WORKSHOP ON USING VIDEO IN COMPUTER SCIENCE EDUCATION

SCAFFOLDING VIDEO ASSIGNMENTS IN CYBER SECURITY
OVERVIEW

• contributions and motivation for using video assignments on two courses related to security.

• observations from these assignments, in terms of differences between artefacts produced on both courses.

• close with a discussion and some recommendations for performing such assignments in the future.
CONTRIBUTIONS
Why would you want to listen to this talk?
CONTRIBUTIONS
CONTRIBUTIONS
CONTRIBUTIONS
CONTRIBUTIONS
MOTIVATION
MOTIVATION
MOTIVATION
MOTIVATION
MOTIVATION
MOTIVATION
What is the real educational motivation?
**Case Studies**

Reflections on Video Assignments for Usable Security  
**Advanced Visual Interfaces, May 29, 2018, Castiglione della Pescaia, Italy**

<table>
<thead>
<tr>
<th><strong>Composition</strong></th>
<th><strong>Benefits &amp; Concerns</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td><strong>Benefits &amp; Concerns</strong></td>
</tr>
<tr>
<td>Lecture. Teams would typically capture speakers using a smartphone camera giving a lecture with supporting slides in a theatre or group study facility.</td>
<td>Optimal for delivering knowledge, but less so for communicating the merits of an artefact, e.g. an interface. Speakers often struggled to interact with the artefact or supporting slides or material.</td>
</tr>
<tr>
<td>Narration. Teams would typically capture a video stream and then narrate over the recording, e.g., screen recording. It was also common for students to capture a traditional slide-deck and narrate.</td>
<td>A very common and relatively easy to capture presentation type. The type often lacked coherence and exhibited lack of planning as team members could remotely capture segments and stitch video together more than in other types. The videos would also often have distracting watermarks due to students using shareware.</td>
</tr>
<tr>
<td>Advertorial. Teams would produce a video as a ‘sales-pitch’ or marketing video that would extol the virtues and benefits of the artefact they produced. The videos would typically be technically advanced and of a high-quality production.</td>
<td>The approach was often effective at demonstrating the effectiveness of the artefact and is also good at demonstrating consideration of context and the intended audience. However, the advertorial approach often failed to demonstrate critical thought and teams would neglect to cement aspects in evidence.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Speaker Roles</strong></th>
<th><strong>Benefits &amp; Concerns</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td><strong>Benefits &amp; Concerns</strong></td>
</tr>
<tr>
<td>Instructor. The speaker would adopt the approach of teacher and methodically progress through a script or series of bullet points.</td>
<td>The approach was beneficial for nervous students that were not confident in the material or the areas being discussed, but such a style was not engaging or distinct. The approach does require some coordination between members.</td>
</tr>
<tr>
<td>Free-form. The free-form approach is a loosely structured video with the speaker seemingly progressing through the presentation with little structure. The approach often exhibited a lack of planning and coordination with speakers rambling through concepts and ideas.</td>
<td>The approach has the potential to be engaging, but only with considerable practice and experience. The reality is that this style often was exhibited by weak teams rushing to meet deadlines.</td>
</tr>
<tr>
<td>Storytelling. Speakers adopted an approach of telling stories and providing of examples to justify the approach to designing the artefact. The concern is that this suggested the artefact was informed by a few examples or stories, rather than addressing a core problem.</td>
<td>The approach is optimal at demonstrating key consideration of the problem area or intended audience. However, it can be time consuming and speakers would often spend considerable time delivering aspects of stories that were often of little relevance.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Tone</strong></th>
<th><strong>Benefits &amp; Concerns</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td><strong>Benefits &amp; Concerns</strong></td>
</tr>
<tr>
<td>Formal. The majority of speakers adopted a formal tone when delivering the presentation. The approach often exhibited planning, but also had the potential be disjointed as students would work on silo-ed segments.</td>
<td>The approach is generally optimal for conveying knowledge and the virtues of a particular interface or solution. However, speakers were often not engaging and often lacked imagination in terms of how to stimulate the audience.</td>
</tr>
<tr>
<td>Conversational. The speaker would attempt to have a conversation with the audience. A challenge for a video presentation, but effective in engaging the audience with short sentences and a clear structure.</td>
<td>The approach arguably only worked well for those confident in language ability, i.e., native English speakers. While it is highly engaging, it often just demonstrated a team that was not prepared and was working to fill the time requirement of the assessment.</td>
</tr>
</tbody>
</table>

**Paper - Table 1 Observations**

Team discussion often was not a feature of disjointed presentations.
CASE STUDIES
ADVERTORIAL Style - FREEFORM ROLE - HUMOUROUS TONE
CASE STUDIES
CONTRAST

- **narration style** was favoured by many teams across both courses.

