



A Method and Resources to Support Accounting Students to Think Critically

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Project Report: A Method and Resources to Support Accounting Students to Think Critically

This project produced 100 Excel spreadsheets to support accounting students to analyse New Zealand, Australian and UK listed companies as part of a financial statement analysis course. These spreadsheets are part of a wider suite of 350 spreadsheets.

These spreadsheets are designed to form an integral part of individualised, authentic assessed learning tasks with regular formative feedback to be used (as part of an integrated set of interventions) in undergraduate and MBA financial statement analysis courses to support accounting students to experience high-level relevance structure, high-level conception of learning, intrinsic motivation and deep learning as necessary preconditions for them to develop their critical thinking skills (and other personal capabilities).

Executive summary

This project was funded by Ako Aotearoa and initiated by a Victoria University of Wellington staff member to develop a suite of Excel spreadsheets to support the use of individualised, authentic assessed learning tasks with regular formative feedback to be used (as part of an integrated set of interventions) in undergraduate and MBA financial statements analysis courses.

The author has previously conducted research projects examining the impact of a set of integrated interventions (supported by an earlier, more simplified version of the spreadsheets) on the way students learn in accounting courses at university and on the necessary cognitive preconditions for developing critical thinking skills. A key finding of this research is that assessments that are individualised (that is, different for each student), authentic (that is, deal with the real world) and involve regular formative feedback as part of an integrated set of interventions, support accounting students to experience high-level relevance structure, high-level conception of learning, intrinsic motivation and deep learning as necessary preconditions to develop their critical thinking skills. Drawing on this previous research, the spreadsheets developed in this project are specifically designed to support the use of such assessments in financial statement analysis courses to support both change in the way students experience how they learn in an accounting course at university and the development of critical thinking skills.

Preliminary findings of this previous research have been published and are encouraging (Turner, 2009). The research findings from use of a previous version of the spreadsheets are discussed later in this report. The author has recently submitted his PhD in Accounting Education based on this previous research. A 'plain English' version of the author's PhD thesis is available from the author as an unpublished manuscript, *Experience of Learning* (Turner, 2011).

Although the author has not as yet had the opportunity to research the use of the new spreadsheets in financial statement analysis courses, it is anticipated that the significantly improved versions of the spreadsheets completed as a result of this project have the potential to improve the effectiveness of teaching practice using individualised, authentic assessments in financial statement analysis courses in our business schools; and to support further research in this area.

Outputs

The work completed for this project was 100 Excel spreadsheets specifically designed to support accounting students to analyse New Zealand, Australian and UK listed companies as part of a financial statement analysis course. These spreadsheets are part of a wider suite of 350 spreadsheets that were prepared and are available for use by others.

These spreadsheets each contain five separate worksheets for data entry; restating of a firm's financial statements; ratio analysis; forecasts of key value drivers of cash flows and economic profit; and valuation. Each worksheet supports students to make the increasingly complex and demanding judgements required by students as they progress through their analysis of their individual firm. The spreadsheets also support students to develop and strengthen their Excel spreadsheet skills and provide students at the end of the course with their own personally tailored spreadsheet they can use to support them to analyse further firms in the future.

These spreadsheets form an integral part of individualised (that is, different for each student), authentic (that is, real companies) assessed learning tasks with regular formative feedback (the spreadsheets have been designed to support feedback to be provided on completion of each of the five worksheets in a student's analysis of their firm). These spreadsheets are designed to be used in undergraduate and MBA financial statement analysis courses to support accounting students to experience high-level relevance structure, high-level conception of learning, intrinsic motivation and deep learning as necessary preconditions for them to develop their critical thinking skills. See attached project report.

The design of the spreadsheets embeds the research findings from previous studies by the author of a third year accounting course in financial statement analysis conducted in 2007 and 2008. The spreadsheets are also available to be used to support further research into the teaching of accounting at university through studies on future financial statement analysis courses using these resources, with the purpose of identifying practices that encourage and support critical thinking by accounting students in our business schools. The author is keen to engage in joint research projects across a range of tertiary institutions to research the use of the spreadsheets (as part of an integrated set of interventions in the design and delivery of financial statement analysis courses) to support accounting students to develop their critical thinking skills.

Five of the spreadsheets are attached. Also, a zip file of 100 spreadsheets is available on the Ako Aotearoa website. The remainder of the 350 spreadsheets that have been prepared are available from the author. Please contact the author if you would like to obtain copies of these spreadsheets. They are freely available from the author. The author can be contacted at martin.craig.turner@gmail.com.

The assessed learning tasks that are supported by the spreadsheets are included as Appendix 1 to the attached project report. The reading materials used in the course are also available from the author. This includes an unpublished textbook, *Financial Statement Analysis: To Know What Adds Value* (Turner, 2008b), and other reading materials that have been shown to be highly supportive of a deep approach to learning by students. These reading materials are integrated into the assessed learning tasks supported by the spreadsheets.

The author is keen to support other academics teaching financial statement analysis to implement the resources to support accounting students to analyse their own individual, real firms. The academic requirements for entry into the New Zealand Institute of Chartered Accountants (NZICA) have recently been altered to require inclusion of advanced finance. It is anticipated many business schools in New Zealand may elect to make financial statement analysis courses compulsory for those students seeking entry into NZICA, to satisfy this

requirement for advanced finance. It is thus anticipated financial statement analysis courses may involve much larger numbers of students than currently, where financial statement analysis courses have typically been elective courses for such students. For this reason, the spreadsheets have been designed to be used effectively in the context of large financial statement analysis courses of up to 350 students. It is an exciting prospect to consider that large numbers of accounting students who intend to seek NZICA accreditation in the future might be able to be supported to experience deep learning and develop critical thinking skills in their university studies.

Objectives

The objectives for the project were to develop resources to:

- support the teaching of financial statement analysis in a way that encourages intellectual development by students, and in particular their development of improved critical thinking skills.
- embed the research findings from a previous case study of a third year accounting course in financial statement analysis conducted in 2007 and 2008.
- support further research into the teaching of accounting at university through case studies on future financial statement analysis courses using these resources. The purpose of this research will be to identify practices that encourage and support critical thinking by accounting students in our business schools.

The resources to be developed were 100 Excel spreadsheets (as part of a suite of 350 spreadsheets) specifically designed to support accounting students in financial statement analysis courses to experience high-level relevance structure, high-level conception of learning, intrinsic motivation and deep learning as necessary preconditions for them to develop critical thinking skills.

