

Developing Pre-Service Teachers' Research Capabilities Using LAMS

Bower, M. (2010). *Developing pre-service teachers' research capabilities using LAMS*. In 5th International LAMS & Learning Design Conference, Sydney, (pp. 50-59): LAMS International.

Matt Bower
matt.bower@mq.edu.au



Introduction

This presentation will:

- Describe why we need to develop teachers' ability to conduct research
- Explain an agile technology-enabled approach to developing their research capabilities using LAMS
- Report on the efficacy of the approach based on pre-service teacher and teacher educator observations

Research-Based Learning

Research based learning is learner-centred knowledge building exercise where learners “pursue their own new questions and lines of inquiry, in interaction with the knowledge-base of the discipline”

(Jenkins & Healey, 2009, p.26, adapted from Levy, 2008)

Advantages of Research Based Learning

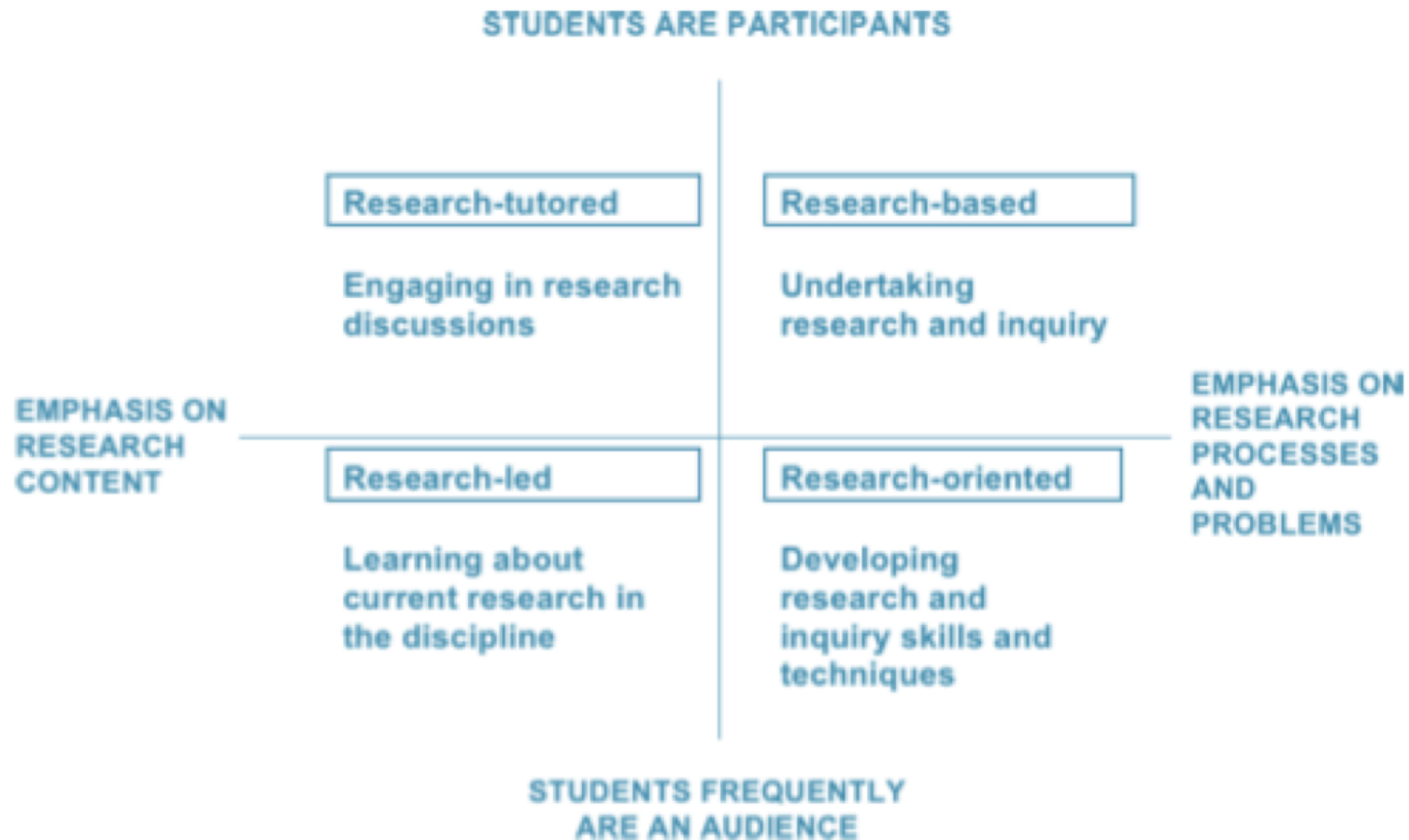
- improved academic performance and lower rates of university dropout
- the development of students' critical thinking and reflective judgement
- enhanced problem solving capabilities and increased confidence in ability to conduct research
- epistemological development surrounding how scientific knowledge is formed

Research based-learning underrepresented in Education studies

- Education programs in the US incorporate less research than any other discipline
- Higher Education Academy report (2009) includes dozens of STEM (Sci, Tech, Math, Engineering) examples but none for Education
- No research based learning examples on the US Council on Undergraduate Research website or the Undergraduate Research in Australia archive relating to Education studies



Ways to engage undergraduate students in research



Critical need for research-based approaches in teacher education

- Teaching is highly context sensitive whereas knowledge and principles in STEM subjects are relatively stable
- Teachers need to not only draw upon theoretical frameworks but also extrapolate, reinterpret, and redefine depending on circumstances
- That is to say, research-based approaches to teaching are *required* in order to be an effective teacher

