Introducing Educational Design Research

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The Netherlands
A little background

- Former pre-school teacher
- Researcher, developer, consultant & teacher
  - Curriculum development
  - Teacher professional development
  - Technology integration
  - Educational design (research)
- In service of educational practice
What is educational design research?

“...a genre of research in which the iterative development of solutions to practical and complex educational problems also provides the context for empirical investigation, which yields theoretical understanding that can inform the work of others.”

- McKenney & Reeves, 2012
Sometimes also known as....

- Design-based research
- Development research
- Design experiments
- Formative research
- Educational design research
Motives & origins

• From research
  • Limitations of dominant modes of research
  • Need for studies that are ‘ecologically valid’
  • Champion: Ann Brown

• From practice
  • Frustration with 90+ years of ‘no significant differences’
  • Need for studies that produce usable knowledge for practice
  • Champion: Jan van den Akker
### Pasteur’s Quadrant (Donald Stokes)

<table>
<thead>
<tr>
<th>Quest for application</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Pure Basic Research</td>
<td>Use-Inspired Basic Research</td>
</tr>
<tr>
<td>No</td>
<td>Bohr</td>
<td>Pasteur</td>
</tr>
</tbody>
</table>

This quadrant is rather sterile. We hope that no work is here…. But some might argue that there is too much work that fits here.

<table>
<thead>
<tr>
<th>Quest for fundamental understanding</th>
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<tbody>
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<td>Yes</td>
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<tr>
<td>No</td>
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Edison
Yields

• Scientific yields
  • “By engaging in design on both a technical and a social level, we were able to arrive at valuable insights in how to foster computer-supported collaborative learning.”
    - Hoadley, 2004

• Practical yields
  • In design-based research, practitioners and researchers work together to produce meaningful change in contexts of practice (e.g., classrooms, after-school programs, teacher on-line communities).
    - DBRC, 2003
EDR: Outputs

• Scientific understanding (to describe, explain, predict or prescribe), e.g.
  • Articulating characteristics of the (type of) solution developed
  • Articulating things the solution engenders (or not)
  • Often with details on when, by whom, under which circumstances

• Applied use (solutions), e.g.
  • Products
  • Programs
  • Processes
  • Policies
Overlaps with other approaches?

• **RBD**: Research-based design & EDR educational design research
  
  “Educational design research is a genre of research in which the iterative development of solutions to practical and complex educational problems also provides the context for empirical investigation, which yields theoretical understanding that can inform the work of others.” – *McKenney & Reeves, 2012*

• **AR**: Action research
  
  “a disciplined process of inquiry conducted *by* and *for* those taking the action. The primary reason for engaging in action research is to assist the “actor” in improving and/or refining his or her actions.” – *Sagor, 2000*
How do processes differ?

Different goals:

- **RBD**: Well-informed intervention
- **DBR**: Intervention and scientific understanding for others
- **AR**: Intervention optional, understanding for self (and often local community) important, changes in practice frequent

What do they involve?

- Similar core phases
- Different outputs
- Different relationships with research
Toward a model for educational design research

**Instructional design influences**
- Foundations for building interventions
- Planned, but flexible iterative approaches
- Systematic, problem-solving mentality
- Importance of context
- Need to anticipate implementation complexities throughout the entire process

**Curriculum influences**
- Consistency from intentions to implementation to attainment
- Need for alignment across curriculum components
- Sensitization to how system levels interact (and the need to plan accordingly)
- Question the relevance of our projects and the values purveyed through them
Generic model for design research in education

(McKenney & Reeves, 2012)
4 recent examples
In each example: Implementation & spread

- Implementation
  - Adoption
  - Enactment
  - Sustained maintenance
- Spread
  - Dissemination
  - Diffusion

- Mindset: Planning for actual use
- Determinants of implementation & spread
  - Intervention attributes
  - Strategies used
  - (System) context
  - Actors
Similar themes across 4 different projects

- Curriculum development
- Teacher development
- Computer-based support

- E.g. creating lessons
Kinds of learning in the examples...