- **advertorial style** occurred more so regards the proactive password checker project.

- **humourous tone** was far more common with the technical assignment.

- **lecture style** was also far more present more with the proactive password checker assignment than technical solution.
HINDSIGHT
DIGITAL NATIVES DELUSION

experienced consumers (of video) ≠ skilled authors (of video)
SCAFFOLDING VIDEO ASSIGNMENTS
CONCLUSION
CONCLUSION

• video assignments have the potential to utilise presentations more in learning and assessment.

• but, need to be careful not to fall for the digital native delusion.

• students need scaffolding and support to reach optimal outcomes.
OVERVIEW

• outline approach to **learning and teaching** at the University of Glasgow and the School of Computing Science.

• **work-based learning** as an opportunity to deliver a professional degree for software engineers.

• discuss some of the **untapped possibilities** and challenges in partnering with companies as learning providers for students.

• outline **consultation period** to partner with companies to deliver strong degree programme in September 2019.
OVERVIEW

GRADUATE LEVEL APPRENTICESHIP LANDSCAPE

CONSULTATION PROCESS

UNIVERSITY OF GLASGOW PROGRAMME

2017  2018  2019
OVERVIEW

2.00 pm Opening remarks.

2.15 pm Skills Development Scotland.

2.45 pm Possibilities of work-based learning.

3.00 pm Leidos experience.

3.20 pm Tea and coffee.

3.40 pm Open discussion.

4.00 pm Invitation for consultation.

4.20 pm Close
THEORY + PRACTICE
ACADEMIC DEGREES
THEORY + PRACTICE

- **computing science plan** - focused on research and in-depth technical knowledge.

- **software engineering plan** - led-by research and focused on in-depth technical knowledge, but slightly constrained with some practice.

- **work-based learning plan** - partnering with industry and government to shape the profession of Software Engineering in Scotland.
WORK-BASED LEARNING
WORK-BASED LEARNING

- there is not single clear definition of work-based learning.
- our perspective, that the workplace can act as the optimal learning environment for some concepts.
- aspiration is to partner with industry to produce a programme of learning for next generation professionals.
- Scottish Government has now released a series of frameworks to support funding for work-based learning.
BENEFITS FOR EMPLOYERS
BENEFITS FOR EMPLOYERS
BENEFITS FOR EMPLOYERS
BENEFITS FOR EMPLOYERS
BENEFITS FOR EMPLOYERS
BENEFITS FOR EMPLOYERS
BENEFITS FOR EMPLOYERS
BENEFITS FOR EMPLOYERS
BENEFITS FOR EMPLOYERS
The integrated learner and employee journey

Laura Brown
Service Development Executive, Service Design and Innovation

Graduate Apprenticeships: The story so far...

Laura Brown
Service Development Executive, Service Design and Innovation
1. What is a Graduate Apprenticeship?
2. Why GAs in Scotland?
3. How are we developing GAs?
4. What to expect from a GA experience?
5. What are the benefits of a GA?
6. Where are we now?
7. Our Future Plans
What is a Graduate Apprenticeship?

GAs are work-based graduate apprenticeship programmes which are offered at SCQF levels 8, 10 and 11.
Why GAs in Scotland?

Countries with **effective work-based learning systems** show **correlation** between:

- Higher levels of **economic growth**
- Lower levels of **youth unemployment**

**Skills demand by 2022** shows **opportunities in sectors including engineering, science and healthcare** will demand qualifications from **SCQF level 8 and above**.

- 72% of employers reported a lack of technical, practical or job specific skills
- 42% of companies have had to reallocate work to address skills gaps

*UKCES Employer Skills Survey 2013*
How are we developing GAs?

GAs are designed by industry, for industry.
What to expect from a GA experience?

**INDUSTRY EMPLOYER**
- A qualification designed by industry, for industry
- No additional costs other than the apprentices salary
- Choose a course that meets your business needs
- Involvement in mentoring and support of the apprentice

**INDIVIDUALS**
- Recognition of prior learning and experience for entry
- Paid full-time employment with 80% of learning in the workplace
- Access to university facilities, support services and online learning
- A flexible learning timetable with assessments based on workplace learning
- An academic and workplace mentor
### What are the benefits of a GA?