Literature review and theoretical model

The author has conducted previous research on how to support accounting students to change the way they experience key aspects of how they learn accounting (Turner, 2008a; 2009; 2011). This work is grounded in the approach to learning research in the educational psychology literature, where students' approaches to learning can be categorised as either surface or deep (Marton and Säljö, 1976). Surface learning involves reproducing clear-cut, black-and-white facts from experts; deep learning involves developing understanding and personal meaning and is a qualitatively distinct and more complex and complete form of learning than surface learning.

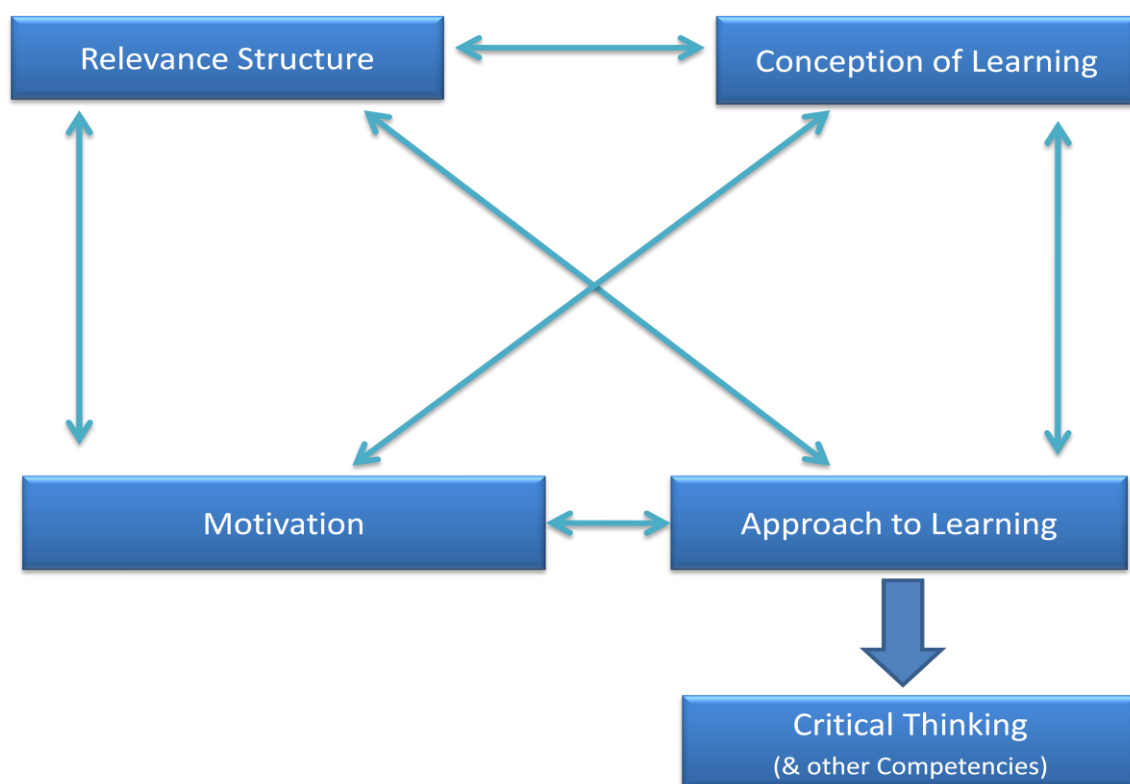
Approach to learning research conceives learning to take place within the learning context. A student's approach to learning is not a personal characteristic of a student but rather a way of describing how a student interacts with a particular learning task. And most importantly, the approach to learning which students experience in response to their learning context will lead to qualitatively different and distinct types of learning outcomes (Marton, 1988; Biggs, 1993). For example, students will not make the cognitive effort to engage in critical thinking unless they first experience deep learning in response to the learning tasks.

Approach to learning research in the educational psychology literature has identified general categories of human learning processes by studying students' experiences of their learning in the context of specific learning tasks, such as reading a text, writing an essay or solving a problem. Four key aspects of learning that have been identified and studied are relevance structure (Marton and Booth, 1997), conception of learning (Säljö, 1979; Marton *et al*, 1993); motivation (Fransson, 1977) and approach to learning. Martin and Svensson (1979) suggest

that if we see learning in its context as the starting point of our research, we will start with an assumption of a relation with that context as we attempt to find the meaning of the terms and the relations between them. A key insight of the approach to learning conception of human learning is that students will not experience change in capabilities such as critical thinking unless they first experience high-level relevance structure, high-level conception of learning, intrinsic motivation and deep learning in response to the context of a university course (Trigwell and Prosser, 1991; Marton and Booth, 1997). Since one important aspect of context is the discipline being studied, it is important to carry out research not just with isolated learning tasks (such as reading a text) but in the context of tertiary courses in specific disciplines such as accounting (Lucas and Mladenovic, 2004).

The model used in the previous research by the author into how students learn, grounded in the educational literature, is set out as Figure 1 below.

Figure 1: How Students Learn in a University Course



This model shows the four key aspects of how students learn (relevance structure, conception of learning, motivation and approach to learning) and the internal relations between them. It also shows how the approach to learning experienced by students is a precondition to the development of personal capabilities or competencies such as critical thinking. This model was developed by the author, based on approach to learning research in the education literature, to support application of these concepts to a university course.

Challenges to accounting education

Based on the model in Figure 1 above, there is evidence that accounting education faces some significant challenges to support accounting students to develop personal capabilities and competencies such as critical thinking as they learn accounting in their tertiary studies.

There is evidence accounting education is characterised by a focus on the transfer of technical accounting knowledge (Sharma, 1998). There is also evidence the study of accounting can actually discourage the development of personal capabilities (Hand *et al*,

1996) and be perceived by students as a discipline that simply applies technical rules (Boyce, 1996). There is also evidence students who are more inclined to engage in and develop capabilities in areas such as critical thinking may be less likely to commence accounting studies in the first place (Saemann and Crooker, 1999).

Further, there is evidence that students can be expected to be more likely to adopt a surface approach to their learning in accounting than students in arts, education and science (Eley, 1992; Booth *et al.*, 1999). There is also evidence that a significant proportion of accounting students (and accounting practitioners) prefer to adopt a surface approach to their learning in accounting (Carland *et al.*, 1994; Sharma, 1998). Further, there is some evidence that studying accounting can actually support or encourage students to experience a surface approach to learning (Gow *et al.*, 1994; Boyce *et al.*, 2001). The experience of surface learning by accounting students would be supported by the widespread experience of low-level relevance structure, low-level conception of learning and extrinsic motivation (Trigwell and Prosser, 1991; Marton and Booth, 1997).