Critical need for research based approaches in teacher education

- Education students who work on research projects indicated more strongly than any other faculty that the experience helped them to develop their:
 - intellectual skills
 - career and collaborative abilities
 - research skills
 - understanding of how knowledge is created
 - ability write more clearly and effectively
 - capacity to work more effectively with others

(Buckley, 2008)

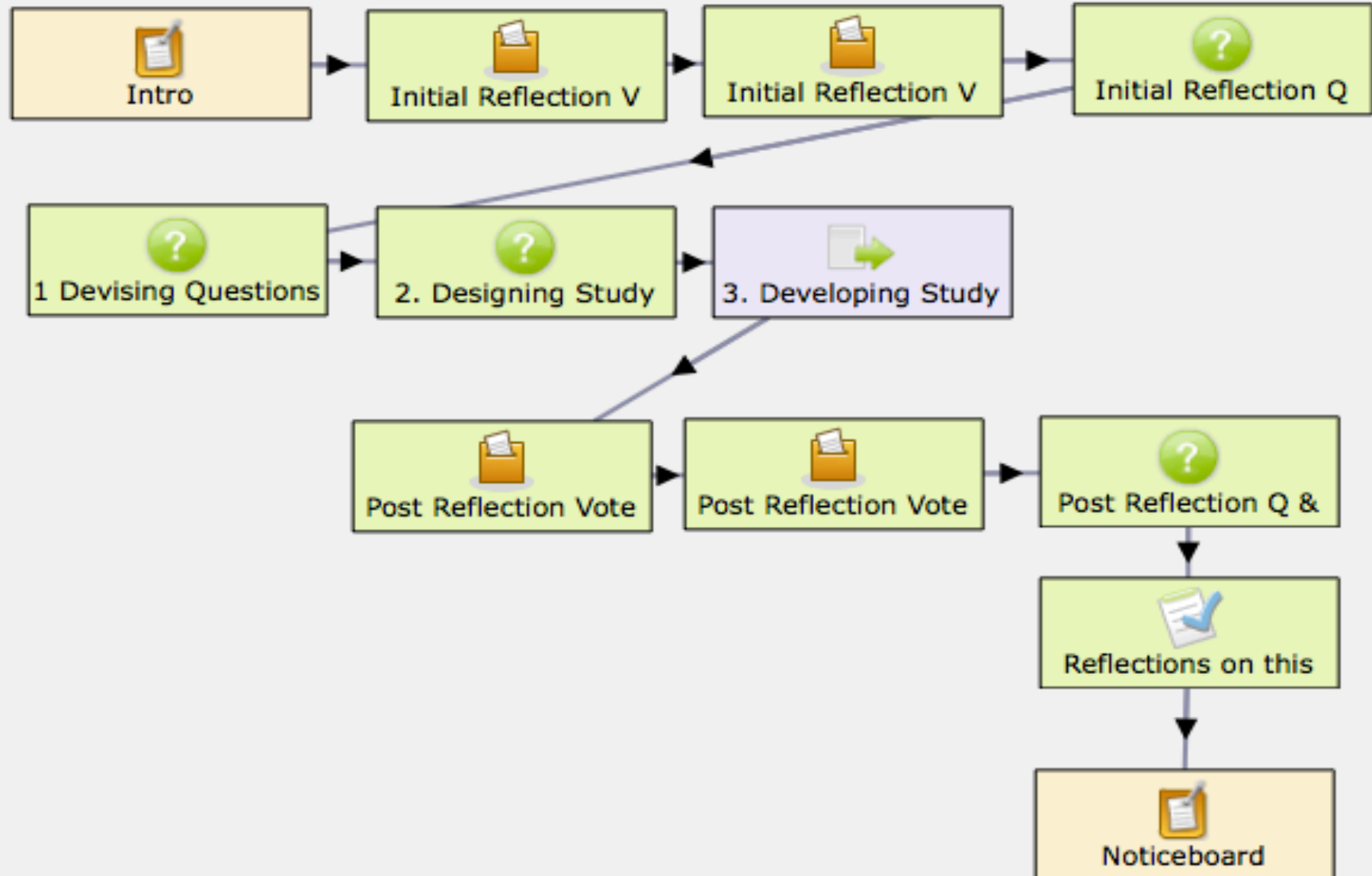
Research Question

How and to what extent can LAMS be used in a pre-service teacher lesson to develop pre-service teachers' research capabilities?

Method

- 62 students in the subject EDUC261 “Information and Communication Technology and Education”
- 90 minute lesson requiring students to design a research study using LAMS (task not assessable)
- Lesson available from http://www.lamscommunity.org/lamscentral/sequence?seq_id=1093725

LAMS Sequence...



LAMS Sequence...

Introduction to research-based practice

Research can be defined as

"original investigation undertaken in order to gain knowledge and understanding"

[Higher Education Funding Council for England, cited in "Research-Teaching Linkages: enhancing graduate attributes" by The Quality Assurance Agency for Higher Education 2009, p 15., Mansfield UK: The Quality Assurance Agency for Higher Education]

Research-based learning is a learner-centred knowledge building exercise where learners

"pursue their own open questions and lines of inquiry, in interaction with the knowledge-base of the discipline" (p. 26)

[Healey, M., Jenkins, A. (2009) Developing Undergraduate Research and Inquiry. York: Higher Education Academy]

In this lesson you will be reflecting upon the value of research based learning and teaching, and designing a research study of your own.



Next Activity ▶

LAMS Sequence...

Initial Reflection 1

Please rate your level of agreement with the following statement:

It is important for education students to adopt a research-based approach when learning about teaching in their undergraduate studies.

Strongly Disagree

Disagree

Mildly Disagree

Neutral

Mildly Agree

Agree

Strongly Agree

Submit Vote

LAMS Sequence...

