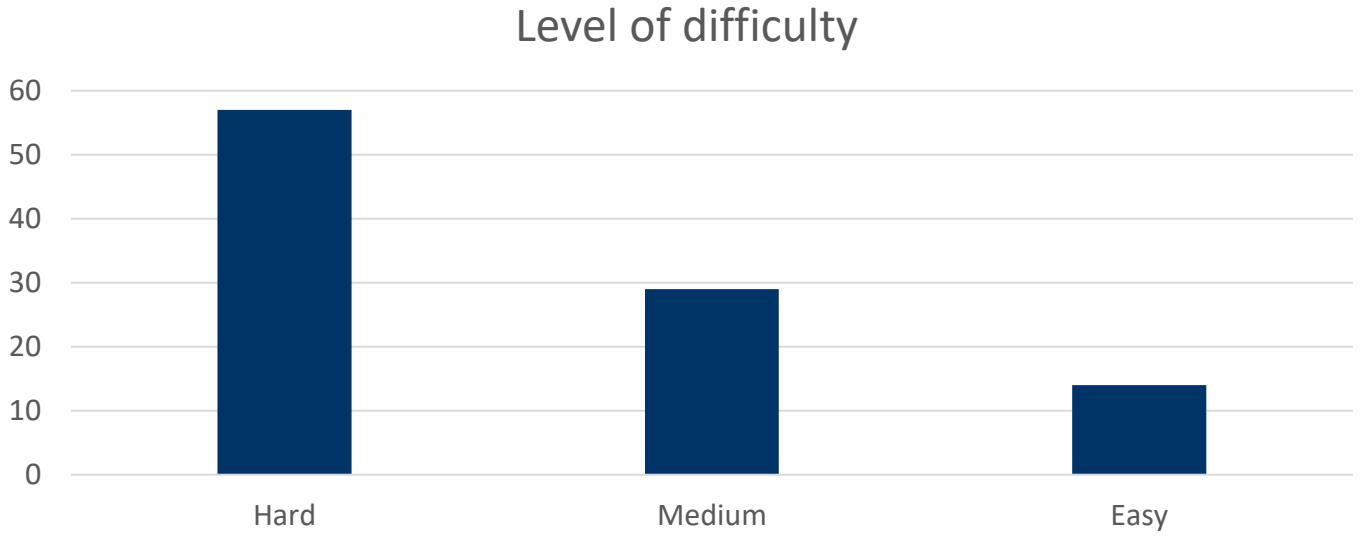
- Analysis was performed using data gathered from student feedback survey conducted online after the assignment deadline on week 7-8.

- 8 students out of 84 responded.

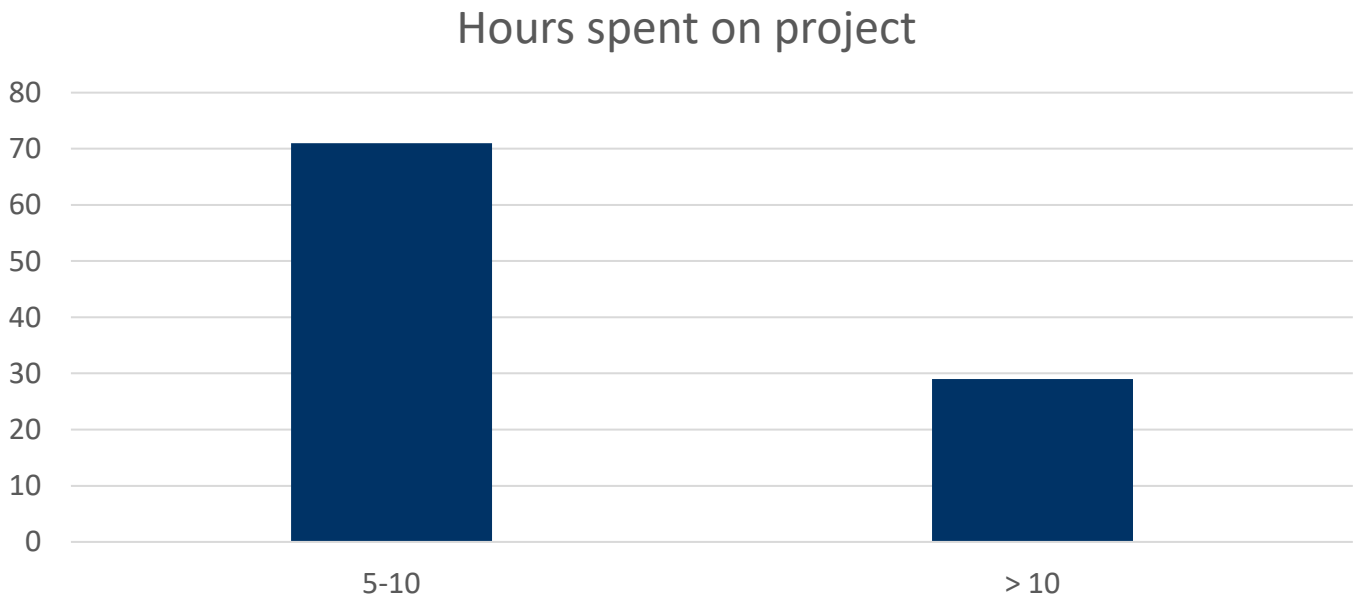
- Questions were :
  - How would you rate the difficulty level of the real-life industry problem (Assignment 1)
  - How much time did you spend on assignment 1?
  - How would you rate the difficulty level of the docker course materials taught by industry
  - How much time did you spend on docker material?
  - Do you think using real-life industry problem has enhanced your learning? (Yes / No and why?)
  - Overall, I am satisfied with the industry-based assignments for this module

All respondents agreed that using real-life industry problem has enhanced their learning.

More than 70% agreed or strongly agreed that they were satisfied with the incorporation of industry-based assignment



How would you rate the difficulty level of the real-life industry problem



How much time did you spend on assignment 1?

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Do you think using real-life industry problem has enhanced your learning? (Yes / No and why?)

- I would say it isn't that great of a usage because of the unknown what your future company/job will hold but at the same time it will empower you if your job/company requires you to use it which is either a win-win situation. **However, this is a good way of learning things that we might not learn if we were to follow the traditional way.**
- Yes. It enables me to apply what i have learnt in lectures to practice and allows me to discover any concepts that are not very clear and thus, to read up more.
- Yes because it measures a real system instead of dummy webpages.
- Yes, to some degree. Would prolly be more useful if the problem was slightly more complex though. Complicated projects are tedious but worthwhile, although I hope this comment won't backfire again since more time will need to be invested, and I hope there won't be a "right" answer but more of a properly guided ones if complicated projects were to arise.

Mixture of authentic and traditional assessments is probably the best combination.

Ensures students have a good knowledge base about the subject.

- In summary, educators should not need to choose between authentic assessment and traditional assessments. A mixture of the two is probably the best combination to ensure that students have a good knowledge base about the subject, which are best assessed in traditional manner, and also able to apply the knowledge in real-context, assessed through authentic assessment.

- Industry-based problem are a perfect vehicle for authentic assessment benefitting all stakeholders.

- Faculties benefit by synergizing their applied research to their teaching, enriching module content, while industry collaborators benefit from various solutions presented by students, many of which highlight issues that are typically not found in regular tests.

Q&A