



# Designing research projects to improve learning and teaching

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Resource handbook for Ako Aotearoa's professional development workshop





### Welcome/Kia ora Tatou

Ako Aotearoa warmly welcomes you to this workshop on the design of learning and teaching research projects that are intended to improve learning and teaching.

#### The Purpose of the Workshop

The workshop focuses, in particular, on *what researchers think about* and *how researchers think* when they conceptualise and design such projects. While these projects can differ widely in the way they are implemented and reported, there is a common story-line with respect to the steps researchers follow during planning. During the workshop we will identify the story-line and use it to provide the agenda for the session. The story-line is summarised in a framework and set of processes that will be introduced and applied during the workshop.

#### **The Workshop Activities**

At the outset of the workshop, we will talk about the nature and purposes of research. This will set the scene for the presentation, modelling, discussion and application of the framework and processes. As succeeding elements of the framework and processes are introduced, you will have the opportunity to try them out in the context of a new project or a project that you have already begun to conceptualize. Learning by doing will be emphasized.

#### The context and rationale for the workshop

Teachers who engage in research that they hope will improve both their students' learning and their own teaching are now often called 'scholars of teaching and learning'. In turn, the domain of research and the body of knowledge that they contribute to is called the 'scholarship of teaching and learning' (SoTL). An overview of SoTL and its practical implications for 'teacher researchers' is provided in the publication I developed for Ako Aotearoa.

Haigh, N. (2010). Scholarship of Teaching and Learning: A practical introduction and critique.

In this publication, I presented the following definition of SoTL:

teachers engage in some form of systematic inquiry into, and critical reflection on, aspects of their own teaching and their students' learning with the primary intention of improving students' learning in particular contexts. Such inquiries and reflection processes embody features that give them the status of scholarship: that is, they are made public, subjected to critical review and communicated to a wider community of scholars and practitioners and they fulfil other criteria and standards associated with strong scholarship within disciplines. (Haigh, 2010, p.12)

As emphasised in the definition, the primary rationale for and intended benefit of SoTL projects is enhanced student learning.

In another Ako Aotearoa publication, Anne Alkema has similarly emphasised learner benefit as the primary rationale for reflective practice which is an aspect of SoTL, and her booklet is a further important resource that supports the workshop.

Alkema, A. (2011). A tertiary practitioner's guide to collecting evidence of learner benefit.

## The purposes and nature of research

#### Why do we undertake research?

The purposes of research include:

#### Construction + Evaluation + Re-Construction

of

points of view about phenomena

We use these points of view to 'make sense of' (describe and explain), predict, influence and control phenomena.

Learning and teaching are the phenomena that we are interested in and we hope that the views (the findings) that emerge from our research will enable us to better control aspects of our teaching so that we have more beneficial influence on our students' learning.

While the findings from SoTL have personal and practical benefits, they also contribute to the overall public body of research-based knowledge about learning and teaching. That contribution is 'original' because it offers new insights.

### What distinguishes reflection and research-based views about learning and teaching?

Constructing-evaluating-reconstructing views are familiar, everyday activities that we engage in through reflection.

When we undertake the same activity as researchers,

- the **EVIDENCE and ARGUMENTS** that we offer to support particular views must fulfil higher standards than we usually apply when engaged in reflection, and
- to fulfil those standards, research work must be characterised by RIGOUR and OPEN-MINDED THINKING.

Dictionary definitions of *rigour* include scrupulous accuracy, strict precision, extreme thoroughness and exactness. When applied to research, rigour means that:

- the ideas used and constructed by the researcher must be very clear and precise!
- research processes should be very carefully and precisely planned and followed!
- the language used to communicate ideas must be very clear and precise!

Synonyms for *open-minded* which are relevant to research include imaginative, original, inventive, and creative. All imply that the thinking of researchers is not unduly constrained by existing ideas. It is open.

#### What is the place of theory and theorising in research?

A set of points of view about a phenomenon, including its relationship with other phenomena, is a theory.

A theory can include five types of view:

- a. the things that make up a phenomenon and that differentiate it from other phenomena: *sleep is* .....; *examination anxiety is* .....; *low quality sleep is*.....; *high examination anxiety is* ......
- b. the presence or absence of a relationship between phenomena: *There is a relationship between quality of sleep and level of examination anxiety*

- c. the direction of these relationships: *low quality sleep leads to high examination anxiety; high examination anxiety leads to low quality sleep*
- d. the impact of changes to phenomena that are in a relationship: *Increases in quality of sleep are associated with decreases in examination anxiety*
- e. the nature of the relationship between phenomena (cause–effect or probabilistic): *Poor quality* sleep does not invariably lead to (i.e. cause) high examination anxiety. It can, however, increase the probability of someone experiencing examination anxiety.