Relevance structure

As far as the author is aware, there has not as yet been any published approach to learning research into the experience of relevance structure by accounting students in accounting courses at university. This aspect has been recently researched by the author as part of his PhD research. This research has identified four categories of variation of relevance structure for accounting students: 'gain a job' (grades gained in an accounting course are important to help win the competitive battle with other accounting students to get the best jobs); 'do a job' (foundational accounting knowledge and technical skills learnt in an accounting course can be useful to perform technical aspects of a job, particularly of an accounting job); 'run a business/invest' (studying an accounting course can help to develop capabilities to run a business or invest in the future); and 'develop personal capacities' (capabilities can be learnt in an accounting course that would be useful in the working environment and possibly in life more generally). The first two relevance structures ('gain a job' and 'do a job') are seen as low-level relevance structures and to be supportive of low-level conception of learning, extrinsic motivation and surface learning. The third and fourth relevance structures ('run a business/invest' and 'develop personal capacities') are seen as high-level relevance structures and supportive of high-level conception of learning, intrinsic motivation and deep learning.

The author's PhD research provides evidence of extensive experience of low-level relevance structures by accounting students.

Conception of learning

Conception of learning is what students think or conceive learning to be. This differs to their approach to learning, which is what students actually do or experience in their learning. Säljö (1979) identified five qualitatively distinct and different conceptions of learning, with learning being seen as:

- A. A quantitative increase in knowledge.
- B. Memorising.
- C. The acquisition of facts, methods, etc.
- D. The abstraction of meaning.
- E. An interpretative process aimed at understanding reality.

Marton *et al.* (1993) later identified a sixth conception of learning:

- F. Changing as a person.

Students' conceptions of learning are related to the approach to learning they adopt (Van Rossum and Schenk, 1984). Säljö's conceptions A-C (where learning is seen as

reproductive, impersonal and as something external to themselves; and involves being able to reproduce clear-cut, black-and-white facts from experts) are strongly related to a surface approach to learning. Säljö's conceptions D-E and Marton *et al*'s sixth conception F (where learning is seen as constructive, personal and being more engaged with and reflective about their learning; and involves searching for understanding and personal meaning while they organise the content into a coherent and meaningful whole) are related to a deep approach to learning. Most importantly, there is strong evidence that students who conceive learning as Säljö's conceptions A-C will not engage in a deep approach to learning (and thus also not develop personal capabilities such as critical thinking). In other words, it is a necessary, but not sufficient, condition that students are able to conceive learning as one of Säljö's conceptions D-E or Marton *et al*'s sixth conception F for them to be able to experience a deep approach to their learning (Byrne and Flood, 2004).

There is evidence that a large proportion of accounting students in accounting courses experience low-level conceptions of learning in accounting tertiary courses (Lord and Robertson, 2006).

Motivation

There are also various assertions in the accounting education literature that accounting students are typically extrinsically (rather than intrinsically) motivated in their studies of accounting (Boyce *et al*, 2001). There is also evidence that a number of accounting students may have negative stereotypes or preconceptions of accounting. These include viewing introductory accounting as dull, boring and lacking in interest; and as a subject to be feared or worried about (Mladenovic, 2000; Lucas, 2001). Existence of such negative stereotypes of accounting amongst accounting students may also be indicative of these accounting students relying on extrinsic motivation in their accounting studies. The author's PhD research provides further evidence of widespread experience of extrinsic motivation by accounting students in accounting courses (Turner, 2011).

Approach to learning

There is also evidence in the accounting education literature that it is difficult and challenging to support accounting students to change the way they experience approach to learning from surface to deep in accounting courses by making limited interventions into the design and delivery of accounting courses (English *et al*, 2004; Hall *et al*, 2004; Ballantine *et al*, 2008; Fox *et al*, 2010). This suggests it will be necessary to implement an integrated set of comprehensive interventions into the design and delivery of accounting courses to support this change by accounting students.

Need to first support change in the 'how' of learning accounting

Thus key context-specific issues for accounting education appear to be the widespread experience by accounting students of low-level relevance structure (Lucas, 2000; Turner, 2011), low-level conception of learning (Lord and Robertson, 2006), extrinsic motivation (Boyce *et al*, 2001) and a surface approach to learning (Booth *et al*, 1999; Byrne *et al*, 2010) in accounting tertiary courses. The educational psychology literature suggests these ways of experiencing how they learn in an accounting course represent a significant barrier for accounting students to develop personal capabilities such as critical thinking (low-level relevance structure: Marton and Booth, 1997; low-level conception of learning: Van Rossum and Schenk, 1984; extrinsic motivation: Fransson, 1977; surface learning: Trigwell and Prosser, 1991). This appears to be a key issue that needs to be addressed before interventions can be successful to support accounting students to develop personal capabilities in an accounting course at university. For this reason, the focus of the previous research by the author has been on developing interventions to support accounting students to experience change in these key aspects of how they learn in an accounting course.