- Teacher learning
  - 0 formal, diploma programs
  - 2 semi-formal, organized programs
  - 2 informal, learning by doing

- Pupil learning
  - 1 semi-formal (out-of school remedial classes)
  - 3 formal schooling (3 age groups)
Analysis & exploration

Analysis

- Initial orientation
- Literature review
- Field-based investigation

Exploration

- Site visits
- Professional meetings
- Networking
Para-teacher learning in an Indian NGO

- **Analysis**
  - Literature review
  - Field portrait
    - Classroom observations
  - Teacher interviews
  - Management interviews

- **Exploration**
  - Program inspiration search
    - India
    - Internationally (especially in developing countries)
  - SWOT
Para-teacher learning in an Indian NGO

**Implementation**

- First: Organizational conditions
- Second: Basic teaching and classroom management skills
- Third: Learner-centeredness

**Spread**

- From start: Eye toward scale and sustainability
- Program institutionalized (endures and grows without researchers)
- 4 journal articles completed, 2 others underway
DESIGN & CONSTRUCTION

Design:
- Mapping solutions
  - Requirements and propositions
  - Skeleton design
  - Detailed specifications

Design:
- Exploring solutions
  - Generating ideas
  - Considering ideas
  - Checking ideas

Construction
- Creating initial prototypes
- Revising prototypes
Integrated science and language curriculum

• Design
  • Multidisciplinary team
  • Full day development meetings
  • Data informed re-design

• Construction
  • Drafted by curriculum dvpr
  • Sent around for review
  • Team discussed revisions
Integrated science and language curriculum

- **Implementation**
  - Workshop
  - Start in design team teacher schools
  - Later in new schools
  - All studied by graduate students

- **Spread**
  - School adopts and expands the work
  - Experts/researchers are asked to facilitate
  - Designed materials and studies published
Ik heb uitgezocht of hoogte uitmaakt voor temperatuur. Dus je moet kijken of het boven warmer of kouder is dan beneden. Je moet het buiten en binnen opnemen met een thermometer. Een thermometer is iets waar jij warmte mee kan meten. We beginnen. Eerst meet je hoe warm het buiten is met een thermometer. Je meet het eerst beneden dus dicht bij de grond. Daarna meet je hoe warm het buiten is maar dan hoger, dat doe je zo: je legt bijvoorbeeld de thermometer op een hoge berg of hangt hem hoog aan de muur. Dan meet je de temperatuur ook binnen, beneden en boven. Slechts als je dat doet dan kijk je op thermometer hoe warm het is. Tenslotte schrijf je het op, kijk of er verschil is en dan ben je klaar.

Kinder proefjes

Nou kinderen je weet dat je met zeep je handen kan wassen, maar je kan er ook wat anders mee doen. Maar dan heb je de spullen er wel voor nodig. Je hebt 2 zeepjes magnetron en een pan... nodig en het moet wel mogen. Hier komt de uitleg. Zet een pan met water op het

En laat het water koken. En laat het 8 minuten er in laten zitten. Leg de zeep in een emmer en kijk of hij drijft, nu doe je het nog een keer maar dan in de magnetron. Laat hem 2 minuten in de magnetron laten zitten. Vervolgens haal je hem er uit en legt hem weer in het koude water. En kijk weer of hij drijft. En wat valt er op kinderen???
EVALUATION & REFLECTION

- Establish the focus
- Frame guiding questions
- Select basic strategies
- Determine specific methods
- Draft and revise a planning document
- Create or seek instruments
- Collect the data
- Analyze the data
- Report the study

Evaluation

Reflection

- Organic
- Structured
Innovative physics in Russian rural schools

- Evaluation
  - Questionnaires
  - Interviews
  - Observations
  - Retrospective reports
  - Pre/post test

- Reflection
  - Team discussions
  - External facilitators (metaplan)
  - Interim reporting
  - End-of-cycle conclusions
Innovative physics in Russian rural schools