<table>
<thead>
<tr>
<th>INDUSTRY EMPLOYER</th>
<th>INDIVIDUALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan for and meet your <strong>skills needs</strong></td>
<td><strong>Paid full-time employment</strong> for the duration of the GLA</td>
</tr>
<tr>
<td>Brings <strong>new skills and knowledge</strong> into your business</td>
<td><strong>Learning is contextualised</strong> in the workplace</td>
</tr>
<tr>
<td>Access to a <strong>diverse talent pool</strong></td>
<td><strong>Available to those who already have a degree</strong></td>
</tr>
<tr>
<td><strong>Develop networks</strong> with colleges and universities</td>
<td><strong>Gain transferable, industry recognised skills</strong></td>
</tr>
<tr>
<td><strong>Retain employees</strong> by investing in their professional development</td>
<td><strong>Available to anyone over the age of 16</strong></td>
</tr>
</tbody>
</table>
Where are we now?

Creation of around 900 **Graduate Apprenticeship opportunities across 11 frameworks** by September 2018
Our Future Plans

4,000 Graduate Apprenticeships by 2020

Graduate Apprenticeships are embedded in career guidance

Offered by a range of learning providers across Scotland

Key role in delivering skills for Scottish industry
How can I get involved?

Visit [www.apprenticeships.scot](http://www.apprenticeships.scot) for the most up to date information on frameworks and learning.
PRINCIPLES

• **first class degree**, not a second-class citizen, with students expected to attain existing academic tariffs.

• world changing curriculum devised through **equal partnership** with industrial collaborators.

• close **community of practice** where apprentices can share and discuss ideas, concepts and experiences.

• learning and assessment informed by the **challenges** of industry and the **opportunities** of research.
VISION
VISION

• work-based learning to form the basis of a new professional degree.

• utilise Skills Development Scotland (SDS) framework to support development of new professional degree.

• collaborate with industry to form a degree that produces professional software engineers.

• collaborate with government to strengthen legal context to ensure strong reputation for software engineering in Scotland.
POSSIBILITIES
POSSIBILITIES
POSSIBILITIES
POSSIBILITIES
POSSIBILITIES
POSSIBILITIES
POSSIBILITIES
POSSIBILITIES
Leidos?

32,000 employees globally
In the UK we provide IT and Management services and solutions to the following sectors:

- Civil
- Transportation
- Health
- Safety & Security
- Defence
2013

- Considering Software Developer Modern Apprenticeships
  - What can they work on?
  - How much support do they need?
  - Can our jobs be done without a degree?

- Little available advice
  - Treat them like a graduate?
  - Give it a go?
  - My Team
Daniel Morrison

- Our First Developer Apprentice
  - The Guinea pig
- Winner of Microsoft Modern Apprentice of the Year 2015
- Now designing solutions and leading teams of developers
Present Day

▶ Structured Apprenticeship Program
  - Hiring 5-7 apprentices per year in Glasgow
  - Developers, IT, Cyber, Support, Facilities and Project Management
  - Salary Plan and Mentor

▶ Graduate Apprenticeships
  - Rewards work based learning
  - Full BSc (Hons) + 4 years of work experience
  - Broaden experience of apprentices
How to Train Your Apprentice

- Pair with a strong mentor

- Real work from day one
  - Start with small dev tasks

- Reduce supervision over time
  - Heavy supervision 3-6 months
  - Every apprentice is different
Part of the team
Benefit to Leidos

- Quality
  - Question everything
  - Different perspective
- Collaboration
- Community
- Hard workers
- Rewarding experience for mentors
My Apprenticeship at Leidos

8 MONTHS IN

Aidan Davis
Why I chose an Apprenticeship

- Background
- School life
- QA Apprenticeships
My first week

- The buddy/mentor system
- Being part of the team
- Real work
Current Focus

- Vue.js – SPA Framework
Debt Arrangement Scheme
New starts and work experience students

- Teaching Vue.js
- Working on development tasks
- Team building
QA Modern and Graduate Apprenticeships

- Training sessions
- Regular visits
- Starting University
- Plans for the future
Would I recommend it to others?

- Benefits of an apprenticeship
- My experience so far
Questions?

COLIN.JACK@LEIDOS.COM
CONSULTATION
CHALLENGES
CHALLENGES

• Grab a tea/coffee and a seat.

• Consider the challenges work-based learning raises for your organisation - key stakeholders?

• What processes, policies and practices does your organisation need to navigate?

• Culture and legal concerns?
CHALLENGES
CHALLENGES

privacy

staging

research opportunities

Intellectual property
timetabling
balance of theory and practice

Ironing
practices and activities
interprofessional learning
LEADING PARTNERS
LEADING PARTNERS

• since December 2016, we have been consulting with industry about the potential for work-based learning.

