Students as Surrogates for Practicing Accountants: Further Evidence

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Behavioural research in accounting is often limited by the availability of appropriate subjects leading to consideration of the use of students as surrogates for professional accountants. This study seeks to extend our understanding of the circumstances in which the use of student surrogates is appropriate in accounting research settings. While the results of prior empirical research suggest caution in using students when the experimental task is unstructured and complex, their suitability on tasks of a more structured nature is not so clear. Employing an experimental design, this study examined the effect of knowledge differences on a series of ten accounting classification judgements across four research participant groups. The four groups comprised professional accountants, accounting students, engineering students with some accounting knowledge, and engineering students with no accounting knowledge. The results confirmed that advanced level accounting students make similar accounting classification judgements to practitioners and that the level of accounting knowledge gained through undergraduate level study systematically influences the classification judgements of student subjects. The findings support the use of advanced level accounting students as surrogates for accounting practitioners in relatively structured decision contexts.

Keywords: Students, surrogates, accounting, auditing, experiment, behavioural research

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1. Introduction

As in other disciplines, behavioural research in accounting is often limited by the availability of appropriate subjects. Faced with this issue, many researchers have turned to students to proxy for 'real world' actors.[1] The use of student surrogates can improve experimental efficiency by reducing costs associated with 'going-to-market' for empirical evidence, and may reduce incentives to resort to non-random sampling, devote less time on detailed post-experimental questions, and/or use a non-controlled setting (Ashton and Kramer, 1980; Abdolmohammadi and Wright, 1987; Liyanarachchi, 2007). Further, surrogation avoids the overuse of 'real-world' participants, which might otherwise make it "…more difficult for other experimenters to gain access to this very valuable resource" (Libby, Bloomfield and Nelson, 2002, p. 803).

The use of student surrogates, however, has not been without controversy. Much of the debate has centred on the threat surrogation poses to external validity (Gordon, Slade, and Schmitt, 1986, 1987; Locke, 1986; Greenberg, 1987; Walters-York and Curatola, 1998, 2000). While the use of surrogates may be seen to have polarised researchers, the seeming intractability of the issue appears to be reflective of Dickhaut, Livingstone, and Watson's (1972) conclusion that no sufficient conditions appear to exist for establishing either the existence or absence of experimental reality or external validity. According to Walters-York and Curatola (2000), the challenge for researchers is to establish those particular circumstances "…under which the use of students as substitute subjects would or would not constitute a substantial sacrifice to the experimental investigation of the behavioural properties or processes of interest" (p. 245).

The existing evidence suggests that students may not be good surrogates where the focus of the research is on antecedents of behaviour, such as *attitudes* (Alpert, 1967; Copeland, Francia, and Strawser, 1973). However, support for surrogation is found in the results of studies that have considered differences in *behavioural responses* between subjects (Dyckman, 1966; Mock, 1969; Hofstedt, 1972; Dickhaut, 1973[2]; Abdel-khalik, 1974; Zimmer, 1980; Ashton and Kramer, 1980; Liyanarachchi and Milne, 2005). Differences in certain demographic and sociopsychological variables between students and non-student subjects might be expected to interact with relationships of interest to the researcher, depending on the objectives of the research. Several such variables have been considered in the literature, including skills, personality traits, wealth, age, and experience (Wetherick, 1967; Birnberg and Nath, 1968; Dickhaut, 1973; Ashton and Kramer, 1980; Krogstad, Ettenson, and Shanteau, 1984; Abdolmohammadi and Wright, 1987). Of these variables, the effect of experience has received the most research attention in the accounting domain (Ashton and Kramer, 1980; Krogstad et al., 1984; Abdolmohammadi and Wright, 1987). Experience refers to task related encounters which provide opportunities for learning in the relevant work environment (Libby, 1995, Trotman, 1996). Together, the results of the previous

[1] For example, studies have used students as surrogates for accountants (Belkaoui, 1980; Houghton and Hronsky, 1993), auditors (Ashton and Kramer, 1980); practitioners (Liyanarachchi and Milne, 2005), bankers (Abdel-Khalik, 1974); businessmen (Copeland, Francia and Strawser, 1973); accounting professors (Belkaoui, 1980).