Three categories of research are associated with the construction-evaluation-reconstruction of these views.

#### **Descriptive/Interpretive** (a) – **Correlational** (b, c) – **Experimental** (d, e)

Researchers take account of existing theory (their own and others) about the phenomena they research as well as contribute to the development of theory.



# Conceptualising and Designing a research project

#### What to think about first, next, then, and ...?

The following framework summarises the aspects of a potential research project that need to be taken into account, thought about and decided on – in turn.

While there is progressive movement along the route shown in the framework, initial ideas and decisions are often revisited and sometimes changed.

Rigorous and open-minded thinking is required on the way.

#### **CONCEPTUALISING AND DESIGNING A RESEARCH PROJECT**

#### **IDENTIFY**

- topic
- thesis
- question

#### ESTABLISH A CASE

#### Research

- *Contribution*replication
- undertaken • gap filled
- limitation
- addressed, improvements made
- generalisation checked

Practical benefits

#### ACKNOWLEDGE

 paradigm ontology epistemology methdology

- values
- theories
  - ethics

#### **DECIDE ON**

- data
- data sources
- methodology
- data gathering
  methods
- data analysis methods
- dissemination

#### **Assess Feasibility**

# Applying the Framework Identify your topic, thesis and question

#### The topic

Your topic is the phenomena or subject matter that your research will focus on. With rigour, begin to clarify, confirm and communicate your first thoughts about the topic. Question and map your emerging thoughts. Invite a colleague to help you engage in this thinking...

> Have you any other ideas about that? You said...Does that mean? Can you give me an example of that? Do you mean? Tell me some more about ..., Are you saying...? I'd like to hear some more details about ..., And this word means? Are there any other categories of ...? So, ... Have I got that clear? How long precisely? An example would help me confirm that I understand what is involved, Is another way of saying that...? Does this involve any more specific steps? I'm still not clear about...Can you help me? Tell me about this word - the meaning, the ideas that come to mind when you use it? I'm not sure whether the meaning that I have in mind for that word is what you have in mind. Could you go back over that again? Keep going, So, in other words...? You have mentioned three explanations. Do you think there are any more explanations? Is it possible to be more precise about this? Can you clarify that for me? Would this be an example of that? Please go on as what this means is becoming clearer to me. How might you say that more clearly?

Decide how to respond if you struggle to express what is in your mind.

- more thinking
- more reading
- more attention to words

Write a clear and precise topic statement.

The factors that students enrolled in the first year of a New Zealand university Master of Engineering programme take into account when deciding whether or not to participate in voluntary workshops on developing a research proposal.

#### Feasibility

As you make your way through the conceptualisation and design process, the feasibility of what you have in mind must be a continuing consideration. It is easy to develop a proposal that is unrealistic with respect to time, skill and resource requirements. Some important feasibility considerations are:

- time available for research work amidst other work and everyday life demands (realistic estimate!)
- time it will take you to complete each/all data gathering and analysis tasks
- time to acquire necessary knowledge and skills
- accessibility of data sources/data
- availability of resources (materials, funds, people, tools, literature)
- adequacy of available resources
- whether ethics requirements can be fulfilled
- time to undertake dissemination tasks

The first occasion when you should pause to consider feasibility is during the topic mapping process. As your prospective topic emerges, the process will give you an impression of its possible scope and scale, which need to be set alongside the time you realistically have available for a project.

Funders, including Ako Aotearoa, also require you to present proposals that can be fulfilled. If you are unsure whether what you have in mind is realistic or feasible, seek feedback from experienced researchers.



#### The thesis (your 'hunch')

The thesis is your initial point of view about the phenomena that you are interested in. It is a view that you are setting out to *construct, evaluate* and possibly *re-construct*.

We initiate research because this point of view has the status of a 'hunch'. It is a tentative, guess-like idea because you lack convincing evidence and arguments to support it.

Research involves the attempt to move from uncertainty about the *truthfulness* or *trustworthiness* of a view – to more certainty.

Your thesis may be genuinely novel or original: no-one has come up with (constructed) this view previously. While we may consider this is the optimal form of contribution we can make to knowledge, there are other versions of a thesis that researchers base projects on and that lead to worthwhile contributions:

- Other researchers may have already proposed and offered evidence and arguments for your thesis. However, you believe that you will be able to gather better evidence and make stronger arguments to support the view.
- When a thesis has been evaluated, but cannot be supported, you may have a hunch that a modified or alternative view (thesis) might be able to be supported.

