Teachers as researchers
A design-based experiment in focus
The following example design-based experiment (DBE) was conducted by a secondary Drama/English teacher in a South Australian school. In this DBE the teacher’s focus was on digital literacies in the middle years.

This document will provide an overview of:
- the importance of professional learning
- an example of a design-based experiment
- the steps involved in design-based research in the classroom

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1.1 Why professional learning?

Why professional learning?

The AITSL Australian Charter for the Professional Learning of Teachers and School Leaders affirms that to create a vibrant professional learning culture in which all individuals can thrive—there must be opportunities and commitment for learning in all parts of the system.

Professional Learning for teachers and leaders is now, more than ever, a crucial factor in the provision of high quality education.

An ability to engage students is what makes great teachers and leaders.
The best educators are the best learners.
The way we think about professional learning and development must expand.

AITSL 2012
1.2 Characteristics of high quality professional learning

**Relevant**
- Timely
- Identified goals
- Linked to school goals
- New solutions
- Matched to learner goals

**Collaborative**
- Observation and reflection
- Learning from experts
- Coaching and mentoring
- Learning communities
- Seeking feedback

**Futures focused**
- Future needs
- Innovation and challenge
- High level skills
- Research and inquiry
- Theoretical models
- Adapt to change

Which characteristics of professional learning are the most familiar to you?

1.3 Types of professional learning with the greatest impact on practice

According to the survey, the type of professional learning with the greatest impact on teaching practice in Australia and internationally involved ‘individual and collaborative research’.

2. An example of a design-based experiment

- A Design-based Experiment (DBE) is a powerful form of professional learning which involves teachers as researchers.
- The impetus for a DBE in the classroom should be based on a teaching and learning focus that a teacher would really like to change.

An example

- The following example of a DBE was conducted by a secondary Drama/English teacher in a South Australian school. In this DBE the teacher’s focus was on digital literacies in the middle years.
- This example is featured in the DECD webisode: 
  
  Teachers as Researchers - Learning from Design-based Experiments
2.2 The origins of a design-based experiment

The teacher was inspired to conduct a design-based experiment with a focus on internet research, as she recognised in her secondary students an apparent lack of skills and knowledge in this area—despite their supposedly constant exposure to ICTs from a very young age.

The inquiry was therefore focused on skills related to digital literacy.

A Year 9 English class became the focus group—the student researchers.
2.3 Steps to the design-based experiment—an example

**Step 1. Planning the DBE**

Choose focus, establish goals, devise research inquiry question, research process and topic, determine participants, decide on a time-line

In the example the teacher’s focus was established with 3 goals and two research inquiry questions.

**The Experiment Goals**

Effective internet research that focuses on:
- Recognising reliability of internet sources
- Relevance of internet sources to the topic
- Seeking a range of information from the internet

**The Research Inquiry Questions**

How do Year 9 learners understand and use the internet for research purposes?

How can I assist learners to be discerning and critical users of the internet for research and text construction purposes?
Step 2. The Pre-Intervention - Interrupting Assumptions

Determine the extent of students’ prior knowledge and skills in relation to the inquiry focus.

In the example this was achieved with a persuasive essay pre-test using internet research and a questionnaire about the process of the learning with a focus on the project goals related to relevance, reliability and range.

Table 1. Sample of questions from pre- and post-intervention questionnaire

<table>
<thead>
<tr>
<th></th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>What was your first step in using the Internet for research? Be specific. e.g. I typed “smoking in teenagers’ into the Google search engine.</td>
</tr>
<tr>
<td>2</td>
<td>Did this first step help you find the types of websites you were looking for? Or did you need to alter your search. Explain what happened.</td>
</tr>
<tr>
<td>4</td>
<td>After carrying out this first step, describe how you went about choosing sites to look at. e.g. Did you choose the first few sites on the list? How did you choose which ones to look at? Be specific.</td>
</tr>
<tr>
<td>6</td>
<td>Describe how you knew that the sites you were looking at were from reliable/trustworthy sources? What features of the website convinced you that they were reliable? Use examples to explain.</td>
</tr>
<tr>
<td>10</td>
<td>Did you find a range of information or different information about your topic from the 4 different websites? Explain what you found with examples of different information.</td>
</tr>
</tbody>
</table>
Steps to the design-based experiment—an example

Step 3. **Analysis of the baseline data** - What do they know? What can they do?