[2] Dickhaut (1973) found no significant main effect for subject type (student vs. businessman), but found a significant 2-way interaction between subject type and experimental setting (business problem vs. generic problem) and significant 3-way interaction between subject type, experimental setting, and information system (single vs. joint information system).

studies examining experience suggest that professional experience is likely to be a significant determinant of task performance for complex (highly unstructured) tasks, but is a less salient factor for low complexity (highly structured) tasks.

Knowledge is an important consideration in research subject choice. Where specific knowledge is relevant to the experimental task, the experimenter ought to utilise subjects who might reasonably be expected to possess the requisite knowledge (Trotman, 1996; Libby et al., 2002). For instance, based on the effects of experience, Trotman (1996, p. 93) argues that students should only be considered for use as subjects in judgement and decision making studies when the focus of the research is not dependent on knowledge acquired through professional experience. Knowledge may be acquired on the job, through professional experience, or by other means, such as through formal education (Bonner and Lewis, 1990; Libby, 1995). While accounting students will generally lack knowledge obtained from practical experience, they are likely to have acquired significant general domain knowledge from university courses.

The purpose of this study is to assess the effect of knowledge acquired through formal education, rather than through professional experience, in relation to the surrogation decision. Knowledge acquired through education is associated with *semantic memory*;[3] that is, memory for concept meanings and relations (Libby, 1995). Houghton (1987) has shown that accounting education causes changes to the meanings students hold about basic accounting concepts, while Houghton and Hronsky (1993) have demonstrated that upper level accounting students have similar cognitive structures (the structure within which meaning is held) to real-world accountants, although the positioning of concepts within the shared structures differed between students and practitioners. However, neither of these studies considered the impact of knowledge differences on behavioural outcomes, such as accounting judgments.

In this study we examine the effect of knowledge differences on accounting judgements between four groups of research participants. Subjects in the first and second groups are qualified accountants (Chartered Accountants) and students in a third level advanced financial accounting course, respectively. The third group consist of third year engineering students with a low to moderate level of accounting knowledge, while the fourth group (the control) were made up of third year engineering students with no formal accounting education. A realistic experimental task was developed requiring participants to classify ten items (cases) based on the application of a single accounting definition (the definition of cash, as it relates to cash flow, in NZ IAS 7 *Cash Flow Statements).*[4] The task was deliberately designed to be relatively structured (i.e., relatively low in complexity) in order to mitigate any experience effect associated with the practitioner group.[5] In so doing, the study addresses a call for future research to consider the effect of experience on structured tasks (Abdolmohammadi and Wright, 1987).

[3] A distinction is drawn in the memory literature between episodic memory, that is, memory of actual events/particular experiences, and semantic memory, the memory of facts, knowledge, concepts and meanings (Libby, 1995).

[4] NZ IAS 7 is New Zealand's equivalent to the International Accounting Standards Board's IAS 7 *Cash Flow Statements*.

[5] Although moderately low overall, task complexity did vary somewhat across each of the 10 items (cases) according to the inherent nature of each item.

This study extends our understanding of the circumstances in which it is appropriate to use students as surrogates. The findings suggest that students with advanced accounting knowledge are adequate surrogates for accounting practitioners in experiments involving relatively structured decision-making tasks. Given the nature of the subjects and research task employed in this study, the results have important implications for specific areas of accounting research.

The remainder of this paper is organised as follows. Section two provides a review of the literature relevant to the use of students as surrogates. Section three considers the two key research questions and section four reviews the research method employed. The results are outlined in section five, followed by a discussion and conclusions section.

2. Literature Review

The validity of using students as surrogates has been broadly debated in both the accounting and wider literature (for example, see Ashton and Kramer, 1980, Gordon, Slade and Schmitt, 1986; Locke, 1986; Sears, 1986; Greenberg, 1987, Liyanarachchi, 2007). Underpinning arguments against the use of student as surrogates is the premise that subjects will "…automatically constitute a substantial threat to the external validity of the experiment" (Walters-York and Curatola, 2000, p. 245). However, in defence of surrogation, several authors have put forward theoretical and methodological counter arguments. In a review article, Walters-York and Curatola (2000) summarise these as follows. First, in suggesting that students are not representative of target populations, opponents of surrogation fail to acknowledge that studies that use real-world subjects frequently fail to comply with formal random sample selection procedures[6] and often suffer from attrition, resulting in 'convenience samples' which provide no better basis for generalisation than convenience samples of student subjects. Second, generalisability may not be the primary purpose of laboratory experiments in which case the focus on external validity is misplaced. For instance, the researcher may be interested in determining whether a theoretical prediction relating to something that *ought* to happen in a controlled environment is supported. Third, the mere existence of differences in sociopsychological characteristics between students and non-student groups does not automatically threaten generalisability. What is important is whether such dissimilarities alter the pattern of treatment responses across subject groups. Last, external validity is affected more by experimental realism (i.e., degree to which the task/setting engages the subject's attention and interest, and is ascribed meaning by the subject) than choice of subject. While there is merit in many of the arguments and counter arguments, from a research methodology perspective attempts to bring resolution to the surrogation debate will always be constrained by the lack of objective criteria for establishing generalisability (Dickhaut et al., 1972; Fromkin and Streufert, 1976).