On the basis of a continuing series of investigations, a thesis may be progressively modified or, in time, abandoned.

Your thesis may initially be a very vague and imprecise idea that you can't communicate easily. The clarifying process that you applied to the topic can be used again to help you develop a clear and precise thesis statement.

The factors that first year Master of Engineering postgraduate students take into account when deciding whether or not to participate in voluntary workshops on developing a research proposal will include:

- (a) the adequacy of their existing knowledge about the topic
- (b) how others will interpret their attendance
- (c) the time they have available to attend discretionary workshops
- (d) the priority that they give to their successful completion of a research project
- (e) the adequacy of information provided about the workshop objectives, content and learning-teaching methods.

Other points about your thesis:

- It may be a relatively general, rather than specific, view when there has been little or no previous related research. Your hunch may be that something different, or something that hasn't been noticed previously, warrants attention. For example, you may notice that a minority of your students are struggling with a form of assessment task, but they are unsure why. Your hunch is that there will be factors that can be identified that account for the comparative performance of these students. Your research will be exploratory.
- As researchers analyse their data, they may form new hunches, which they choose to follow-up in the same project. This approach is taken in Action Research.
- Open-mindedness, as well as rigour, will continue to be necessary as you identify your thesis.

No great discovery was ever made without a bold guess. (Sir Issac Newton)

#### The research question(s)

Because your thesis is a hunch or best guess, you 'question' whether it:

- is a valid or trustworthy idea
- · can be supported by good evidence and arguments

Your research question is a restatement of your thesis, in the form of a question.

**Do** the factors that first year Master of Engineering postgraduate students take into account when deciding whether or not to participate in voluntary workshops on developing a research proposal include:

- (a) the adequacy of their existing knowledge about the topic
- (b) how others will interpret their attendance
- (c) the time they have available to attend discretionary workshops
- (d) the priority that they give to their successful completion of a research project
- (e) the adequacy of information provided about the workshop objectives, content and learning-teaching methods?

The thesis is your hunch about the answer to this question.

Subsidiary questions may be associated with this question.

What proportion of students enrolled in the first year of a Master of Engineering a programme participate/do not participate in voluntary workshops on developing a research proposal?

What proportion of these students offer a, b, c, d and/or e as factors that they take into account?

What are other factors that these students take into account?

IMPORTANT: When the research question is very clear and precise, it is much easier to make subsequent decisions about

- the data to gather
- data sources
- possible methodology
- data-gathering and data-analysis methods.

#### Make a case for your research

You need to justify the time, effort and resources required to answer the question. You need to make a convincing case for undertaking research.

The case is made with respect to:

- a worthwhile *contribution* to research on the topic
- the practical benefits of having an answer to the question

Making the case involves a very thorough and critical review of existing research literature on the topic.

See: Haigh, N. (2012). Historical research and research in higher education: Reflections and recommendations from a self-study. *Higher Education Research and Development*, 31(1), 689-702.

With respect to a possible contribution to knowledge, the literature review may reveal:

- a. The question has been asked and answered satisfactory. However, **replication** of previous research may provide data that confirms, strengthens or weakens the original answer.
- b. The question hasn't been asked. There is a **gap to be filled** in research-based knowledge.
- c. The question has been asked but not answered satisfactorily. There are **limitations to address** in aspects of the way the research has been conducted, or **improvements to be made** in data and data gathering and analysis methods.
- d. The question has been asked and answered satisfactorily but **checking the generalisation or transferability** of the answer (findings) to other contexts (*e.g.* postgraduate business students) would be worthwhile.

The practical benefits may include:

- teachers have greater appreciation of students' need for complete, accurate and persuasive information about workshops and can competently provide such information
- · more students attend because of better scheduling
- students' confidence and competence developing research proposals improves.

#### Acknowledge your paradigm positioning, values, theory and ethics

The term paradigm has different meanings for researchers, which tend to reflect the disciplines they identify with. Most social science researchers, and therefore learning and teaching researchers, associate the term with views researchers have about:

- the nature of reality and what can be known about that reality (**Ontology**).
  - There is a directly experienced, observable world a *realist* perspective.
  - There is a 'constructed in the mind', imagined world a *relativist* perspective.
- The nature of knowledge, getting to know, knowing; how we can justify our claims that we know something; the relationship between the person who seek to know and the knowledge they construct (**Epistemology**).

e.g.