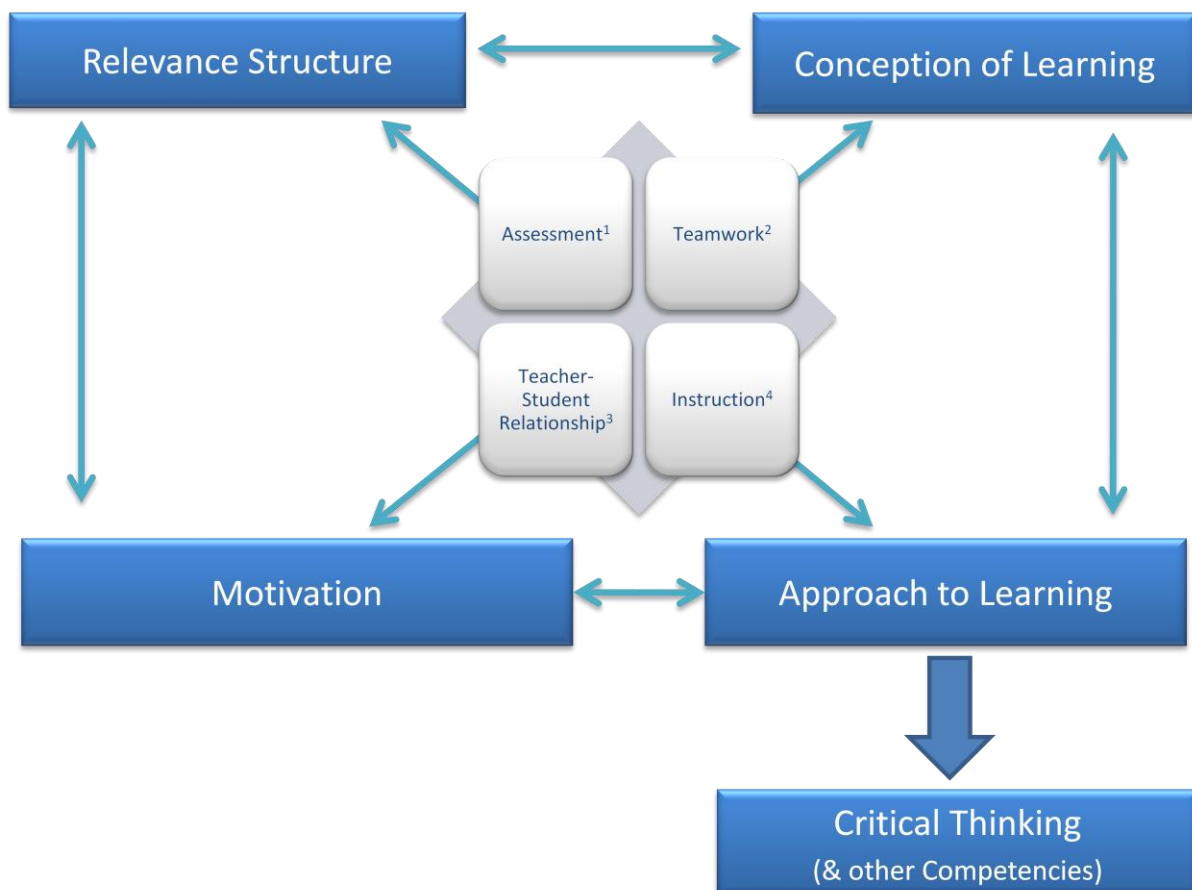
Author's previous interventions

In the author's previous research on financial statement analysis courses (Turner, 2008a; 2009; 2011) there was considerable evidence that the integrated set of interventions used resulted in widespread change in how accounting students learn accounting. The key interventions used in this research designed to support accounting students to change their experience of their own learning were:

- Individualised, authentic assessed learning tasks involving regular formative feedback ('Assessment').
- Cooperative learning interventions, including the use of study groups, to support teamwork ('Teamwork').
- Informal, student-centred and facilitative teaching style where 'right' answers were not imposed but curiosity, questioning and exploration were encouraged ('Teacher-Student Relationship').
- Teaching and reading materials ('Instruction') that involved:
 - Direct instruction on conceptions of learning and the critical importance of adopting a high-level conception of learning to be able to successfully negotiate the assessments in the course;
 - Use of reading materials that had a deep approach to learning embedded in them and which were integrated into the assessed learning tasks: and
 - Use of authentic examples (including the ongoing application of concepts being taught throughout the course to an exemplar company) in both the classroom teaching and the reading materials.

The integrated set of interventions is set out in Figure 2 below.

Figure 2: Supporting Students to Change How They Learn



Footnotes for Figure 2:

1. Hand *et al* (1996); Biggs (1999); Entwistle and Ramsden (1983); Thomas and Bain (1984).
2. Cottell and Millis (1993).
3. Ramsden and Entwistle (1981); Entwistle and Ramsden (1983).
4. Biggs & Rihn (1984); Martin and Ramsden (1987); Marton *et al* (1993); Weimer (2002); Ramsden (2003).

The Assessment design involved structured, sequenced assignments in which students received brief, regular formative feedback, involving:

- five reflective Session Preparation Assignments (SPAs) (25% of the total assessment for the course)
- one large Assignment (broken into five stages) (75% of the total assessment for the course).

The SPAs involved students reading before classes and recording their personal engagement with and reflection on the key ideas and concepts in the readings. The Assignment involved each student analysing their own different listed New Zealand or Australian company, applying and adapting the concepts and ideas taught in the course to a real company. Students were supported in this with a previous, much simpler version of the spreadsheets. Progressively for each stage of the Assignment there were increasingly no 'right' or 'wrong' answers, as the analysis and valuation of companies increasingly depended on uncertain information, such as students' own forecasts of an uncertain future. Thus there were only solutions that were more or less convincing or compelling than others. SPAs and Assignments also included questions to support students to reflect on their learning and to discuss aspects of teamwork that they had engaged in. Besides a grade, students were also given formative feedback on each of their five SPAs and on completion of each of the five stages of the Assignment. This feedback involved:

- Individual feedback to each student, provided by the lecturer and two tutors.
- General feedback to all students.
- Exemplars of other students' work, as examples of good practice on different elements of the assessed learning tasks.