The appropriateness of using students as surrogates in behavioural research has been empirically investigated in a wide range of disciplines.[7] In general, reviews of

[6] Trotman (1996, p. 85) notes that "[i]n accounting and auditing, random selection is rarely if ever possible."

[7] For example, studies have considered the surrogation of students for: housewives (Sheth, 1970; Park and Lessig, 1977); consumers (Wilson and Peterson, 1990); clinical psychologists (Chapman and Chapman, 1969); software developers (Host, Regnell and Wohlin, 2000) and business practitioners (Khera and Benson, 1970; Ashton and Kramer, 1980).

both the accounting and non-accounting literature note similar findings (for example, see Ashton and Kramer, 1980; Walters-York and Curatola, 2000; and Liyanarachchi, 2007). In this section, we focus mainly on student surrogacy in accounting studies.

As Ashton and Kramer (1980) observe, studies (both in accounting and in the wider literature) focusing on attitudes and attitudinal change have generally indicated that students make poor proxies for non-student groups. Alpert (1967, p. 207), for instance, concluded that "the best subjects for tests designed to reflect businessmen's behaviour in the business setting…is the businessman himself". Copeland et al. (1973) compared the attitudes of accounting students with those of three groups of professional business subjects[8] regarding financial reporting practices. Similar to Alpert (1967), Copeland et al. (1973) identified significant between subject differences, leading to the overall conclusion that students are not appropriate surrogates for real-world subjects. However, the authors preface their conclusions by emphasising that they were concerned with "…the use of students as surrogates for businessmen for the purpose of assessing attitudes, not actual behaviour" (p. 369).

Research focusing on behavioural outcomes, including judgement and decision making, has generally provided support for the use of accounting students as representatives for a variety business professionals across a range of research settings (Dyckman, 1966; Mock, 1969; Hofstedt, 1972; Dickhaut, 1973; Abdel-Khalik, 1974; Zimmer, 1980; Liyanarachchi and Milne 2005). However, in synthesising the prior literature, Ashton and Kramer (1980) argue that to extend our knowledge further about factors that are important for any generalisations from students to non-students, it is important to consider the role of individual-level differences where they might be expected to interact with relationships of interest.

Ashton and Kramer (1980), in their study, examined the suitability of students as surrogates for business subjects (auditors) in *decision-making* or *judgement* based studies. Their study was a replication of Ashton's (1973) experiment examining internal control judgements by independent auditors. Using volunteers from an undergraduate auditing course, they found no statistically significant differences between the student and professional groups' decision outcomes in 19 of 30 cases. Further, they conclude that "[i]f one goes beyond statistical tests and considers the general directionality in the data, it appears that students were adequate surrogates for auditors" (p. 11). In an important extension to the literature the researchers also considered the role of professional experience. They found that the level of experience had only a small correlation with measures of judgement.

Krogstad et al. (1984) also considered the effect of experience, but in a different setting. They examined judgements of audit partners, audit seniors, and auditing students in relation to materiality judgements, and found that "…while audit seniors closely resembled audit partners in the experimental task, accounting students were found not to be good surrogates for the professional auditor" (p.71) and posit that the probable reason for inconsistency between their findings and those of

[8] Subjects consisted of qualified accountants, members of the Institute of Chartered Financial Analysts and mangers from the 500 largest companies in the US.

Ashton and Kramer (1980) is likely to be due to differences in specific task characteristics (e.g., task complexity/structure).