- Objective the researcher's personal views, theories, attitudes, values, feelings need not influence research processes and outcomes (if certain research practices are followed) – a *realist* perspective.
- Subjective the researcher's personal views, theories, attitudes, values, feelings inevitably influence research processes and outcomes and should be acknowledged – a relativist perspective.

How to answer the question – the overall approach or plan (Methodology)

Methodology: the strategy, plan of action, process, or design lying behind the choice and use of particular methods and linking the choice and use of methods to the desired outcomes. (Crotty, 1998, 166)

• Methodology is not a synonym for method,

Methodology is the overall approach to research .....method refers to systematic modes, procedures or tools used for collection and analysis of data. (Mackenzie & Knipe, 2006, 4)

• There are numerous methodologies. Their choice is determined by the question you are setting out to answer, and your views in relation to ontology and epistemology.

survey, observation, naturalistic inquiry, grounded theory, narrative inquiry, phenomenology, ethnography, talanoa, case study, correlational, experimental, historical, action research, simulation – modelling, appreciative inquiry.

Some researchers are *realist/realists* with respect to ontology and epistemology (positivists); others are *realist/relativists* (critical realists), or *relativist/relativists* (constructivists-social constructionists).

Resources that can help you determine your paradigm positioning include:

Davidson, C. & Tolich, M. (2003). Social science research in New Zealand: Many paths to understanding.

Crotty, M. (1998). The foundations of social research: Meaning and perspective in the research process

Grant, B. & Giddings, L. (2002). Making sense of methodologies: a paradigm framework for the novice researcher.

The second meaning for the term paradigm encompasses these views, but also relates to what is considered to be the dominant or most prevalent paradigm position in a discipline or field of research. In the natural sciences, there have been extended periods when one paradigm was most prominent. In contrast, social science researchers have always adopted a range of paradigm positions. There has not been a dominant paradigm.

**Values:** If you adopt a relativist epistemological position you believe that your personal values (*e.g.* respect, social justice) will influence what and how you research and the purposes of your research. Acknowledging and reporting your personal values will be an aspect of your research (Axiology – a set of values).

**Theory:** Your existing theory will influence you thoughts about a topic, thesis and question and may be a 'lens' through which you analyse and interpret your data (a deductive approach). Your personal theory will need to be acknowledged, taken into account and reported – as well as the theories that other researchers draw on and use.

#### Ethics

In learning and teaching research projects, you need to consider the possibility that the students and/ or teachers who participate will be harmed in some way – and to take steps to avoid or mitigate this occurring. For example, participants may be harmed if information that they provide and which is reported is not confidential and anonymous. It is also possible that they will experience discomfort or stress when talking or writing about some of the topics that your research focuses on. To address these potential harms, you need to inform possible participants about what their participation would involve, tell them about possible harms and state clearly what you will do to avoid them occurring or to reduce their impact if they did occur. This will enable prospective participants to make a decision to participate or not on the basis of 'informed consent'. They will have the right to decline to participate or to withdraw from the project at any time.

In many cases issues of ownership of knowledge by both individuals and indigenous groups will also need careful consideration.

There are well-established guidelines that have been developed by social science researchers that you can draw on to identify potential risks and to plan these steps.

When you seek approval from your institution for undertaking your project, you will need to obtain 'ethics approval'. Most tertiary institutions will have someone or a committee who will receive and consider your 'ethics application'.



### Completing the design phase

Now a case for your research has been established, decisions need to be made about the data, data gathering methods, data analysis-interpretation methods and reporting.

#### The data

The research question will name the phenomena that you will need to gather data about and also indicate the type of data that will need to be gathered to answer the question: **qualitative** data – students' reasons for participating or not; **quantitative** data – proportion of students identifying each reason).

**Qualitative Data** describes phenomena that we can believe we can differentiate from other phenomena because they have different qualities. For example, we can identify qualitatively different reasons that students offer for (not) participating in workshops on developing research proposals (*e.g.* availability of time, interpretation of other students' views about their attending; adequacy of information about the workshops).

**Quantitative Data** concerns quantified or quantifiable features of the phenomena. Numbers and symbols represent these features (*e.g.* 10% of students identify time availability as a factor influence their decision to participate or not).

There are several forms of quantitative data – nominal, ordinal, interval and ratio. These different forms have implications for the way you analyse the data statistically and your interpretation of data.

Often a **mix** of qualitative and quantitative data must be gathered to answer the research questions of a project.