Initial Reflection 2

Please rate your level of agreement with the following statement:

It is important for practicing teachers to adopt a research-based approach to teaching when teaching their classes.

Strongly Disagree

Disagree

Mildly Disagree

Neutral

Mildly Agree

Agree

Strongly Agree

Submit Vote

LAMS Sequence...

Initial Reflection Q & A

Please spend a few minutes reflecting upon and responding to each of the following questions:

Number of questions presented in this activity: 2 questions.

Question 1:

What are the advantages of adopting a research-based approach to professional learning as a practicing teacher?

Answer:

Question 2:

What are some issues to consider when adopting a research-based approach to professional learning as a practicing teacher?

Answer:

LAMS Sequence...

1. Devising Research Questions (5 minutes)

Spend a few minutes reflecting on the following question and writing down some ideas.

Question 1:

What are some research questions that are of interest you, in order for you to better understand learning and teaching?

Answer:



Submit

LAMS Sequence...

2. Designing a Research Study (5-10 minutes)

Select a research question that is of interest to you that could be investigated in one or two lessons, and design a study to investigate your question.

In the method section try to include detailed descriptions of the tasks that would be completed. However you do not need to worry about the finer details of how it would be implemented (for instance, using a pen and paper survey).



Question 1:

Write the design of your research study here. At this stage your design should be a written outline that includes

Question to be investigated:

Approach to investigation (method):

Issues to consider:

Answer:

LAMS Sequence...

3. Developing a Research Study

Spent approximately 10-15 minutes developing a LAMS sequence that could be used to conduct your research study. Once you have finished, upload it here.

No files have been uploaded yet.

File

File Description



LAMS Sequence...

Post Reflection 1

Please rate your level of agreement with the following statement:

It is important for education students to adopt a research-based approach when learning about teaching in their undergraduate studies.

Strongly Disagree

Disagree

Mildly Disagree

Neutral

Mildly Agree

Agree

Strongly Agree

Submit Vote

LAMS Sequence...

Post Reflection 2

Please rate your level of agreement with the following statement:

It is important for practicing teachers to adopt a research-based approach to teaching when teaching their classes.

- Strongly Disagree
- Disagree
- Mildly Disagree
- Neutral
- Mildly Agree
- Agree
- Strongly Agree

Submit Vote

LAMS Sequence...

Post Reflection Q & A

Please spend a couple of minutes responding to each of the following questions:

Number of questions presented in this activity: 2 questions.

Question 1:

What are the advantages of adopting a research-based approach to professional learning as a practicing teacher?

Answer:

Question 2:

What are some issues to consider when adopting a research-based approach to professional learning as a practicing teacher?

Answer:

Submit

Method (cont)

- Pre-survey requiring students to rate
 - Importance of research-based approach at uni
 - Importance of research-based approach in their classes
 - Advantages and issues associated with research-based approaches to professional learning

(All ratings on a seven point Likert Scale from Strongly Disagree to Strongly Agree, with numerical transformation used to perform statistical tests)

Method (cont)

Lesson consisted of the following three phases:

- A. *Devising research questions* – students brainstorm educational research questions of interest as part of an open-ended Q&A activity.
- B. *Designing the research study* – students write (in plain text) the design of a research study including the question to be investigated and the approach to investigation (method).
- C. *Developing the research study* – students develop a LAMS sequence that could be used to conduct their research study and then upload it.

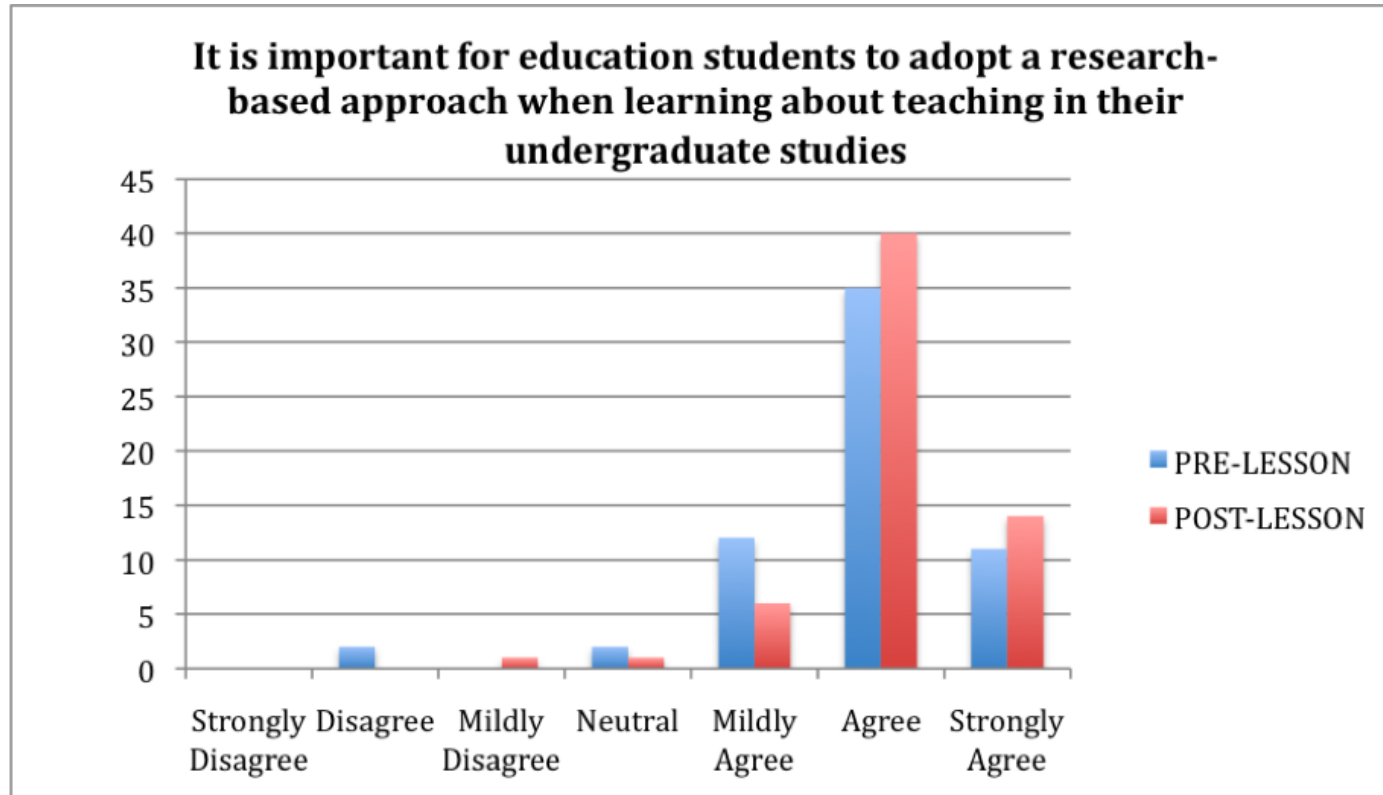
Method (cont)