Using a set of questions related to the experiment goals.

**Table 2. Sample of questions used to analyse baseline data (essay and questionnaire) Ranked according to evidence of skills.**

<table>
<thead>
<tr>
<th>Rank</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do the websites utilized appear reliable?</td>
</tr>
<tr>
<td>2</td>
<td>Does the student know what to look for in a reliable website? Could the student name features to look for?</td>
</tr>
<tr>
<td>4</td>
<td>Can the student clearly describe the most useful website/s and explain why it was useful?</td>
</tr>
<tr>
<td>8</td>
<td>Could the student explain how they went about deciding what to include and what to leave out?</td>
</tr>
<tr>
<td>10</td>
<td>Was there evidence of a range of content from the websites?</td>
</tr>
</tbody>
</table>

**Sample of responses from pre-test questionnaires:**

- “Google has all the answers”
- “…the ones at the top are usually the most helpful”
- “I clicked on the first couple of websites because I thought they would have the most helpful info”
- “I copied an interesting sentence”
- “I mostly took the information from the site and made it into my own words so it isn’t plagiarism”
Step 4. Determine the most prevalent issues

What does the baseline data reveal? What do the intervention lessons need to address?

Based on analysis of the baseline data in the example, the teacher determined that the most prevalent issues that students needed to know about were how to:

- Use a search engine effectively
- Recognise reliable internet sites
- Understand plagiarism and how to avoid it
- Knowing how to effectively use quotations, summarising and paraphrasing
- Use of correct referencing
Step 5. We need an **Intervention**

*Design (through research) and carry out the intervention lessons*

In order to design the intervention the teacher conducted research into digital literacies to gain a ‘big picture’ perspective of the teaching and learning required for the students.

The teacher sought out suitable online resources to use with the students. The 21st Century Information Fluency website ([http://21cif.com](http://21cif.com)) included highly effective tutorials which enabled experimentation of the identified internet research skills in a formative setting. Students also practised skills related to quotations, paraphrasing and recognising plagiarism. The Harvard Referencing Generator was a focus of the lessons about correct use of referencing and bibliographies.

**Summary of Intervention Lessons**

- Task 1: Advanced Search with Google
- Task 2: Evaluating Websites
- Task 3: Understanding plagiarism and how to avoid it
- Task 4: Understanding how to quote and paraphrase
- Task 5: Referencing and bibliographies
Step 6. Post Intervention - Testing the waters

Conduct a learning activity which enables students to try out their new learning.

In the example this included a persuasive essay and a questionnaire about the process (the same as the pre-test questionnaire).

A section of the persuasive essay task sheet:

<table>
<thead>
<tr>
<th>Responding to Playing with Fire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post Intervention Summative Task</td>
</tr>
<tr>
<td>- Choosing a question from the list below you are to respond to Henning Mankell’s novel, Playing with Fire, by completing either an essay OR an oral presentation using PowerPoint.</td>
</tr>
<tr>
<td>- Along with your own insights and thoughts you are to conduct research into your topic on the Internet. You may for example search for relevant facts, statistics, real life stories, pictures and any other information that may enable you to produce a piece of work that is completed with depth and a high level of thinking.</td>
</tr>
<tr>
<td>- You are to use a minimum of 4 websites in your research. After our intervention lessons about effective research on the Internet – you are encouraged to apply what you have learnt as you conduct your research and then use it in your work.</td>
</tr>
<tr>
<td>- You may include pictures in your work and any other relevant visual features in your essay/presentation.</td>
</tr>
<tr>
<td>- A bibliography and reference list must be included (we will learn about the correct way to do this in our intervention lessons)</td>
</tr>
</tbody>
</table>

LENGTH
Essay: 500-600 words
Oral Presentation: 3-4 minutes

It is important to note that the nature and content of the activities carried out within the design-based experiment were all related to the Year 9 English course. The post-intervention summative persuasive essay was connected to the class novel. As with the pre-test persuasive essay, internet research was compulsory. Students completed the same questionnaire as in the pre-test—in order to identify the learning that had taken place.
**Steps to the design-based experiment—an example**

**Step 7. Analysis and evaluation - of Post-Intervention Essays and Questionnaires - So what did they learn?**

*Using a set of questions (the same as the pre-test analysis) related to the experiment goals.*