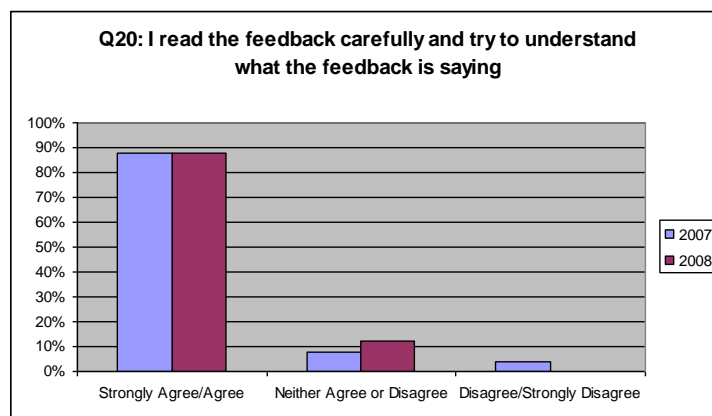
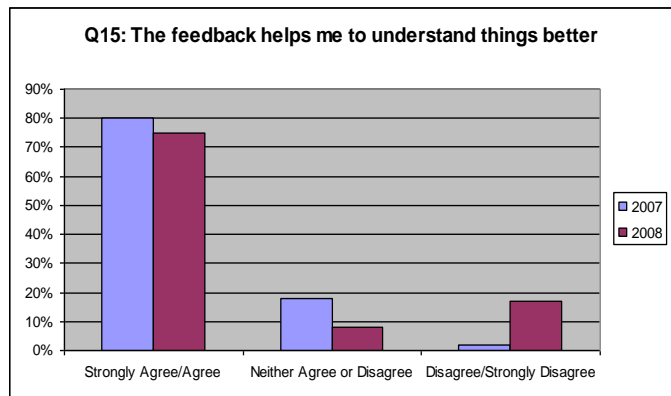
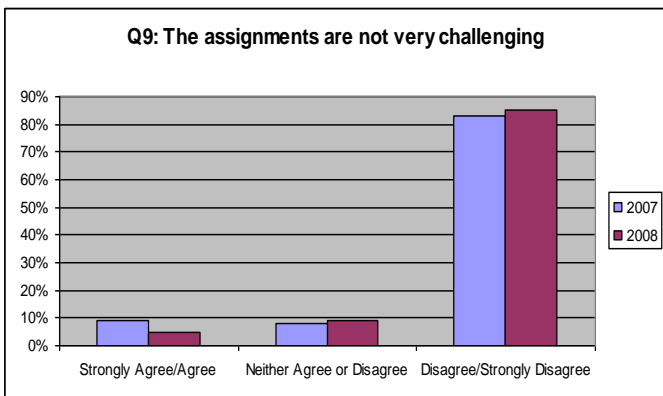
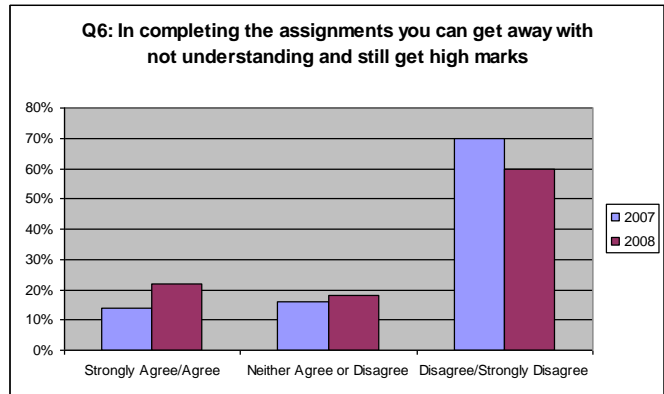
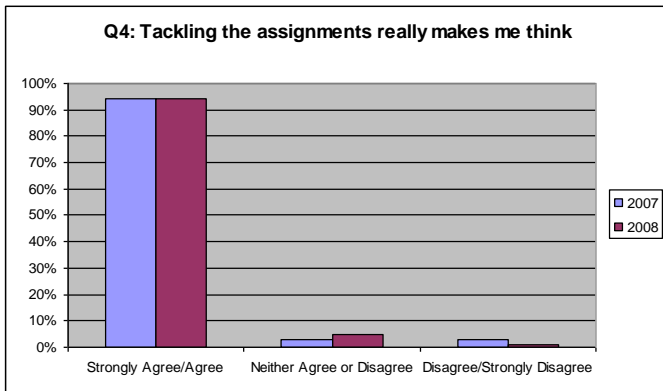
The feedback was provided electronically through the learning management system. The SPAs and Assignments are included in Appendix 1.

Results from the Assessment Experience Questionnaire (AEQ) are shown in Figure 3 below. The AEQ is a standardised questionnaire designed to measure the response of students to assessment (Gibbs & Simpson, 2003). These AEQ results have been previously reported in Turner (2009). The AEQ results show students perceived that the assessments (which used a previous version of the spreadsheets) supported them to learn for understanding and to think.

In addition, over 3,000 quotes from 81 students in the 2008 course were coded to various themes, being taken from students' SPAs and five stages of the Assignment, and from a focus group and critical incident questionnaires completed by students. This qualitative evidence gave insights into how the previous version of the spreadsheets supported students to experience relevance structure, conception of learning, intrinsic motivation and deep learning, which are necessary preconditions for developing critical thinking skills.

Figure 3: Assessment Experience Questionnaire (AEQ) Results¹

Assessment Supported Students to 'Understand' and 'Think'



1. Response rate: 58% (66/113) in 2007; 95% (77/81) in 2008

Use of the spreadsheets allowed each student to analyse their own different, real firm. The application of the concepts in the course to their individual firm supported students to develop understanding and personal meaning about these concepts:

... we're seeking to understand our firms, not to apply techniques unthinkingly to numbers that mean nothing to us.

Accounting student

I'm 'forced' into being more engaged with my chosen company. Somehow there is more meaning to what I'm learning as I can apply this knowledge to assess my company... I am not just a spectator anymore, but an active contributor in my *own* studies!

Accounting student

Students also found the assessed learning tasks of analysing their own firm intrinsically motivating:

Everyone I spoke to seemed pretty enthusiastic about their companies too. I love how everyone is already really 'in to' their company, and everyone appears to be chomping at the bit to get their teeth into further analysis of their firms.

Accounting student

...assessing real companies ... can be quite exciting ... Also the fact that each individual in the class ... had a different company makes us kind of special. [The teacher] sees us each as individuals and having different companies separates us from each other. No one has our company so no one can look at ours and be like hey I've done this and you haven't. We can each do our own thing without being judged by other class mates. It is our own opinions and we cannot be proved wrong until in the future when we see the outcomes of the economic and business drivers.

Accounting student

Use of the spreadsheets also supported students to experience high-level conception of learning:

I felt pleased ... that I will be learning new skills of putting my own view and interpretation on information given to me. This is my final year at uni so this should not be a new concept – but it is!

Accounting student

There was also evidence use of the spreadsheets supported students to experience high-level relevance structure:

What made it so important or significant was the fact that we looked at real companies with actual data and figures, not just a hypothetical situation or made up figures. This provides that extra confidence that the work we did was practical and applicable to what we can expect outside in the field.

Accounting student

...I have gained a lot more from this course than just a mark! This paper has challenged me to think ... has been very 'real' and has taught me how to think for myself which is far more valuable than having another A on my transcript...

Accounting student

The second worksheet in the spreadsheet involved students completing a largely technical exercise of restating their firm's financial statements, although there was also the need for them to begin to make a range of judgements. There was evidence students found this task challenging and yet also experienced intrinsic motivation in this learning task:

I found this task to also be refreshingly challenging and once I started getting into all the finer details of the statements, I found it incredibly hard to put them away and move on to do something else.