• developed an understanding regards the opportunities and challenges of work-based learning.

• now seeking to expand the consultation process to consult a wider community of employers seeking professional software engineers.

• on-going discussions about the academic tariff, timetabling, staging, curriculum as well as assessment and feedback strategies.
LEADING PARTNERS

• since December 2016, we have been consulting with industry about the potential for work-based learning.

• developed an understanding regards the opportunities and challenges of work-based learning.

• expand the consultation process to consult wider community of employers seeking professional software engineers.

• on-going discussions about the academic tariff, timetabling, ironing, curriculum as well as assessment and feedback strategies.
INITIAL CONSULTATION

SOFTWARE ENGINEERING FOR ENTERPRISE DEGREE PROGRAMME - JUNIOR (DRAFT)

YEAR 1

- PROGRAMMING
- DATABASES
- HUMAN FACTORS
- ENTERPRISE ARCHITECTURES
- SOFTWARE ENGINEERING PROCESSES
- METHODS AND OPERATING SYSTEMS
- ALGORITHMIC FOUNDATIONAL
- WEB DEVELOPMENT
- INDUSTRY DAY
- SUPPORT

YEAR 2

SOFTWARE ENGINEERING FOR ENTERPRISE DEGREE PROGRAMME - JUNIOR (DRAFT)

YEAR 1

SOFTWARE ENGINEERING FOR ENTERPRISE DEGREE PROGRAMME - JUNIOR (DRAFT)

YEAR 2

LEARNING PLAN

JUNIOR

1

2

SENIOR

3

4

INDUCTION

Typical

END OF TERM INDUCTION DAY

Students will be expected to present an oral, written, and/or practical assessment. The submission is due on the last working day.

SELF ORGANIZING DISCUSSION

OPEN DAY

TYPICAL

EVENING ORIENTATION DAY

Self-directed activities may be included as part of the course. The submission is due on the last working day.

LECTURES

SELF-LED DISCUSSION

FORMAL EXAMINATION

FORMAL SEMINAR

FORMAL LABORATORY
INITIAL CONSULTATION

TARIFFS

SOFTWARE ENGINEERING FOR ENTERPRISE DEGREE PROGRAMME - JUNIOR (DRAFT)

INDUCTION

END OF TERM 1

TYPICAL
INITIAL CONSULTATION

ADMISSIONS FOR SEE/GLA

LEARNING PLAN

SOFTWARE ENGINEERING FOR ENTERPRISE DEGREE PROGRAMME - JUNIOR (DRAFT)

EXPERIENCE
INITIAL CONSULTATION

LEARNING PLAN

SOFTWARE ENGINEERING FOR ENTERPRISE
DEGREE PROGRAMME - JUNIOR (DRAFT)

INDUCTION

TYPICAL

LENGING:
- FORMAL LECTURE
- SELF-DIRECTED LEARNING
- FORMAL DISCUSSION
- SELF-ORGANIZED DISCUSSION
- FORMAL SEMINAR
- FORMAL LABORATORY

The induction is the first formal stage of the programme. Students will be expected to wear a lab coat and lab coat in accordance with the college health and safety guidelines. The key components of the induction will vary depending on the specific programme.
INITIAL CONSULTATION

SOFTWARE ENGINEERING FOR ENTERPRISE DEGREE PROGRAMME - JUNIOR (DRAFT)

YEAR 1
- INDUCTION
- PROGRAMMING
- GAMES DESIGN
- HUMAN FACTORS
- ENTERPRISE ARCHITECTURES
- SOFTWARE ENGINEERING PROCESSES
- NETWORKING AND OPERATING SYSTEMS
- ALGORITHMIC FOUNDATIONS
- WEB DEVELOPMENT
- INDUSTRY DAY
- SUPPORT

YEAR 2
- INDUCTION
- PROGRAMMING
- GAMES DESIGN
- HUMAN FACTORS
- ENTERPRISE ARCHITECTURES
- SOFTWARE ENGINEERING PROCESSES
- NETWORKING AND OPERATING SYSTEMS
- ALGORITHMIC FOUNDATIONS
- WEB DEVELOPMENT
- INDUSTRY DAY
- SUPPORT

SOFTWARE ENGINEERING FOR ENTERPRISE DEGREE PROGRAMME - JUNIOR (DRAFT)

YEAR 1
- INDUCTION
- PROGRAMMING
- GAMES DESIGN
- HUMAN FACTORS
- ENTERPRISE ARCHITECTURES
- SOFTWARE ENGINEERING PROCESSES
- NETWORKING AND OPERATING SYSTEMS
- ALGORITHMIC FOUNDATIONS
- WEB DEVELOPMENT
- INDUSTRY DAY
- SUPPORT