When deciding on the data to gather, think carefully about what would be **relevant/valid**, **complete** and **accurate** data.

Remember that your initial thoughts about what is relevant or necessary data will be influenced by your existing theory about the topic. In the course of, or as an outcome of, your research, you may become aware of other relevant data and decide to incorporate it.. Your theory will change. Openmindedness needs to be maintained throughout your project, so that you avoid bias.

#### Data sources

The sources of data in learning and teaching research may include people, documents, records, and artifacts.

For a helpful overview of possible data sources associated with learning and teaching inquiries, see the Ako Aotearoa publication,

Alkema, A. (2011). A tertiary practitioner's guide to collecting evidence of learner benefit.

Several questions need to be addressed when making decisions about people who will be a source of data for your project.

#### Who should the data be gathered from?

The topic statement names the **population**: students enrolled in the first year of a New Zealand university Master of Engineering programme.

However, you may revisit and refine your thoughts about who data will be gathered from and subpopulations/groups may be identified (*e.g.* male/female students; domestic/international students, international students from ...., .....). In turn, new hunches and related questions may arise:

Are there differences in the level of participation of domestic and international students? What reasons for (non)participation are offered by domestic and international students? Are there differences in reasons offered by domestic and international students?

#### From how many members of the population (sub-groups) should data be gathered?

The answer to this question will be influenced by the question and the methodology,

e.g.

It may be possible and appropriate to gather data from all members of the population but this is often not feasible or necessary. It will only be possible or necessary to gather data from a **sample** of the population.

There are guidelines about:

- types of samples (*e.g.* purposive, convenience, stratified, random)
- processes to follow when selecting these types of samples
- the minimum sample size required for the use of particular statistical techniques. How much data needs to be gathered from each person?
- how much data need to be gathered to enable the consistency/reliability/trustworthiness of data to be assessed.

#### Data gathering methods

Methods: "the techniques or procedures used to gather and analyse data related to some research question or hypothesis (Crotty, 1998, p.3).

The choice of method(s) will depend on the nature and type (quantitative, qualitative) of data to be gathered. Often, in learning and teaching research projects the data will be mixed and a mix of methods will therefore be necessary. A very good resource on **mixed-methods research** is

Tashakkori A. & Teddlie, C. (Eds.). (2010). *Handbook of mixed methods in social and behavioural research.* 

Examples of data-gathering methods commonly used in learning and teaching research projects are:

- observation (in a natural or contrived setting; as a participant or not)
- Testing
- questionnaire (varied forms of items: closed/open, dual/multi-choice, scale, short answer, extended answer)
- interview (conversational, semi-structured, structured)
- focus group
- diary/journal
- document collation

There are always pros/cons and strengths/limitations for each method. There are no fool-proof, flawless methods!

Points to consider:

- whether to use an existing method (fit for purpose) or to design a method. If the latter, will you have the expertise and time required to do the design and validation work?
- assessing the psychometric properties and qualities of measures developed by others, or that you develop (*e.g.* item analysis)
- piloting methods
- practising use of methods to ensure confidence and competence.

We need to make judgements (and claims) about the quality of the data we gather and the use of particular methods. The criteria used for this will depend on paradigm positioning.

Relevant concepts when the data is primarily quantitative and the researcher has a 'realist paradigm positioning are *validity* and *reliability*. These concepts are invariably discussed in general texts on social science/learning and teaching research.

When qualitative data is significant and the researcher has a relativist paradigm positioning, a central concept is likely to be *trustworthiness*. which is in turn associated with the criteria of *credibility, transferability, dependability,* and *confirmability*.

A helpful article on these criteria is:

Shenton, A. (2004). Strategies for ensuring trustworthiness in qualitative research projects.

#### Data analysis methods

#### For quantitative data

Data may already be in a quantitative form or need to be quantified (*e.g.* count the number of questionnaire respondents who express a particular view in response to an open question).

Choice of statistical analysis will depend on the question you are trying to answer and the associated purpose of your research to:

- describe the quantifiable feature of a phenomenon (descriptive research)
- establish whether a relationship exists between two or more phenomena (correlational research)
- determine what the impact of change to one phenomenon is on another phenomenon (experimental research)

There are two general categories of statistical analyses: **parametric** and **non-parametric**. Your choice will depend on whether or not you can assume or claim that the data (*e.g.* intellectual ability, vocabulary knowledge, achievement motivation, attitude to academic reading) is normally distributed or not, and whether the data is ordinal, interval or ratio.