Accounting student

The third worksheet in the spreadsheet involved the calculation and interpretation by students of various financial ratios for their individual firm. There was evidence this caused them to reflect on what these ratios told them about the economic and business realities of their firm. Students also discovered they needed to make some judgements in the actual calculation of ratios:

The calculation of ratios looked quite technical and straightforward at first as it involved taking different figures from the statements and calculating a ratio. But it's only when I actually started doing it that I found that it is actually not as simple as it seems and there is a whole lot of areas which require judgment and understanding.

Accounting student

The fourth worksheet in the spreadsheet supported students to forecast the key value drivers of their firm. There was evidence a large proportion of students were experiencing intrinsic motivation in their analysis of their firm by this stage and also engaging in genuine teamwork with others in the course:

I remember I met with [another student] to discuss Assignment [stage 4] [supported by the fourth worksheet of the spreadsheet], and we were supposed to meet for only 1 hour but it ended up being 2 hours. Time flew by so quick, we both laughed at the end at how we could talk about financial statement analysis for 2 hours out of class time. We began to realise that we were both really interested in our firm, how it compared with others, and how it's affected by the current economy.

Accounting student

Students also responded positively to the opportunity of being able to think for themselves and make judgements about their own firms:

This whole process has enthused me and is continually making me think and connect everything that is going on in the world with [my firm]. I even talked about [my firm] in a job interview I had on Friday!

Accounting student

The fifth worksheet in the spreadsheet supported students to arrive at their valuation of their firm, based on the forecasts in the fourth worksheet. There was evidence of widespread experience of intrinsic motivation and deep learning:

...in my five years at university this is only the second time ever that I have still been working on an assignment at midnight. The last time was when I had a report due in the next day. This time, the deadline is still two days away and I am only working because I WANT to not because I have to! I might not be that good at forecasting yet, but I have found my passion. I have always been interested in investing ... but have never been stimulated to further this interest as I have in this course. I now am confident enough to have a go, putting my money into a company that I have analysed.

Accounting student

Students found completion of an analysis of their firm to be personally rewarding:

...we have had the opportunity to delve into the life of a real business looking past the set of numbers presented in a set of financial statements. This has been both challenging and at the same time very rewarding ... there was more to this assignment than simply getting a grade. I felt more compelled to find an answer to the questions that I had posed to myself at the start of this course when I was given [my firm] to analyze. To do all the hard work ... and to finally come up with ... a valuation ... for my company has been very rewarding ... There has been a constant urge to find out the ... value of my company throughout my time in the course and to finally get there is extremely rewarding.

Accounting student

Students valued the learning they had experienced in completing an analysis of their firm, supported by use of the spreadsheets:

...the most precious thing for me is that I know [an] approach to analyse a firm, a real firm!

Accounting student

Further findings of the author's PhD research are included in Turner (2011). Copies of this unpublished manuscript can be obtained from the author.

Development of spreadsheets

This previous research by the author showed that accounting students could experience widespread change in how they learn accounting in a single accounting course (Turner 2009; 2011). This change in how accounting students learn accounting can then support accounting students *to be able to* develop personal capabilities such as critical thinking in an accounting course.

To embed these research findings and to support the teaching of financial statement analysis in a way that encourages intellectual development by students (and in particular their development of improved critical thinking skills) this project developed 100 Excel spreadsheets (as part of a suite of 350 spreadsheets). These resources have been specifically designed to support accounting students in financial statement analysis courses to experience high-level relevance structure, high-level conception of learning, intrinsic

motivation and deep learning as necessary preconditions for them to develop critical thinking skills. The author has not yet been able to complete research on the new spreadsheets, although he is currently using them in an executive management course in financial statement analysis and anecdotally they appear to be working well.

The spreadsheets have the following design features:

- They each contain five worksheets. Each worksheet relates to each of the five stages of the Assignment (see Appendix 1), involving data entry, re-statement of financial statements, ratio analysis, forecasting and valuation. Each worksheet is designed to support students to make the increasingly difficult and complex judgements required by each stage of the Assignment. It does this through supporting students with aspects of the technical tasks of data entry, re-statement of financial statements, ratio analysis, forecasting of key value drivers and support with discounted cash flow (DCF) and economic profit valuation models. At the end of the course, each spreadsheet becomes a personalised, tailored spreadsheet each student takes with them which they can then use to analyse further companies. This is an important tool for them to have as a way of analysing firms.
- Strong technical support is provided by each spreadsheet for each student with their different, individual company in areas of data entry, ratio analysis, forecasting and valuation. This is central to efficiently giving each student individual support or scaffolding as they experience the significant cognitive challenge of making the commercial judgements involved for their different individual firms. These judgements gradually increase in difficulty with each worksheet, as follows:
 - *Data entry worksheet:* This worksheet involves students examining each element of their individual firm's financial statements line by line and entering this data. This is a valuable task for students to complete for one or two year's data. However, entering many years' data for their firms can become quite a time consuming task for students (with limited additional educational benefit). This time would be better spent on subsequent tasks in their analysis which involve more judgements and critical thinking. Also, having some of the previous years' data already entered into the spreadsheets (but not the most recent years) supports students to interrogate the more recent years of their individual firm's financial statements. This support is important since, in the author's previous research, almost all accounting students (in a third year accounting course) reported they had never before looked in detail at a real firm's set of financial statements. They thus needed support to help with the initial barrier of looking at the variety and complexity of their own individual firm's financial statements compared to highly simplified, non-authentic examples they were used to in their previous accounting courses. The first worksheet in the spreadsheet is designed to support each student with the challenges they face with the data entry of their specific, individual firm with its various unique features, accounting treatments and presentations. Completion of this first stage in their analysis is foundational for all subsequent stages.
 - *Restated financial statements worksheet:* This worksheet involves students recasting the financial statements for their firm in such a way as to carefully separate their firm's operating and financial activities. This requires students to examine each item in their firm's financial statements and to decide whether it relates to the operating or financial activities of their firm. To do this, they need to first be able to understand what the item actually is and what it signifies for their particular firm. In his 2007 research study, the author discovered that in their previous studies accounting students had a