Post activity students asked to complete the same questions as in the pre-survey plus optional questionnaire:

1. What did you learn from this activity?
2. Which phase of creating a research study was most difficult?
3. Why did you find that phase harder?
4. What sort of extra support could have been offered?
5. I was able to develop a research study in this lesson (Likert scale).
6. LAMS enabled me to more quickly and easily develop a research study than if I did not have this system (Likert scale).
7. As a result of this lesson I am more likely to adopt research-based approaches when I become a teacher (Likert scale)
8. Any other comments.

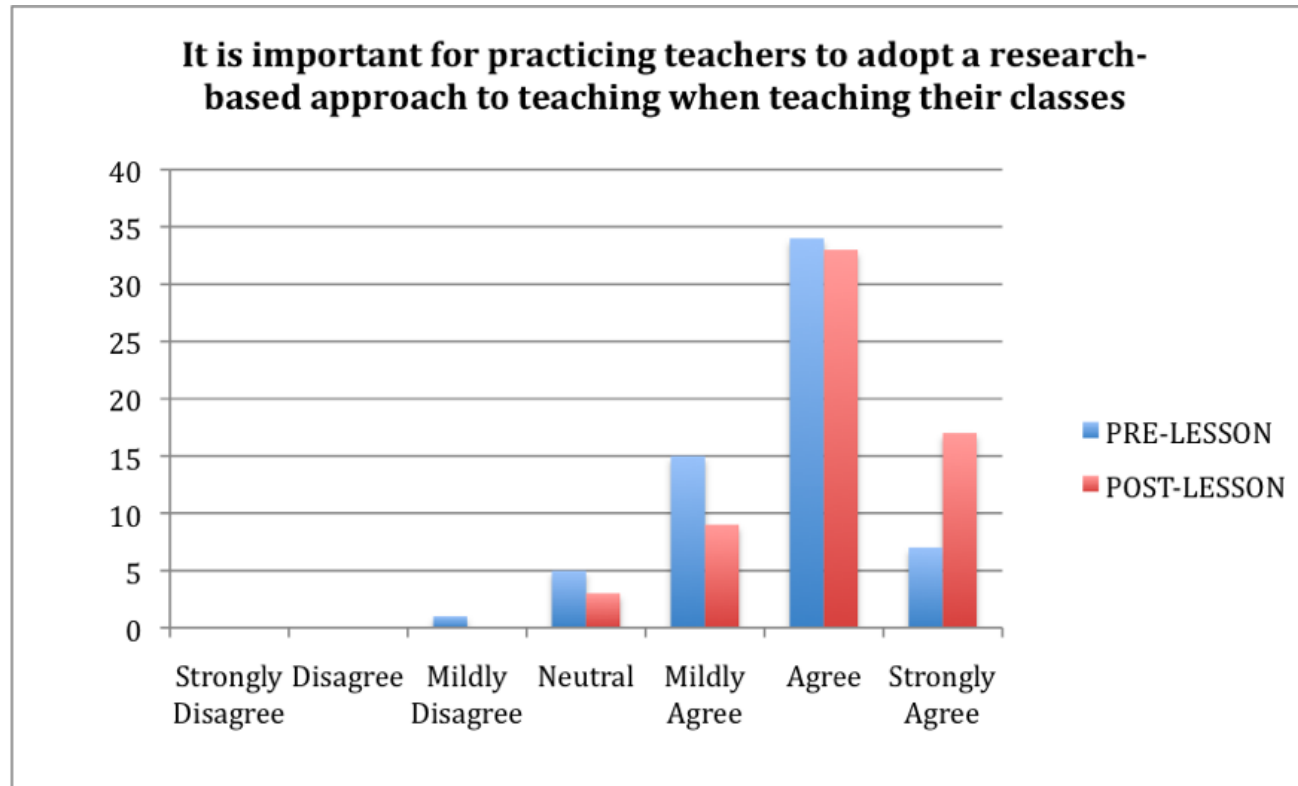
(25 students completed)

Results



Statistically significant difference ($t = -2.34$, $p = 0.022$, $d.f. = 61$)

Results



Statistically significant difference ($t = 2.98, p = 0.002, d.f. = 61$)