- Implementation
  - 2 Cycles
  - Workshops
  - Activities
  - Coaching
  - Support tool (website)

- Spread
  - Student satisfaction
  - Teachers shared expertise in schools
  - Teachers initiated new activities
  - Publications
Main outputs

- Maturing Intervention
- Theoretical Understanding
PictoPal

Les 3 – Weerbericht

Eindresultaat van deze les
In deze les gaan de leerlingen een weerbericht maken met behulp van Clicker®. Aan het eind van de les presenteren de leerlingen het weerbericht op een (nog) TV. In Figuur 4 staat een afbeelding van een mogelijk eindresultaat.

PictoPal

Whisk the eggs in the bowl.
PictoPal

• **Implementation**
  • Informed by 9 cycles of implementation studies
  • Now working with teachers as co-designers of the materials

• **Spread**
  • Next: expanding to include pre-service teachers
  • Workshops, conferences and publications
## Theoretical understanding

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Local theory</th>
<th>Middle-range theory</th>
<th>High-level theory</th>
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<tr>
<td>Describe</td>
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<td>Explain</td>
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<td>Predict</td>
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<tr>
<td>Prescribe</td>
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All 4 examples of design research:

- **Iterative**: Multiple cycles
- **Interventionist**: Practical, relevant intervention developed by considering implementation/spread from the start
- **Theory-oriented**: Use and contribute scientific understanding (e.g. books & journals)
- **Collaborative**: Involved practitioners, in various roles, through activities also for professional development
- **Iterative**: Multiple cycles planned and executed
- **Responsively grounded**: Adaptations based on findings in field
Take home considerations: Warrants of EDR

EDR has the potential to offer some much-needed evidence that educational research is needed, e.g. through its:

• Ecological validity
  • Yields usable knowledge for researchers and often also participants
  • Contributes to the building of theories that can do real work

• Practical relevance
  • Solutions are implemented along the way, not as an afterthought
  • Solutions are theory- and data-informed, therefore they have better odds for being of value

• Often invigorating process, as experienced by
  • Researchers
  • Participating professionals
  • Other stakeholders
Take home considerations: Risks of EDR

• Full studies are poorly suited to short timelines
• Generalizability challenges
• Researchers often find themselves in conflicting roles, e.g. that of the critic and of the advocate
• Easy to do poorly, difficult to do well:
  • Necessitates a rich research repertoire to allow researchers to choose the right tool for the job
  • Requires sound methodological judgment, especially when research concerns and development concerns are pitted against each other
Design research resources in print

Design research resources online

- **Design research communities and information:**
  - [http://learndbir.org](http://learndbir.org)
  - [http://dbrxroads.coe.uga.edu/](http://dbrxroads.coe.uga.edu/)
  - [http://www.evaluateitnow.com](http://www.evaluateitnow.com)

- **Conducting Educational Design Research** book:
  - Amazon discounted: [http://goo.gl/AuSJ0c](http://goo.gl/AuSJ0c)
  - Routledge inspection copy: [http://goo.gl/Mh9VUb](http://goo.gl/Mh9VUb)

- **Open access ebook:**
  - [http://international.slo.nl/edr/](http://international.slo.nl/edr/)
UH-Netvest & educational design research

Discussion
• Clarification?
• Impressions?
• Critiques?
• Concerns?
• Excitement?
Before lunch

This afternoon we will experience a small taste of EDR

But first, let’s:

• Identify potential EDR topics
• Establish teams (3-5 people in each)
• Consider sitting together to explore topics at lunch
How might EDR taste?

About this afternoon

• Goals: Exposure, sensitization, stimulation
• Format: Three short working group activities
• Tools: Handouts offer options
• Groups: Must make choices (only 1-2 tasks in 30 min)

Three phases of group work and discussions

• 13:45: Analysis & exploration
• 14:15: Design & construction
• 14:45: Evaluation & revision
Thank you!
For discussion beyond today...

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