widespread lack of understanding of many basic areas of accounting. These areas included consolidated accounting; equity accounting; accounting for financial instruments and tax; and foreign currency translation. The author developed into the reading materials for the 2008 research study an Accounting Primer that supported students to understand these key items so they could be in a better position to be able to restate their firm's financial statements. This also provided accounting students the opportunity to gain some insight into the extent to which they had learned these central accounting concepts in their previous accounting studies. As each firm's financial statements are different, each student is forced to understand each item in their own firm's financial statements, which often involves a careful interrogation of the notes to the financial statements, with different items being either operating or financial activities depending on the specific circumstances and activities of their firm. Having done this, students then make the judgements required to decide whether they are operating or financial activities. There are quite a few subtleties to this task that require careful judgements to be made. The separation between operating and financial activities is also foundational for their analyses, as they will make enterprise valuations of their firms (which are based on the operating activities of their firms excluding their financial activities). They will also have the opportunity to reflect on the value of viewing their firm in terms of a clear separation of its operating and financial activities as they progress through their analysis. The approach adopted with the design of the spreadsheets was to provide minimal support for accounting students on this task in the spreadsheet itself, other than to provide layout and design in the spreadsheet, with primary support coming from the Accounting Primer in the readings and from teamwork and co-operation between students. With each student analysing their own different firms, this both required students to understand the concepts in the Accounting Primer and also each item in their firm's financial statements (because they could not simply copy material out of the textbook or other students' work) and also allowed them to work openly and freely with other students because there was no risk they could be seen to be copying the work of other students who were each analysing different firms.

- *Ratio analysis worksheet:* This worksheet involves students calculating a range of ratios based on their firm's original financial statements and restated financial statements. The spreadsheets support this through providing a number of potential ratios students can calculate. They are also encouraged to calculate different ratios if they wish. The ratios are clearly described and students are also supported in class with the excel skills needed to connect data in their previous worksheets to the calculation of their ratios (in the author's previous research a large proportion of students lacked the most basic Excel skills, so this support was found to be necessary). This step of calculating ratios is a very important one. Almost all students before starting a financial statement analysis course think they will be learning to calculate a few ratios that will permit them to analyse and value firms. Simply calculating ratios is focusing on the accounting numbers (the 'signs') and not on the underlying economic and business realities of their firm (the 'signified'). Supported by this worksheet of the spreadsheet, it is an important objective for accounting students to realise that the ratios actually tell them nothing about the future of their firm and thus of its value. They also have the opportunity of discovering that the ratios calculated based on their firm's restated financial statements are much more informative about the past financial performance of their firm, because these ratios are connected to an overarching valuation framework.

The third stage of the Assignment (which relates to the worksheet on ratio analysis – see Appendix 1) supports students to realise that to be able to analyse and value a firm it will be necessary for them to personally engage with and make judgements about the economic and business realities of their real, individual firm, using the accounting numbers to help them identify what these might be and how these realities might be connected to the accounting numbers of their firm. This is a critical realisation for students to make. This third worksheet of the spreadsheets is thus an important one to support accounting students to make another step in the increasing challenge of being able to make their own commercial judgements as they also develop the technical skills they will need to analyse their own firm.

- *Key value drivers worksheet:* This worksheet supports students to forecast the key value drivers of their firm using the conceptual model taught in the course (Turner, 2008b). This worksheet in the spreadsheet supports students to first calculate the key value drivers from their past restated financial statements (with students directly linking the formulae in this worksheet to their data in other worksheets in their spreadsheet). They are then confronted (in the fourth stage of the Assignment) with the challenge of identifying the key economic and business drivers of their firm and how these are driving their key accounting drivers in the past. These will be different and specific to each firm. The making of these intuitive judgements is central to financial statement analysis and requires considerable judgement, with there being no clear-cut, black-and-white answers. The students are then supported to make the judgements involved in forecasting the key economic and business drivers of their own firm and from these to develop forecasts of their firm's key value drivers. These are substantial and difficult judgements for students to make. A key aspect of the design of the key value drivers worksheet is to support students to develop all the inputs they will need to calculate discounted cash flow (DCF) and economic profit valuations for their firm.
- *Valuation worksheet:* This worksheet calculates a discounted cash flow (DCF) and economic profit valuation for the student's individual firm based on the inputs they have developed in the key value drivers worksheet. Thus the spreadsheet provides strong support for students on the specific technical challenges of completing these valuations. Students are thus free to focus on assessing the quality of the inputs into their valuation models and making their own sense and understanding of their analysis and their total experience in the course, rather than overly focusing on any specific, detailed technical issues (for example, the calculation of continuing values) in their valuation.

Based on previous research by the author (which included use of a previous version of more simplified spreadsheets), it is expected that the assessed learning tasks (critically supported by the revised spreadsheets) will support accounting students to experience:

- *high-level relevance structure:* This can be achieved through discussing with students that they would each be analysing their own individual, different firm (supported by their own individualised spreadsheets) and that it would not be possible to simply regurgitate clear-cut, black-and white facts unthinkingly and with little or no understanding; rather, they would need to make a series of increasingly difficult judgements about their firm, supported by the spreadsheets, as they progressed through the course. Thus students can be supported to experience high-level relevance structures of 'run a business/invest' or 'develop personal capabilities'. The author's PhD research has shown that the design of the assessed learning tasks

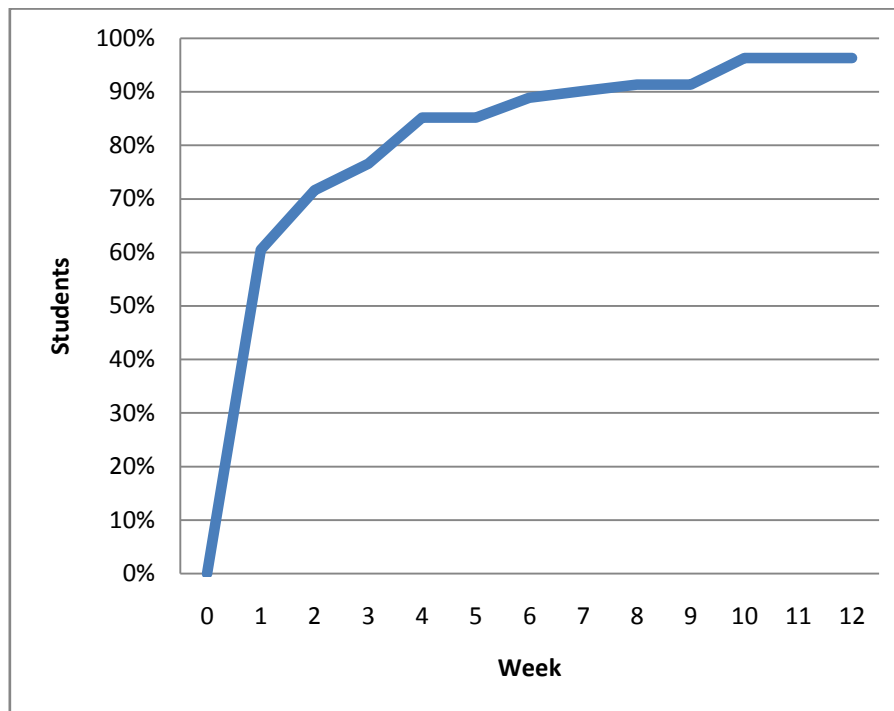
can have a powerful impact on the experience of relevance structure by accounting students in accounting courses.