Results – Advantages of research-based professional learning for teachers

- *keep up to date with new pedagogies, basing ideas on research*
- *you, as a teacher, explore the views and opinions of peers and academics*
- *trying out new emerging methods or peer reviewed ones*
- *understanding the methods by which students learn and comprehend concepts*
- *knowing when and how to apply different approaches and situations*
- *constantly improving on your own practice (reflective practice)*
- *continuous life long learning; stimulating your interest and challenging your assumptions*
- ***can contribute your own research to assist in others' professional development***
- ***by adopting this approach you role-model to others who just go-with-the-flow***
- ***keeping an open mind, continuously seeking to learn more and updating your knowledge (not simply walking into a classroom with one idea of how you will teach and sticking to it***

Results – Issues with research-based professional learning for teachers

- Time in light of the other ongoing responsibilities
- Pragmatic issues
 - Acquiring parental consent
 - Funding
 - Colleague relationships / politics
 - Methodological issues such as reliability, validity, ethics, and the like (pre: 7, post: 15)
- **How much evidence required to draw valid conclusions?**
- **Can results be generalised to other ages and abilities?**
- **Difficulties controlling for all extraneous variables**
- **A lot of variables to consider**

Phase A: Pre-service teachers' research questions

1. *How to make teacher's teaching more interesting and motivating*
2. *How do students respond to different forms of assessment?*
3. *To what extent should norms-based assessment be used, if criterion-based assessment is more valuable for individual students?*
4. *Should the teacher be 'friends' with the students?*
5. *Value of discovery learning vs tradition (difference in time spent achieving same outcomes)*
6. *Does group work assignments develop students' learning better than individual assignments?*
7. *Do classrooms with technology get better results than classrooms without technology?*
8. *Effectiveness of virtual experiments As a replacement for real science experiments*
9. *Relative effectiveness of computer mediated mind mapping versus physical pen and paper mind mapping creation*
10. *Can collaborative/constructive technologies like Wiki's and blogs be applied to students with Autistic Spectrum Disorder?*

Phase B: Pre-service teachers' methodologies

Some students able to define and align methodology:

Question to be investigated: Do students retain knowledge better from online or offline sources.

Approach to investigation:

- 1. Students are divided into two groups, (1) reads a passage offline, (2) reads the same passage online on a website with pictures.*
- 2. Students are quizzed about their knowledge through 10 short answer and 10 multiple choice questions.*
- 3. Students swap over and repeat steps 1 and 2 with a different source.*

Phase B: Pre-service teachers' methodologies

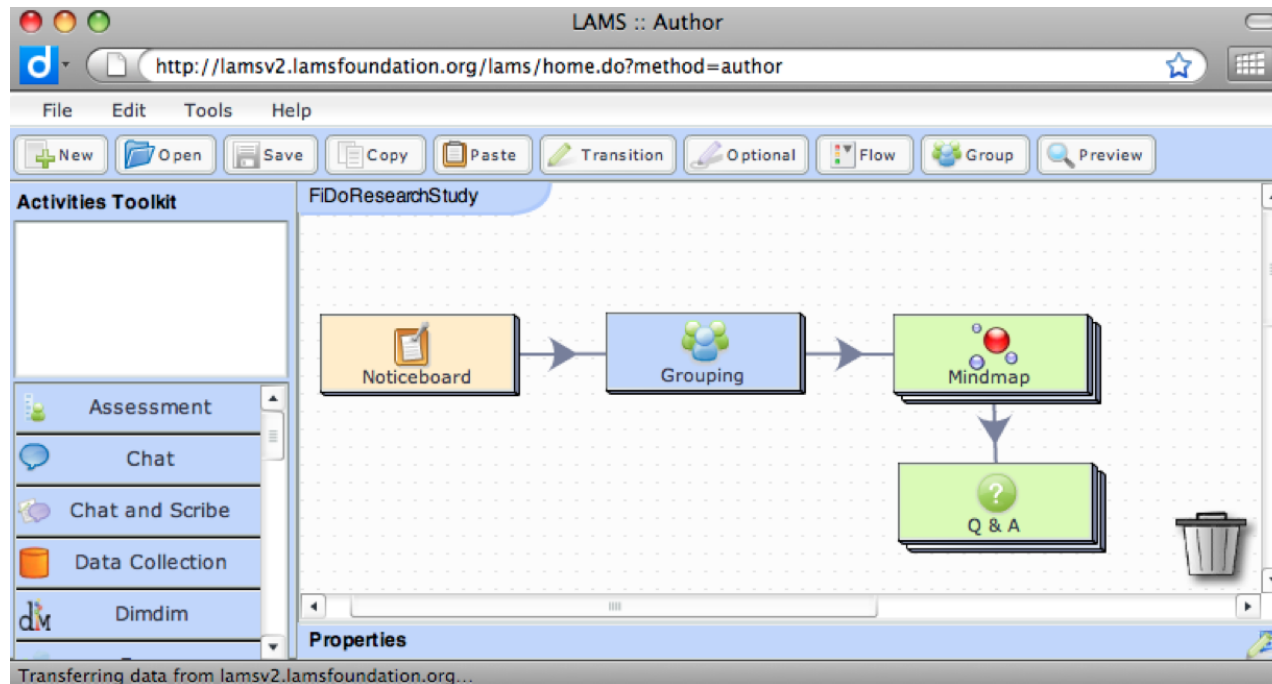
Some students experience difficulty defining and aligning:

Question: How would you make student learning (lesson plan) more fun and constantly being creative, interesting and engaging throughout the lesson?

