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Design-based research as a methodological approach to support participatory engagement of learners in the development of learning technologies

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What is Design-Based Research?

History and Nature of Design-Based Research (DBR)

Originated by Ann Brown (1992) and Alan Collins (1992) to enable research to be conducted in the ‘messy conditions’ of authentic educational settings.

Interdependence of theory and practice is key to design-based research (e.g. Brown, 1992; Collins, 1992; DBRC, 2003).

Offers opportunities to conduct mixed methods research which is flexible and responsive to the data, allowing for an emergent research design.

Can incorporate other methodologies (e.g. case study) within an overarching methodological approach.
Background and Context

Motivations for the Research

*Teaching in a highly visual area within the Computing discipline (games)* ...

Previous study had highlighted opportunities to introduce video tutorials

High incidence of SpLDs including dyslexia, autistic spectrum conditions

Aiming to promote greater inclusivity/level the playing the field

Desire to engage students with assessment *for* learning

Need to provide timely, usable, and effective feedback

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Inspiring tomorrow’s professionals
DBR and Software Engineering

DBR Cycles and Software Engineering Models

cf. Knowlton’s (2007) observations on congruence of DBR and rapid prototyping
Theoretical Backdrop

Cognitive Theory of Multimedia Learning
Cognitive Load/Dual Coding Theory

Social Presence (Col)
Learning Styles

Teaching Presence (Col)
Conversation Theory
Conversational Framework

Key:
A: Artefact
L: Learner
T: Tutor
Three Research Cycles: First Cycle

Introduction of Instructional Tutorial Videos (ITVs)

Findings: Feed-forward, Dialogue, Visual Demos

Refinements: Video-Enhanced Assessment/Feedback
Three Research Cycles: Second Cycle

Design, Implementation and Evaluation of VEA/VEF Techniques

Findings: Enhanced Inclusivity and Engagement
Refinements: Increase Frequency of VEF, Formalise VEA
Three Research Cycles: Third Cycle

Refinement of Techniques to Form Integrated Model

Findings: Increased Reflexivity, Autonomy, Inclusivity

Recommendations for Future Research/Development
Data Collection and Analysis

TEL INTERVENTIONS IN PRACTICE-BASED SETTINGS

Pre-curser Study / Mahara Intervention
Social media parallel (driver for development of instructional video tutorials)

First Design-based Research Cycle (DBRC1)
Introduction of Instructional Tutorial Videos
Firstly-facing data (driving refinement of the intervention)

Second Design-based Research Cycle (DBRC2)
Video-enhanced Assessment and Feedback
Firstly-facing data (driving refinement of the intervention)

Final Design-based Research Cycle (DBRC3)
Integrated Video-enhanced Assessment and Feedback
Firstly-facing data (driving refinement of the intervention)

Video-Enhanced Assessment and Feedback (VEAF) Strategy

RESEARCH QUESTIONS AND THEORETICAL BACKGROUND

OVERARCHING RESEARCH QUESTION
How might asynchronous video influence the learner experience of assessment and feedback?

Cognitive Theory of Multimedia Learning
PRQ: How might the introduction of new learning materials in the form of asynchronous instructional tutorial videos impact on the learner experience?
SRQ: How might asynchronous video influence the experience of learners diagnostically assessed as affected by dyslexia?

Conversational Framework, Formative Feedback
PRQ: How might the introduction of asynchronous video-enhanced assessment and feedback activities influence the learner experience?
SRQ: How might asynchronous video-enhanced assessment and feedback influence the experience of learners affected by dyslexia?

Conversational Framework, Teaching as Dialogue
PRQ2: How might integrated video-enhanced A&F influence the learner experience?
SRQ1: How might integrated video-enhanced A&F influence learners affected by dyslexia?
SRQ2: How might integrated video-enhanced A&F influence learners affected by Asperger’s Syndrome?

Findings, Case Studies and Conclusions emerging from this investigation

Practice informed by Theory
Theory informed by Practice
Phase Differences in DBR

Design and implementation phases clearly differentiated during Cycle 1, where focus was on development of artefacts (i.e. ITVs)

Differentiation began to blur in Cycle 2 when developing techniques (e.g. video-feedback loop), where design and implementation phases became less distinct

In Cycle 3, differentiation between analysis and design phases became blurred, where techniques were refined to form an integrated system
Conclusions

Flexibility a Key Advantage of DBR

DBR can bridge the paradigmatic divide, knitting together elements of both cognitive and social theories of learning.

Student participation in the development of learning technologies can lead to the enhancement of inclusivity, reflexivity, autonomy and academic performance.

"Where participants play an active role in defining and shaping an intervention, the application of the personalisation effect (Mayer, Fennell, Farmer & Campbell, 2004), within a dialogic interviewing framework underpinned by a collapsed tutor-student hierarchy, offers a strong vehicle through which to engage with participants as students in the role of practitioner, and to engage students as participants in the role of researcher."

Inspiring tomorrow’s professionals
Any Questions?