**Sample revelations from students from the pre and post-intervention questionnaires.**

<table>
<thead>
<tr>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>“My first step was searching in Google ‘good things about competition’ because that is a direct search.”</td>
<td>“The first thing I did to start my research was I went on an advance Google search and typed in that I wanted information about landmines. I decided that I did not want to use any website where random people could submit facts that weren’t true…”</td>
</tr>
<tr>
<td>“I usually choose the first couple of sites on the list because they’re related to the search…”</td>
<td>“…now I am looking at the dates and when it was last updated. I also look at the web address and see if it’s a government site or just made by people’s knowledge. e.g. Wikipedia…”</td>
</tr>
<tr>
<td>“I think most of the time I just look at the website and see if it is helpful or not.”</td>
<td>“I scrolled straight to the bottom to see if it had a publisher and maybe the date to see when it was last updated.”</td>
</tr>
</tbody>
</table>
**Step 8. Further Intervention**

Based on analysis of post intervention data - design and carry out a second intervention. This second intervention may be a much smaller activity with a focus on the elements of the design that require further improvement.

In the example the teacher noticed that a significant number of students had not consolidated skills related to referencing and bibliographies. This therefore became the focus of a second intervention.

**Step 9. Testing the Waters - Take 2**

Collect more data to determine the depth and consolidation of the learning. This could include additional activities that provide further information on the experiment focus. This could be for example a test, interview, sample writing etc. You may analyse and adapt the intervention a number of times, each time being sure to collect comparable data'.

In the example the teacher conducted a revision test in which students demonstrated their skills of persuasive essay writing (using internet research) and website evaluations.
Step 10. Final Evaluation

Reflection on learning and potential impact on others.

The teacher researcher and student researchers should reflect on what they have learnt from participating in the design-based experiment. Consider:

Who could the findings and activities be shared with?

What potential impact could this learning have on others in the school community and beyond?

How could others benefit from the learning that has occurred?

Final evaluation in the example DBE involved the teacher conducting interviews with sample students about their learning. Students also were given the opportunity to work collaboratively to produce internet research resources suitable for their peers beyond their classroom.

The teacher then shared her findings and recommendations with the whole staff at her site. This led to particular faculties in the school incorporating the explicit teaching of several internet research skills into their existing courses. The teacher also shared her findings with teachers at middle schooling conferences.

More detail about the example project and others can be found in Literacy in the Middle Years: Learning from Collaborative Classroom Research, a book listed on the resources page.
3.1 Further reading and resources

Design-based research is:

- An opportunity to create change in teachers and learners
- Requires collection of baseline, midpoint and endpoint data for analysis to guide changed practice and to provide evidence of outcomes
- Context-specific, but with potential for wider application
- Can be designed to be responsive to changing teaching and learning demands – it needs to be relevant to those involved
- Acknowledges the role of teachers as researchers of their own practice and students as researchers as well
- Provides an excellent opportunity for professional learning and reflection on practice
- If successful on any level – is inspiring – especially for the teacher

Professional learning is not an end in itself; it is, or at least it should be, a means to an end and that end is improved student learning outcomes. The prime object is to improve what teachers and school leaders do, not merely what they know.

- (Hargreaves, 2011)
3.2 Recommended Resources

Books:

*(this book features a chapter about the example design-based experiment)*


Articles:


Morgan, A (in press) ‘Proof of concept: using design based research (DBR) for improving science curriculum literacy in the middle years’, *Australian Journal of Language and Literacy*.

The participation of the high school teacher in this design based experiment was part of a collaborative project—*New literacy demands in the middle years: Learning from design experiments*. The project ran over 2010-2012 and involved 12 South Australian middle years teachers. It was supported by:

- Australian Research Council
- Department of Education and Child Development
- Australian Education Union
- University of South Australia

**University researchers:**

- Dr Anne-Marie Morgan  
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- Professor Peter Freebody  
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- Professor Barbara Comber  
  *University of South Australia (now at Queensland University of Technology)*

- Adjunct Professor Helen Nixon  
  *University of South Australia (now at Queensland University of Technology)*
3.4 Contact details and planning resource

For further information about how to approach design-based experiments and other models of action research contact:

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A resource to plan your own design-based experiment:

*A Design Based Experiment - Where to Begin*