Problem Based Learning (PBL) in Cybersecurity
GEN1222

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Objectives of Presentation

• Share the findings of the HEA project
  – Rationale for using PBL
  – Changes to student learning
  – Addressing the cyber skills shortage
  – Pragmatics
  – Ongoing research to gather views from stakeholders (students, educationalists, practitioners employers) on the effective use of PBL

• Encourage you to get involved
  – Participation in upcoming workshops
  – Using PBL materials
  – Provide feedback to inform model
Objectives of Project

• To provide shared PBL materials for HEI cyber security community
  – Develop and share resources to be used in PBL
• To contribute to the current cybersecurity curriculum debate by developing and disseminating guidance on effective pedagogy
• To evaluate PBL as a method in teaching and learning in cybersecurity
• To explore opportunities for future collaboration
• To provide a forum for discussion and debate in teaching and learning issues and opportunities in cybersecurity
Using PBL in Cybersecurity

• We appreciate that the transition from conventional teacher centred education to problem-based learning can be tricky
• A true understanding of PBL will only come with time and by students and academics engaging in the process
• Our use of PBL is designed to improve the efficiency of cybersecurity education and to help students develop the wide range of skills needed to be a cybersecurity professional
  – Including technical aspects, team work, making judgments and developing as life long learners
Rationale for Using PBL in Cybersecurity

• Reduce ‘information overload’ and stop students from learning huge amounts of unnecessary theoretical detail
• Address perceived weakness in traditional ‘didactic’ teaching methods
• Improve students’ control over their learning by providing more opportunity to be self directed, to locate what they need to know and give them possession of their learning
• Improve students’ interpersonal skills
Why important professionally?

• Make undergraduate education a platform for lifelong learning
  – Cybersecurity is a field where professionals will need to continually build on and update their knowledge in accordance with ongoing developments in technology

• Cybersecurity professionals must be able to
  – make judgments when faced with uncertainty
  – have the confidence to react quickly to situations
  – be able to work both as part of a team and independently.
Cases and Scenarios

- Debate in PBL literature about use of case studies
- Project decided to employ case studies for contextualising PBL
- Case study – providing focus and context for task
- Scenario – task / strategy
Materials

- Case studies for PBL in cybersecurity
- Scenarios for PBL cybersecurity
- Teaching guide in using PBL in cybersecurity
  - To use materials
  - To develop own materials
  - To create learning environments
- Student learning guide to PBL as a learning tool
Collection of Data

• Trying to measure effectiveness of PBL
  – Summative performance
  – Student engagement
    • Formative / summative
  – Student confidence
  – Smiley face – this is common across 4 partners

• Collecting data at different levels from level 4 to 7

• Range of PBL interventions
  – Single session (component of module)
  – Week long activity (component of module)
  – Longer period (3 weeks-ish) (component of module)
  – Semester (module)
  – Complete level / year
  – Whole programme
Initial Feedback from Students

• Warwick
  – Use of standard module feedback and indication that scenario based PBL exercise was supportive of exercise

• Gloucester
  – See graph

• Sunderland
  – See graph

• Canterbury
  – Longitudinal data collection in progress
Confidence Measure pre and post PBL

N = 30
Promote Discussion about Learning and Teaching in Cybersecurity

• Upcoming workshops
• Blog space
• Feedback after using materials
Summary

• Project took time to get started so now looking at finish later in 2017
• Initial findings are that PBL helps students learn in a different way
• Initial findings suggest that PBL facilitates deeper learning
• Takes time to get students used to approach
• PBL tools appear to be “common sense” but actually quite difficult for students