

Models, processes and interactions: Challenges to inter-disciplinary education in computing technology and culture

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Interdisciplinarity

- Lack of a common language
 - Often seen to be the main issue, but this is only a superficial indication of deeper issues
- Differences in conceptual frameworks, ontologies, modes of seeing and perceiving (in a very concrete sense – people from different backgrounds may literally not see the same things, pick out the same aspects of a visual display); basic working processes and practices.
- Tacit knowledge
- First challenge is one for educational research: how to bring these differences to the surface so that educators know what they are
- Second challenge is one for educational practice: how to educate practitioners so that they are able to function in interdisciplinary domains?



Research

- Drawing from theory
 - Science and technology studies
 - Philosophy of science and art
- Drawing from empirical studies in interdisciplinary domains
 - Computer science and mathematics in life science contexts



Epistemic practices and cultures

- What constitutes the epistemic practice of a discipline is not specified in isolation but within groups, institutions, or cultures
- Common language
- Means for the achievement of key epistemic goals of an area of enquiry
- Activities necessary for claims to be made and justified within a disciplinary area; what counts as 'playing the game'
- Examples: dissecting, segmenting, relating, measuring, counting, comparing, classing, annotating, etc.



- Epistemic practices are local and situated; they are carried out in specific time and space ('doings', 'routines' and specific activities)
- Their significance (meaning, purpose, role in justification, relation to researcher's credibility, etc.) is not independent of their participation in an 'epistemic culture'
- Similar to the relation between a practice of representation in a specific art work and the more general culture in which it is embedded.



- An epistemic culture refers to ‘those sets of practices, arrangements and mechanisms bound together by necessity, affinity and historical coincidence which, in a given area of professional expertise, make up how we know what we know’ (Knorr-Cetina 2007: 363)



Computing and the humanities

- Computing has mathematico-philosophical origins, hence on both sides of the science / humanities divide
- Increasing instrumentalisation of computing leads to increasing mathematisation / quantification
- Fundamentally different epistemic practices and cultures



- **McCarty's distinction**
 - Nomothetic vs idiographic
 - Logical vs psychological
 - Detached vs engaged
 - Distant vs close
 - Singular vs plural (McCarty 2007a)



Education practice

- Sensitising students to the existence of different conceptual frameworks and providing opportunities for practising intellectual flexibility
 - When is a word a term?
 - Give an analogy for ...
 - Define, Describe, Interpret, Explain
 - Model
- Sensitising students to different processes and interactions using an ethnographic requirements approach
 - Requirements elicitation approach



Modelling

- What is a model?
- Representations: resemblance, analogy, constructs, isomorphism ...
- Deeply metaphorical



Maps of science

QuickTime™ and a
decompressor
are needed to see this picture.





Modelling

- What is a model?
- Representations: resemblance, analogy, constructs, isomorphism ...
- Deeply metaphorical
- A variety of forms from alpha-numeric to richly narrative and visual
- Diagrams, maps, equations, simulations, algorithms



Beyond the reach of modelling

- Models and abstraction / quantification
- Quantitative and qualitative approaches
- The residue
- An art-historical example: a 96% successful solution to the Icarus problem (McCarty 2007b)

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Beyond the reach of modelling

- Quantitative and qualitative approaches
- The residue
- An art-historical example: a 96% successful solution to the Icarus problem (McCarty 2007b)
- There is a need to sensitise students to pick up what they may overlook



Processes and interactions

- User requirements elicitation as a means of achieving this sensitisation
- Context - observation, ethnographic techniques, workplace studies
- Rich qualitative fieldwork to gain understanding of users work in organisational settings



- Can make visible 'real world' naturalistic workplace activities vs operationalised accounts
- Use of video
- Focus on contingencies of workplace
- Focus on details of everyday activities and use of artefacts in interaction
- Resource throughout design and development process-transportability of experience
- Resource for: informing requirements, design and generation of scenarios, prototype evaluation and deployment
- Resource for teaching and training