YEAR 2
- INDUCTION
- PROGRAMMING
- GAMES DESIGN
- HUMAN FACTORS
- ENTERPRISE ARCHITECTURES
- SOFTWARE ENGINEERING PROCESSES
- NETWORKING AND OPERATING SYSTEMS
- ALGORITHMIC FOUNDATIONS
- WEB DEVELOPMENT
- INDUSTRY DAY
- SUPPORT

INDUCTION

- PROGRAMMING
- GAMES DESIGN
- HUMAN FACTORS
- ENTERPRISE ARCHITECTURES
- SOFTWARE ENGINEERING PROCESSES
- NETWORKING AND OPERATING SYSTEMS
- ALGORITHMIC FOUNDATIONS
- WEB DEVELOPMENT
- INDUSTRY DAY
- SUPPORT

TYPICAL

- PROGRAMMING
- GAMES DESIGN
- HUMAN FACTORS
- ENTERPRISE ARCHITECTURES
- SOFTWARE ENGINEERING PROCESSES
- NETWORKING AND OPERATING SYSTEMS
- ALGORITHMIC FOUNDATIONS
- WEB DEVELOPMENT
- INDUSTRY DAY
- SUPPORT

STAGING
INITIAL CONSULTATION

ADMISSIONS FOR SEE/GLA

ACADEMIC TARIFF

EMPLOYER TARIFF

LEARNING PLAN

JUNIOR

1

2

SENIOR

3

4

SOFTWARE ENGINEERING FOR ENTERPRISE DEGREE PROGRAMME - JUNIOR (DRAFT)

<table>
<thead>
<tr>
<th>WEEKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
</tr>
<tr>
<td>T</td>
</tr>
<tr>
<td>W</td>
</tr>
<tr>
<td>Th</td>
</tr>
<tr>
<td>F</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DAYS</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
</tr>
<tr>
<td>24</td>
</tr>
<tr>
<td>36</td>
</tr>
<tr>
<td>48</td>
</tr>
<tr>
<td>60</td>
</tr>
<tr>
<td>72</td>
</tr>
<tr>
<td>84</td>
</tr>
<tr>
<td>96</td>
</tr>
</tbody>
</table>

SOFTWARE ENGINEERING FOR ENTERPRISE DEGREE PROGRAMME - JUNIOR (DRAFT)

<table>
<thead>
<tr>
<th>WEEKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
</tr>
<tr>
<td>T</td>
</tr>
<tr>
<td>W</td>
</tr>
<tr>
<td>Th</td>
</tr>
<tr>
<td>F</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DAYS</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
</tr>
<tr>
<td>60</td>
</tr>
<tr>
<td>80</td>
</tr>
<tr>
<td>100</td>
</tr>
</tbody>
</table>

GUIDANCE

INDUCTION

LEGENDS:

- FORMAL LECTURE
- SELF-DIRECTED LEARN
- RESEARCH/DISCUSSION
- FORMAL SEMINAR
- FORMAL PRACTICAL

TYPICAL CURRICULUM

- Pre-requisite, sessional, written, oral, practical
- Research and development
- Self-directed learning
- Formal lecture
INTERNATIONAL BEST PRACTICE
PERCEPTIONS
CONSULTATION PROCESS
CONSULTATION PROCESS

QUESTIONNAIRE
DEVELOP AN UNDERSTANDING OF THE ORGANISATION OR COMPANY
CONSULTATION PROCESS

SITE VISITS
VISIT ORGANISATION AND CONSULT WITH WIDER STAFF ABOUT THE POTENTIAL FOR WORK-BASED LEARNING
CONSULTATION PROCESS

MODEL REFINEMENT
PRESENT MODEL AND
POTENTIAL SOLUTIONS FOR
FEEDBACK
CONSULTATION PROCESS

• we want to begin the wider consultation process as soon as possible.

• consultation process is central to forming the foundation and partners for work-based learning degree.

• recruitment onto the programme will begin as early as September 2018.

• aspiration is to deliver the first year of the work-based learning programme in September 2019.
SUMMARY

• the aim of the University of Glasgow is to cultivate a culture of learning.

• School of Computing Science wants a degree plan that supports students to become professional software engineers.

• consultation process is designed to ensure a strong degree programme not only for students but industry as well.

• call to action to join us in forming this exciting new degree programme.
SIGN-UP
TALK TO OUR BUSINESS DEVELOPMENT MANAGER.

JILL.RAMSA@GLASGOW.AC.UK