Approach:

- understanding the students knowledge of technological tools.*
- catering to all learning styles (continuously)*
- train students on one tool each lesson.*
- Introduce tools such as Wiki, Podcast, LAMS, Computer Games, Slide Shows or even facebook or twitter which would be more familiar to a student and easy to use and adapt to.*
- Let students work in groups to create their own LAMS or WIKI*

Phase C: Pre-service teachers' educational research lessons



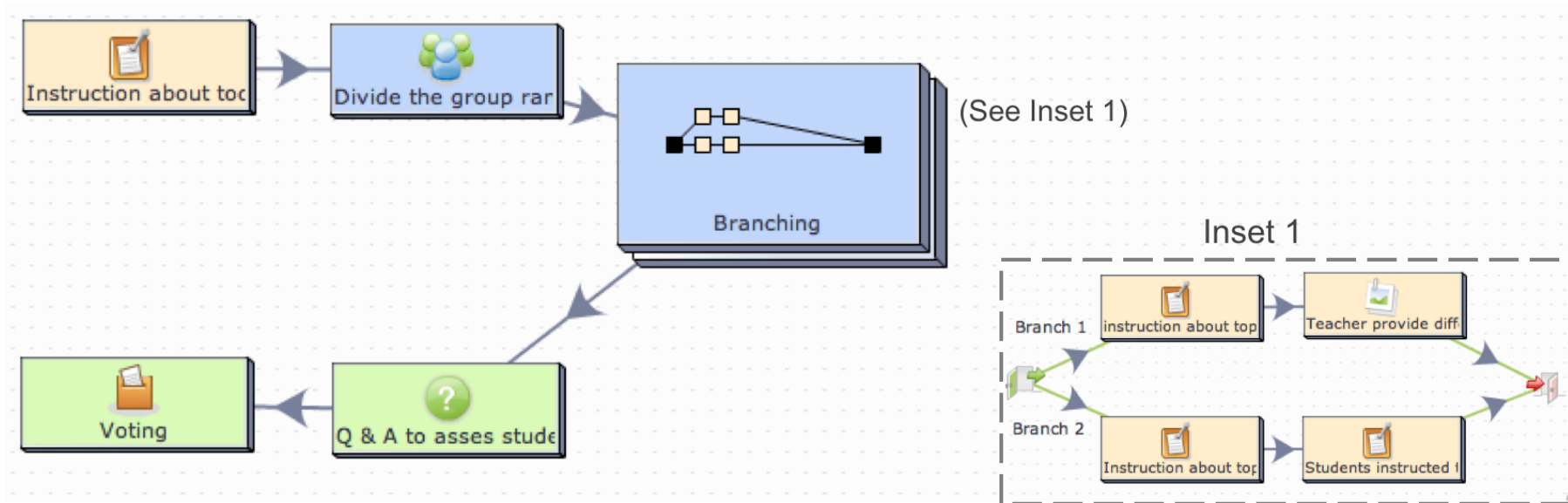
- Question: Where could technology go in the future?
- Problem: Asked students for responses to questions, but did not derive data as evidence

Phase C: Pre-service teachers' educational research lessons

Other problems included:

1. Using the wrong tool for a specific purpose
2. Incorrect or inappropriate use of grouping
3. Inappropriate or insufficient data collected to address the research question
4. Unintended compounding of treatments
5. Inconsistent pre and post treatment data collected
6. A disconnect between the question being researched and the activities in the sequence
7. Providing tasks at an inappropriate level for the target audience

Phase C: Pre-service teachers' educational research lessons



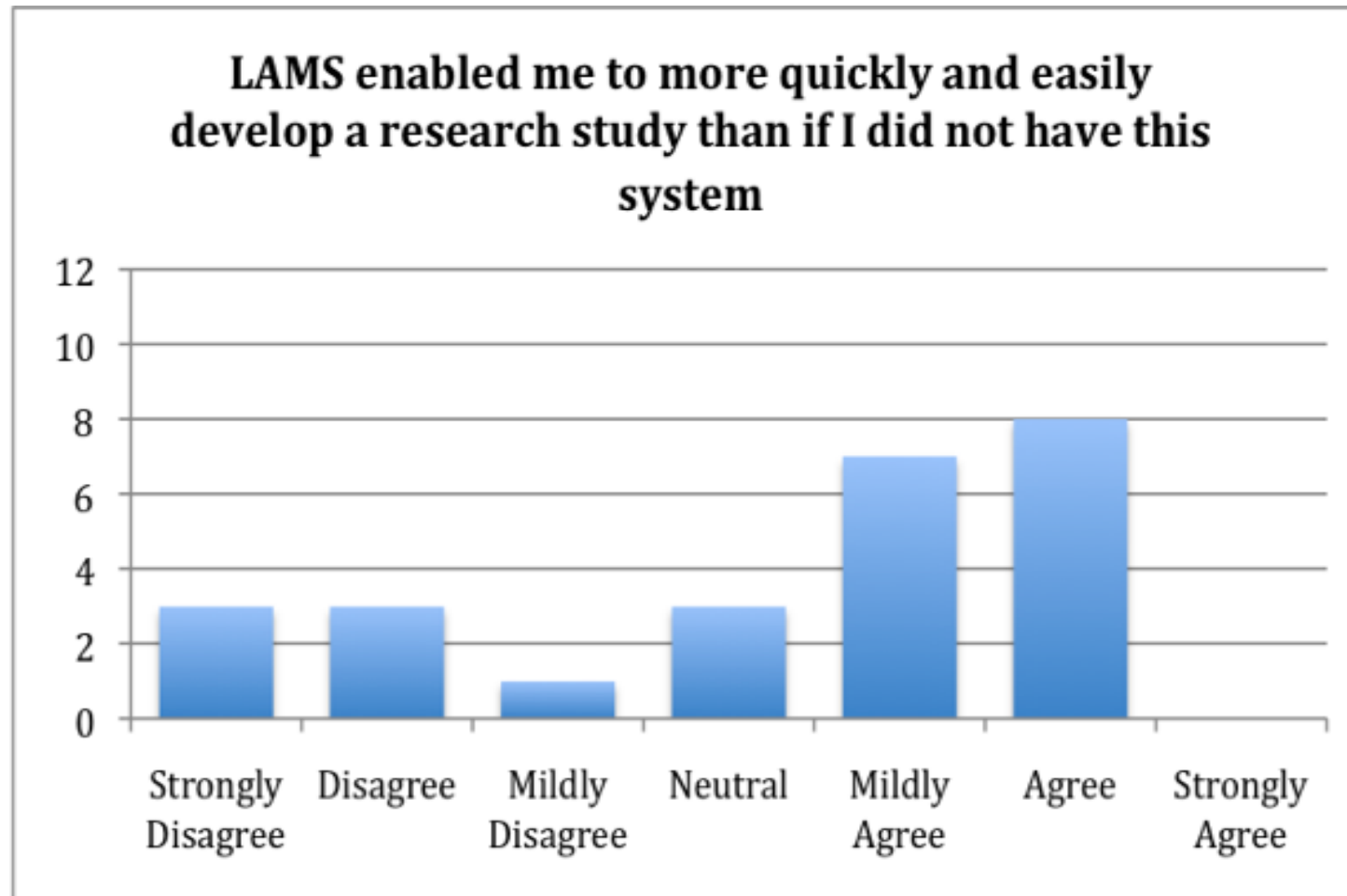
- Question: Is it better for the teacher to provide links to resources or for students to find them for themselves?