Images

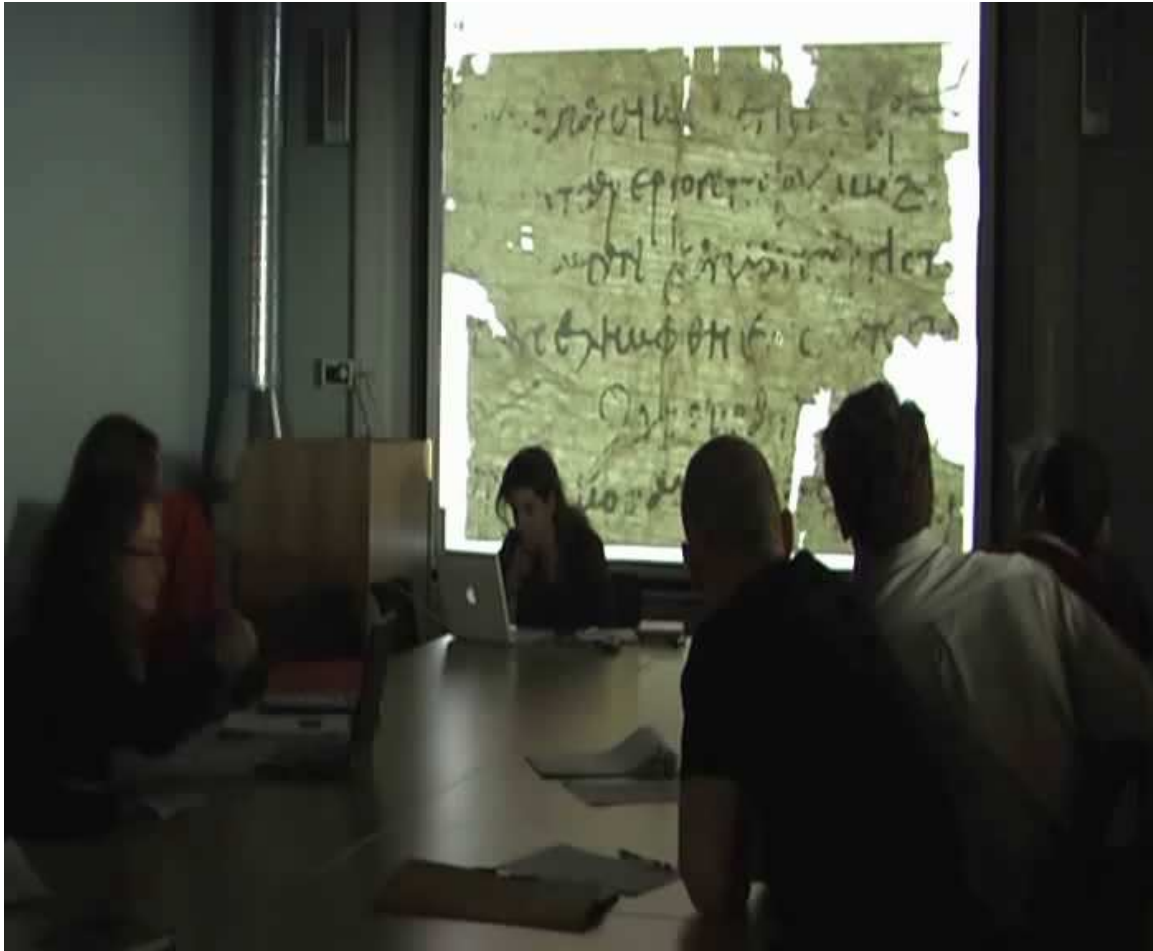
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Documents





Conclusion

- Draw on a number of different disciplinary approaches and methodologies to inform our teaching
- Our aim is not to train students who will be ‘panexperts’
- Rather students who are aware of alternative perspectives and overlapping spaces, who know how to dig deeper to articulate them, how to question, how to use different metaphors and frameworks, how to look and to listen
- Practitioners who know what they know, but also know the limits of what they know.