Abdolmohammadi and Wright (1987) attempted to explore the apparent interaction between task complexity and experience in the context of an audit setting. As expected, their findings indicated that the judgements of experienced subjects differed to those of other subjects on unstructured and semi-structured tasks. However, contrary to expectations, judgements also differed for the structured task. The authors suggest that the latter result was an artefact of their experimental design (the judgement for the structured task depended on judgements made for the semi-structured tasks) and that future research "…should include independent structured tasks to study the effect of experience" (p. 12). The authors conclude that "…students, or more junior staff, were not appropriate surrogates where complex decisions are required" (p. 12).

Kleinman, Palmon and Lee, (2003), who used postgraduate (masters) students as surrogates for auditors and senior managers within an audit-client negotiation context, echo the Abdolmohammadi and Wright (1987) conclusion. They support the use of student surrogates provided they are not asked to make judgement decisions requiring "technical expertise" specific to experienced accountants (Kleinman et al., 2003, p. 68).

Clearly matching the experimental task with the knowledge-level of subjects will be an important consideration in most judgement and decision making experiments. As noted in the Introduction, knowledge may be acquired on the job, through professional experience, or via other means, such as through formal education (Bonner and Lewis, 1990; Libby, 1995). Two studies from the measure of meaning literature (Houghton, 1987; Houghton and Hronsky, 1993) shed some light on the relationship between knowledge acquired through formal education and student surrogacy.

In a study focusing on a first course in accounting for MBA students, Houghton (1987) found that the structure within which connotative meaning is held (cognitive structure) changed over the duration of the course, as did the meanings of fundamental accounting concepts (as measured by changes in the placement of the concepts within the cognitive structure). Building on these findings, Houghton and Hronsky (1993) examined the degree to which accounting students and practitioners share cognitive structures and meaning. They found that "…the accounting students demonstrated a level of structural cognitive complexity in relation to the meanings of accounting concepts similar to experienced accounting practitioners" (p. 139). However, they also found significant differences in the quantifications (or placements) of specific accounting concepts within the cognitive structure. The authors conclude that while accounting students may be adequate proxies for practitioners in the determination of cognitive structures, "…they may not be adequate surrogates for the more precise task of the measurement of meaning in accounting" (p. 143). Houghton and Hronsky (1993) conclude by recommending the extension of the "…surrogation debate into areas of decision-making where meaning, perceptions or attitudes are potentially important, (for examples, in the application of concepts…which are defined in accounting standards)." (p. 143).

3. Research Questions

In this study we seek to further understand the particular circumstances in which using students as proxies for real world actors is warranted. We do this in an accounting setting. The prior literature highlights the importance of matching subject knowledge with the knowledge requirements of experimental tasks. In particular, prior research suggests that because accounting students lack professional experience, they are likely to be unsuitable in tasks for which experience is an important determinant of task performance. Such tasks are typified by their relatively high task complexity and lack of structure. However, students may be acceptable substitutes for practicing accountants in tasks which are relatively structured in nature. Performance on these tasks is likely to be more dependent on general domain knowledge, acquired through formal education, rather than on knowledge developed through professional experience. Abdolmhommadi and Wright (1987) expected but failed to confirm this relationship empirically, largely due to a limitation of their study.

We further seek to advance the surrogation literature by exploring the relationship between general domain knowledge (acquired through formal education) and task performance. Prior research by Houghton (1987) and Houghton and Hronsky (1993) collectively suggests that accounting education changes students' cognitive structures and meanings of accounting concepts, and that final year undergraduate accounting students cognitive structures can coincide with those of practicing accountants. However, their research did not consider the impact of education on behavioural outcomes, such as accounting judgments.

Accordingly, the research questions examined in the current study are:

1) Do advanced level accounting students make similar accounting classification judgements as practitioners?
2) Does the level of accounting knowledge gained at an undergraduate level impact the accounting classification judgements of student subjects?

4. Method

4.1 Research Subjects

This study examines the effect of knowledge differences on a series of accounting classification judgements across four research participant groups. The four groups comprised professional accountants, accounting students, engineering students with some accounting knowledge, and engineering students with no accounting knowledge. The professional accounting subject group (Group 1) consisted of 86 New Zealand Chartered Accountants (CAs) who were either working in senior financial accounting roles in a local corporate environment or were working within three of the Big Four accounting firms (the Big Four) in New Zealand. The corporate accountants were randomly chosen from the members' list of the New Zealand Institute of Chartered Accountants (NZICA) while the Big Four accountants were selected from staff lists provided by the respective firms. The

accounting student group (Group 2) consisted of 58 undergraduate students in the final stages of a third year advanced financial accounting course. They were considered to be appropriate subjects because the course they were completing is the most advanced level financial accounting course required to meet NZICA's academic requirements. Further, the experimental task required the interpretation of professional standards, for which knowledge of accounting concepts and standards is necessary. Such knowledge is normally acquired through formal accounting education (Liyanarachchi, 2007). Prior studies (e.g., Ashton and Kramer, 1980; Houghton and Hronsky, 1993; Liyanarachchi and Milne, 2005) have also used senior accounting students to proxy for accounting professionals.