- *High-level conception of learning:* This can be achieved through direct instruction at the beginning of the course about the different conceptions of learning possible for students to have and that they would need to experience high-level conception of learning (that is, developing understanding and personal meaning) to successfully negotiate the assessed learning tasks in the course. The five stages of the Assignment, critically supported by the spreadsheets, can be used to help accounting students to see that they would need to experience high-level conception of learning in the course because there would be no way around doing this within the assessment structure of the course.
- *Intrinsic motivation:* Students need to experience intrinsic motivation in the learning tasks if they are to experience deep learning and develop their critical thinking skills. Individualised, authentic assessments with regular formative feedback strongly support students to experience intrinsic motivation (Entwistle and Ramsden, 1983; Ramsden, 2003). This has been supported by previous research of the author in relation to accounting students in an accounting course (Turner, 2009). The spreadsheets support students to analyse their own real firm (individualised and authentic). Further, their design into five worksheets supports the provision of regular formative feedback after the completion of each worksheet in the student's spreadsheet. The design of the spreadsheets also provides a lot of technical support for students in their analysis, thus making the provision of regular formative feedback practical and not overly time-consuming for the teaching staff. This support for the experience of intrinsic motivation by students is a key benefit of the design of the spreadsheets.
- *Deep learning:* In the author's previous research using an integrated set of interventions (which included a much more simplified version of the spreadsheets), there was evidence a large proportion students experienced deep learning. Indeed, as shown in Figure 4 below, large numbers of students were able to begin to experience deep learning in the early stages of an accounting tertiary course, with evidence that about 60% students started to experience deep learning in the first week of the course, 90% within the first six weeks of the course and 96% by the end of the course.

The strong connection to the assessment structure of learning tasks that were intrinsically interesting was vital to support accounting students, with extensive prior experience of low-level relevance structure, low-level conception of learning, extrinsic motivation and surface learning to first engage with and then persevere in the challenges of the learning tasks. Personally interesting, challenging and relevant assessed learning tasks that were individualised (different for each student), authentic (part of real life) and with regular formative feedback (and with the freedom to share and discuss their own work on the learning tasks with other students because the tasks were different for each student) support accounting students to experience intrinsic motivation and also support deep learning. The spreadsheets developed in this project provide a key resource to support intrinsically interesting learning tasks (that are individualised, authentic and with regular formative feedback) within the context of an integrated set of interventions described in this report.

It is the author's intention to use the suite of spreadsheets to research their effectiveness as part of an integrated set of interventions to support accounting students to develop their critical thinking skills.

Figure 4: Initial Experience of Deep Learning



Recommendations for teaching practice

A suite of 350 spreadsheets for New Zealand, Australian and UK listed companies are available from the author for use in undergraduate and MBA financial statement analysis courses. The author is keen to support their use in such courses throughout New Zealand and elsewhere.

The outputs from this research project provide a valuable resource that could be incorporated into the teaching methods of financial statement analysis courses. They provide support to academics to develop individualised (that is, different for each student), authentic (that is, real companies) assessments with regular formative feedback (the spreadsheets have been designed to support feedback to be provided at a number of stages in a student's analysis of their firm). This form of assessment has been shown to be effective to support both change in the way accounting students experience how they learn accounting in an accounting course and the development of critical thinking skills (Turner, 2009).

The experience of high-level relevance structure, high-level conception of learning, intrinsic motivation and deep learning and the development of critical thinking skills in financial statement analysis courses (supported by the spreadsheets from this research project) may also prove to be transferable by students to their subsequent accounting tertiary courses. Thus from this project there may be benefits more widely for the overall learning experience of accounting students at university.

Recommendations for future research

The suite of spreadsheets prepared by the author provides a valuable tool for further research into the use of individualised, authentic assessments with regular formative feedback to support accounting students to experience change in the way they learn accounting and develop critical thinking skills.

The author would be interested in conducting joint research projects with other academics on the effectiveness of these spreadsheets as part of integrated sets of interventions designed to support both change in the way accounting students experience how they learn and the development of critical thinking skills in various financial statement analysis courses. In this way, these spreadsheets could be used to support further research that may not only support improved teaching and learning (particularly in relation to the development of critical thinking skills) in financial statement analysis courses but also in accounting and other courses more generally in our business schools.

It is the author's intention to use the spreadsheets as an important part of future research on financial statement analysis courses.

It is considered that this project and the learning from this project can be readily adapted and adopted by others. The spreadsheets and other aspects of the assessment design can be used in financial statement analysis courses in New Zealand and also in Australia and UK. The author is willing to support other academics to implement the learning from this project in other financial statement analysis courses and to support further research into their use. The learning from this project is also relevant more generally to any tertiary course.

Five of these spreadsheets are attached. Also, a zip file of 100 spreadsheets is available on the Ako Aotearoa website. The remainder of the 350 spreadsheets that have been prepared are available from the author. Please contact the author if you would like to obtain copies of these spreadsheets. They are freely available from the author. The author can be contacted at martin.craig.turner@gmail.com.

Conclusions and recommendations

The key recommendations for good practice from this project are:

- individualised, authentic assessments with regular formative feedback are powerful tools within the context of an integrated set of interventions designed to support intrinsic motivation, deep learning and the intellectual development of students, in particular developing their critical thinking skills.
- careful design of these forms of assessment is required.
- although considerable effort and thought is required in the initial design of these forms of assessment, the ongoing marking and implementation can require no more resources than traditional assessment methods.

This project provides a suite of Excel spreadsheets that can be readily used (in the context of an integrated set of interventions described in this report) by academics to support the use of individualised, authentic assessments with regular formative feedback in financial statement analysis courses; and can also be used to support further research into the effectiveness of the use of such forms of assessment to support students to experience change in the way they learn accounting and to develop critical thinking skills.

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