Software can simplify the use of statistical analyses. However, you still need to be able to choose an appropriate analysis and be able to explain why it is appropriate. If in doubt, always seek advice.

#### For qualitative data

Requires interpretation of words, images and other symbols with respect to what they mean.

There are two forms of qualitative data analysis:

**Deductive:** The researcher looks for instances of already-conceived meanings or points of view in the data. Those meanings or views may have been derived from previous research findings (*e.g.* student participation in voluntary learning support programmes and/or a particular theory, *e.g.* Tinto's theory of student retention).

**Inductive:** The researcher reads the data closely, spots features that are relevant to a research question (*e.g.* a reason offered for attendance) and assigns a meaning to them (benefit for personal research). Meanings emerge from this analysis process.

Some common tools for qualitative data analysis are:

- constant comparison analysis
- keywords in context
- word count
- classical content analysis
- domain analysis
- taxonomic analysis
- componential analysis
- (Leech and Orwuegbuzie (2007))

A well-known book on qualitative data analysis is:

Miles, M. & Huberman, A. (1994). Qualitative data analysis: an expanded sourcebook.

## Dissemination

For an activity to be designated as scholarship, it should manifest at least three key characteristics. It should be:

- public
- susceptible to critical review and evaluation
- · accessible for exchange and use by other members of one's scholarly community

(Shulman, 1998, p. 5)

When preparing a research project proposal, you will need to think about initiatives you might take to ensure that other teachers, researchers and students will have access to information about the project. You need to decide **what** information you will communicate about the project, **to whom**, **when** and **how** to help ensure that the intended benefits for students are achieved.

Dissemination may occur as the project is underway as well as at the end.

Effective dissemination is essential if:

- a. your research is to have enduring benefits for your own teaching and your students' learning. You may need to persuade colleagues and academic leaders/managers to change policy, processes, facilities or resources to enable you to sustain new approaches that your research findings support.
- b. other teachers are to be prompted to try-out these approaches *i.e.* the benefits of your research **spread** to other teachers.

See: Haigh, N. (2012). Sustaining and spreading the positive outcomes of SoTL projects: Issues, insights and strategies. *International Journal for Academic Development*, 17(1), 19-31.

A key consideration when you are developing a dissemination plan is who should you communicate to and with? The potential audience is wide (*e.g.* students, colleagues, other teachers in your institution, other higher education teachers in New Zealand and internationally, learning support staff, academic leaders and managers in your own and other institutions, discipline and professional bodies, national policy makers, government agencies). What, how and when you communicate with particular people will vary accordingly. The avenues for dissemination are similarly varied and go well beyond conference papers and journal articles.

An Ako Aotearoa publication that provides advice and information about dissemination issues and options is,

Alkema, A. (2012). Creating sustainable change to improve outcomes for tertiary learners: A framework for thinking about projects in tertiary education.

## Conclusion

Both teaching and research are inherently rewarding and challenging. For both activities, the reward comes from being able to contribute directly to the construction and evaluation of new knowledge which can improve the lives of other people and the environments in which they live. The challenges that they share come from two sources. First, successful teaching and research require you to draw on a wide range of intellectual capabilities, demonstrate your capacity to work both independently and collaboratively, and they require the ability to manage large-scale projects effectively. The second source of challenges arises from the inherent complexity of learning and teaching phenomena. That **complexity** arises from:

the number of factors that can potentially influence teacher and student learning, many of which are not readily recognized or are unpredictable; the complexity of interactions between those factors; and the inability of teachers to control many important factors. The latter mean that relationships are probabilistic rather than causal and a development agenda is necessarily concerned with 'improving the odds for learning' rather than 'ensuring learning'. (Haigh and Naidoo, 2007).

Reflecting on their participation in a learning and teaching research project a teacher/researcher observed,

Our data is saying that it is very difficult to see direct connections .... We know when things go wrong, but it is not necessarily obvious what is happening when things go well. Complexity abounds in teaching and learning situations and it is often a coming together in harmony of many, many aspects and elements that make up the context that results in positive learning and experience outcomes. (Naidoo, et.al., 2010)

Awareness of the everyday and inescapable complexity of learning and teaching, coupled with insights offered from complexity theory, can help ensure that we conceptualise and design research projects that do acknowledge this reality.

*My best wishes for your on-going conceptualisation, design, implementation and dissemination of learning and teaching research projects.* 

Neil

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Note: Please contact me direct if you would like suggestions for further literature on specific aspects of the design of learning and teaching research projects at: haigh@xtra.co.nz



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