The third subject group (Group 3) were made up of 78 undergraduate engineering students in the final stages of a third year compulsory engineering course who had some (limited) level of accounting knowledge. The control group (no accounting knowledge) consisted of 60 undergraduate engineering students who were completing the same third year compulsory engineering course as Group 3 but who had no formal accounting education. The former students were differentiated from the latter based on demographic data collected in the research instrument. Specifically, the instrument solicited information pertaining to the subject's prior exposure to accounting and accounting education. Respondents could choose from the following three categories: 5 hours or less, 5 to 20 hours, and more than 20 hours of accounting education/experience. Students with 5 hours or less accounting knowledge represented the 'no accounting knowledge' control group. The decision outcomes for engineering students in the last two categories were compared, with no significant difference being observed between categories that had 5 to 20 hours and more than 20 hours of accounting education/experience. Therefore these two categories were pooled, resulting in a group of 78 engineering students with some accounting knowledge (represented as Group 3).

To summarise, the total sample size was 282 subjects, consisting of 86 professional accountants, 58 accounting students, 78 engineering students with ***some*** accounting knowledge and 60 engineering students with ***no*** accounting knowledge.

4.2 Administration

Each subject group had been contacted prior to the study to request their participation. The student groups were not randomly selected as all attendees at one of their respective course lectures were invited to participate. As previously noted, the professional accountants' group was either randomly selected from the NZICA members' list or non-randomly selected from staff lists provided by three Big Four firms. When initially contacted, subjects were provided little information about the purpose of the experiment in order to avoid demand effects. They were told that participation was voluntary, given assurances about their anonymity (and that of the information obtained), the expected time needed to complete the instrument and the possibility of a prize draw should they choose to participate. They were also provided with a URL link for on-line administration. This link differed depending on the nature of the particular group, allowing the resulting data to be separated between the four subject groups. They were prevented from submitting twice through a tracking system embedded in the survey instrument.

Laboratory conditions were partially imposed by restricting subjects from scrolling (backwards and forwards) through the instrument. Therefore, only after each task was completed could the subject proceed to the next task and only after all tasks were completed could they "submit" the instrument. Failure to complete all components of the survey resulted in a failure to submit.

4.3 Experimental Research Task

The experimental task involved a series of accounting classification judgements based on a concept defined in accounting standards. Liyanarachchi (2007) believes that the ability to make judgements consistent with professional standards is an important quality of decisions in the field of accounting. Subjects were required to review the definition of "cash" (as it relates to cash flow) provided under NZ IAS 7 *Cash Flow Statements*, and then indicate the "degree" to which they believed each of 10 cases represented an item of "cash" (as defined under NZ IAS 7) using a Likert scale ranging from "clearly an item of cash" (1) to "clearly not an item of cash" (6). Case items were selected to represent a range of potential classification decision outcomes. Items were identified from discussion documents and the exposure draft leading up to the issue of IAS 7, Cash Flow Statement, and varied in terms of clarity or level controversy associated with their inclusion within the definition of cash. Appendix A includes relevant extracts from the online instrument.

As noted in the literature review, tasks may vary based on their degree of structure and complexity. Abdolmohammadi and Wright (1987) suggest that structured decisions are relatively routine, associated with well-defined problems and cues, have limited/well specified decision alternatives, and require little judgment. In contrast, unstructured decisions tend to be unique, be associated with undefined problems with few or no guidelines available, have infinite/undefined alternatives, and require significant judgment and insight. In applying their framework to internal control evaluations, Abdolmohammadi and Wright (1987) consider such evaluations, to be either structured or semistructured decisions in that they normally entail "a well-defined, routine problem…often involve the completion of standardized internal control questionnaires…[and] offer limited/well specified decision alternatives…(e.g., strong, mediocre, weak controls)" (p. 5). It appears that the decision task in this study (classification judgements using predefined accounting concepts and with defined alternative outcomes) also appears to be in the range from structured to semistructured. Performance on such tasks are less likely to depend on professional experience in comparison to less structured/more complex tasks (Abdulmohammadi and Wright, 1987).