Phase C: Pre-service teachers' educational research lessons

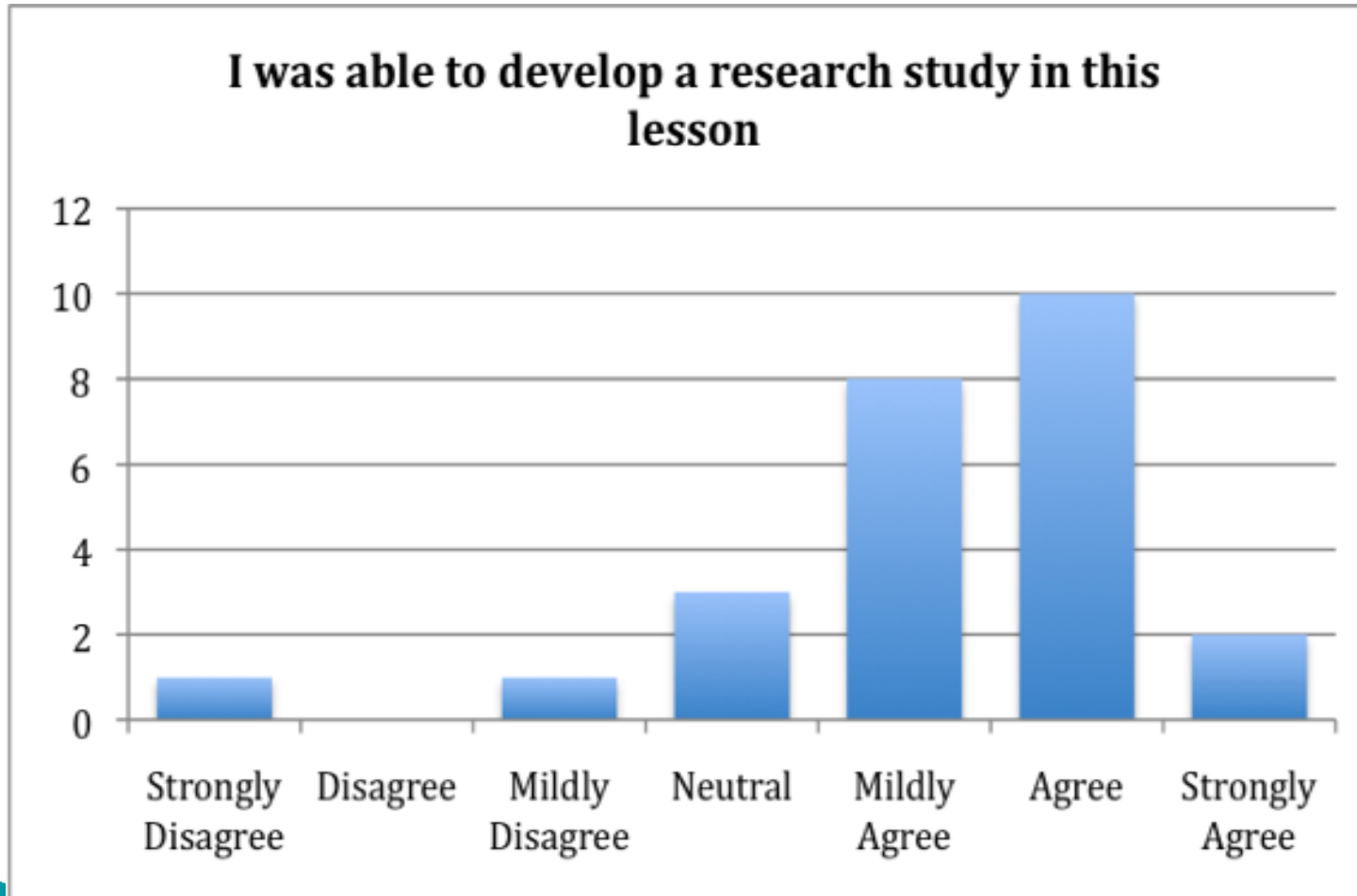
Distinguishing attributes of higher quality research designs included:

1. High quality research questions
2. Clear specification of the lesson
3. Activities that directly addressed the question
4. Use of random grouping and branching to objectively compare
5. Matching pre- and post-test for accurate comparison
6. Collection of both learning data (using assessment tools) and attitudinal data (using surveys and voting)
7. Collecting a range of learning data (from multiple choice to mindmaps) to assess impact on different levels of knowledge
8. Applying repeated trials using different topics to gauge generalisability

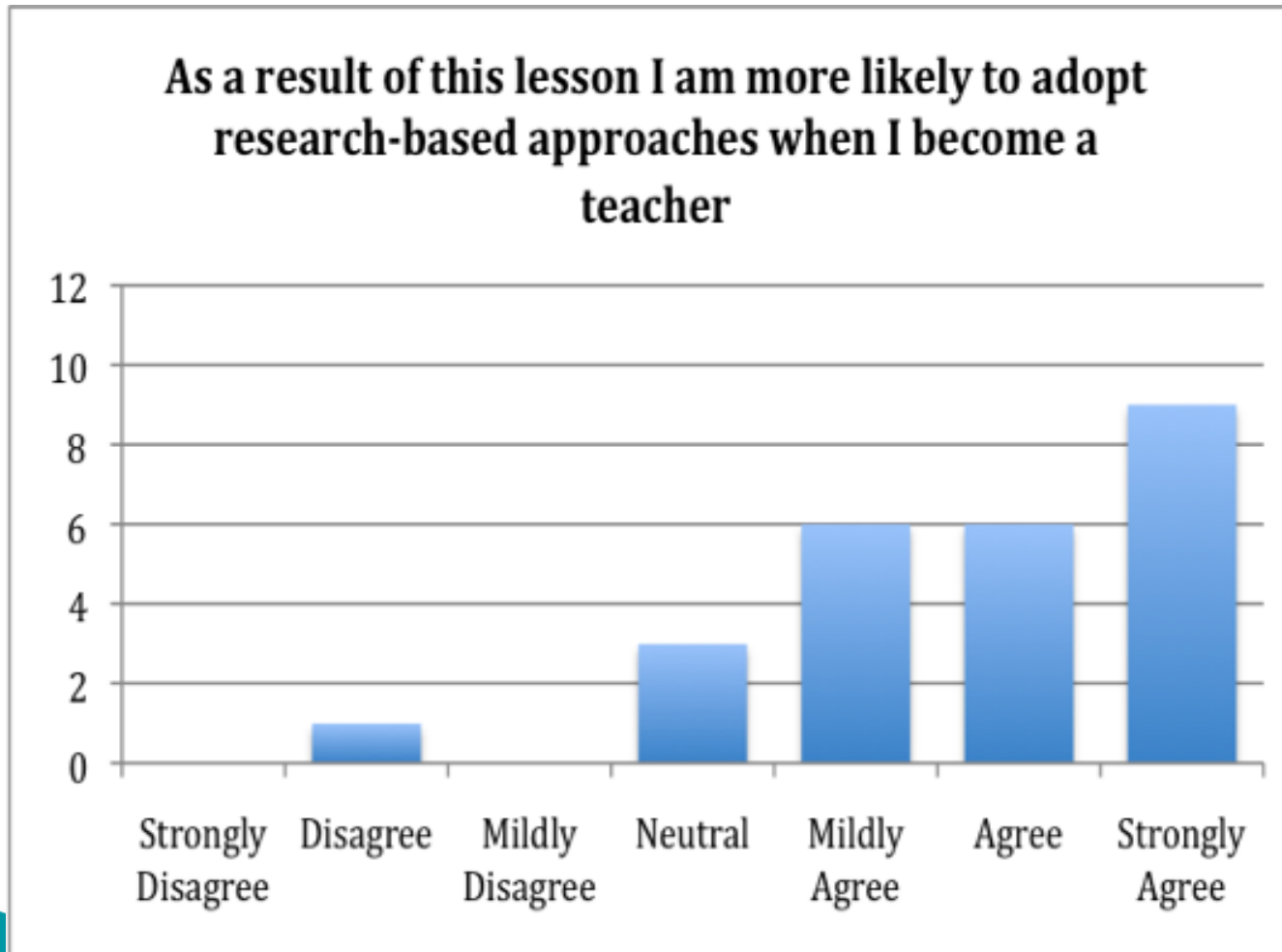
Post survey responses



Post survey responses



Post survey responses



Post survey responses

Student ideas about how the lesson could be improved:

- providing a number of examples of questions and designs
- more extensive discussion of research concepts
- more group collaboration
- additional technology support
- more time
- greater collaboration between teachers of the same discipline area
- Provision of fully worked examples that included collected data, analysis and results

Post survey responses

Other comments included:

- *I think it was a good activity to make education students more aware of what research can do for them as a teacher, both at this stage of their professional development and later on when they are practicing.*
- *I had always bagged research studies [due] to incomprehensibly high academia and now I have it tucked away as a wonderful reflective tool. Thank you.*

Discussion

- Concrete nature of task required students to detail their thoughts allowing more accurate assessment of their research designs
- Survey feedback from students indicates that a 90 minute task can have a significant (positive) impact on their attitudes towards research-based approaches to professional learning
- LAMS provides a tool for pre-service teachers to rapidly formalise their research ideas and implement research designs in their classes

Concluding remarks

- It is imperative that our teachers of the future have the skills to perform research-based professional learning
- LAMS is an ideal conduit for the development of these skills and their application in schools
- It is hoped that this presentation encourages teachers (and teacher educators) to explore the possibilities of using LAMS enabled research designs in their classes

Questions?



matt.bower@mq.edu.au

Bower, M. (2010). *Developing pre-service teachers' research capabilities using LAMS*. In 5th International LAMS & Learning Design Conference, Sydney, (pp. 50-59): LAMS International.