5. Results

A detailed review of the results is now provided, looking specifically at each of the 10 cases and assessing the level of difference/similarity between each of the subject group responses.

Table I provides the mean scores and the results of one-way analysis of variance (ANOVA) with post hoc pair-wise multiple comparisons of means using Scheffé's

test for each case. This is supported further by Table II, which identifies means for groups in homogenous subsets based on Scheffé's post hoc test. Means appearing in the same subset for a particular case are not regarded as being statistically different.

[Take in table I]

[Take in table II]

Table III provides a graphical presentation of the mean scores for each subject groups' responses to the experimental task for each of the ten cases, allowing for consideration of the general directionality in the data. To facilitate interpretation, groups are presented in the order of their perceived level of accounting knowledge, from the greatest (the accountant group) to those subjects with no prior knowledge of accounting (engineering student group with no accounting knowledge).

[Take in table III]

Each case item will now be addressed separately:

5.1 Case 1 - Coins and Notes on Deposit

Table I reveals no significant difference between all four groups (p=0.15) when classifying case 1 (*coins and notes on deposit*) as cash or not cash. The mean response from each subject group and ANOVA for between group differences indicates a high level of agreement for this case, supported further by Table II which shows one overall subset group. There was also no noted binary difference (yes vs. no), with all subject groups agreeing that case 1 is an item of cash (all mean scores are less than 3.5).

Although not statistically significant, the general trend in the graph corresponding to c*oins and notes on deposit* in Table III is not inconsistent with the second research question, i.e., that the level of accounting knowledge has influenced each subject groups' mean response regarding this case. There appears to be a slight move further away from a score of 1 ("clearly an item of cash") as the level of accounting knowledge diminishes, perhaps reflecting a lack of understanding around the term 'notes on deposit' which may not be common speak for non-business majors.

5.2 Case 2 - Accounts Receivable

Table I suggests that the accountant and accounting student groups considered the a*ccounts receivable* case to be "not cash", while the engineering students with and without accounting knowledge believed it to be "cash". The ANOVA results for this case reported in Table I confirmed significant between group differences in mean scores (p=0.00). Pair-wise post hoc analysis (see Table I) shows mean responses were not significantly different between the accountant and accounting student groups and between the engineering students with no accounting knowledge and the engineering students with accounting knowledge. However, a

significant difference was identified between the accountant group and the engineering students with and without accounting knowledge groups (p<0.01).

Table II evidenced two subsets: the accountant and accounting student groups in subset one; and both engineering student groups together with the accounting student group in subset two. The accounting student group is represented in both subsets as this group's mean score is not significantly different to that of any of the other groups. While the responses of the accounting students for this case were not significantly different to the responses of accountants, both engineering student groups had significantly different responses to those of the accountants.

The graph corresponding to *accounts receivable* in Table III shows that the perception that this asset is "cash" increased as the level of accounting knowledge diminished. However, there is no significant difference between the results of the engineering student group with accounting knowledge and those without.

5.3 Case 3 - Four Month Treasury Bill

The results of the ANOVA presented in Table I show no significant difference between all four groups (p=0.09), while Table II confirms the presence of one subset group for the *Four month Treasury bill* case. However, Table III illustrates more clearly the changing degree of confidence around the decision to classify this asset as cash, with both accountant and accounting student groups exhibiting a greater level of acceptance that this item is "not cash", while both engineering student groups were less confident that this item is "not cash" (4.68 and 4.57 vs. 4.31 and 4.10, respectively). Clearly, however, all four groups do agree that this item was "not cash" for the purpose of the cash flow statement.

5.4 Case 4 - Reserve Bank Bills

A significant between group difference (p=0.01) was noted for *Reserve Bank bills* (see Table I). Post hoc analysis identified only one significant pair-wise difference, a significant difference in the mean responses between the accounting student group and the engineering students with accounting knowledge group. Table II reveals two subset groups. The accountant and both engineering student groups represented one subset, while the accountant and accounting students were in the second subset. Clearly, the accountants' mean response was not significantly different to any of the other groups.

A clearer picture of the overall pattern of mean responses emerges in the graphical representation depicted in Table III. The accountant and accounting student groups appear more confident of this case being "cash" relative to both the engineering student groups (2.35 and 2.12 vs. 2.92 and 2.87). The engineering student group with some accounting knowledge provided the least support for this item being represented as "cash" (2.92), while the accounting student group provided the strongest support, with a mean score of 2.12. Nevertheless, the conclusion with respect to the accountants and the accounting students is that there is no statistically significant difference in responses between these two groups. The graphical representation in Table III suggests that, while there is not a significant difference between the accountants and both groups of engineering

students, the mean response of the accounting students was closer to that of the accountants than those of either engineering student group.

5.5 Case 5 - Gold Bullion

A significant between group difference (p=0.00) was observed for this case (see Table I). Post hoc analysis (Table I) revealed no significant difference between the accountant and accounting student subject groups, while a significant difference did exist between the accountant and both engineering student groups (p<0.01 in each case). Significant differences were also observed between the accounting student group and both engineering groups (p<0.01 in each case). No significant difference existed between the two engineering student groups.

Not surprisingly, Table II identifies two subsets with the two engineering student groups being represented in one subset and the accountants and accounting students in the other subset. As for a*ccounts receivable* (case 2), there is a clear difference in classification decisions for *gold bullion* between those groups (accountants and accounting students) who believe the item is not an item of cash versus those groups (both engineering student groups) who believe it is cash.

The graphical representation in Table III supports the claim that the view that this case is “not cash” strengthened with the level of accounting knowledge, with the accountant group and the engineering students with and without accounting knowledge group and the accountant group being at opposite ends of the scale (4.79 versus 3.06 and 3.08, respectively).

The conclusion for this case is clear. The accountants and the accounting students are in agreement with respect to the classification of gold bullion for purposes of the cash flow statement, while the two groups of engineering students have significantly different responses.

5.6 Case 6 - Readily Tradable Equity Securities

A significant between subject group difference was noted for this case (p=0.00, see Table I), with post hoc analysis revealing significant differences in means between accountants and all other groups (p<0.01 in all cases), and between accounting students and both engineering student groups (p<0.01 in all cases). Three subsets were identified in Table II. These are represented by the engineering student groups, the accounting student group, and the accountant group, respectively. Similar to case 5 (*gold bullion)*, a clear distinction was made by the accountant and the accounting student groups that *readily tradable equity securities* were “not cash”, while both engineering student groups indicated that the case was an item of cash.

Table III presents a similar trend to that noted in cases 2, 3, 5, 7, 8 and 10. For this case the accountant group have the highest mean score of all four groups, followed by the accounting student group, then the engineering student group with accounting knowledge and finally the engineering student group with no accounting knowledge. The conclusion is clear that, while the mean response of the accounting student group was significantly different to that of the accountant

group, it was significantly closer to the accountants than were the responses of either engineering student group.

5.7 Case 7 - A Three Month Futures Contract

While the results show an overall agreement that the *three month futures contract* item was "not cash", Table I indicates a significant between group difference (p=0.00). This difference was attributable to significant pair-wise differences between the accountant group and all other groups ($p<0.05$ for accounting students and $p<0.01$ for both engineering student groups). Table II identifies two subsets, with the first represented by all student groups, and the second by the accountant group. There is clear evidence that the latter subset perceived most strongly that the case was "not cash".

Table III provides visual evidence of the degree to which each group perceived the item not to be cash, with a gradual decline in mean scores being noted from 5.52 for the accountant group to 4.47 for the engineering students without accounting knowledge. This graphically presents a steady decline in confidence as the level of accounting knowledge diminishes.

5.8 Case 8 - Non-Cash Payments for Goods And Services (Barter)

While a significant between group difference is noted in Table I for this case (p=0.00), no significant pair-wise difference is noted between the accountant and accounting student groups or between the two engineering student groups for *non-cash payments for goods and services*. The means of both accountants and accounting students, however, were significantly different to either engineering student group. Accordingly, Table II notes two homogeneous subsets made up firstly of both engineering student groups, and secondly the accountant and accounting student groups. The visual representation in Table III clearly show the two subset clusters, with the accountant/accounting student subset most strongly perceiving the case as not representing cash. However, overall, all four groups believed that the case is not an item of cash.

5.9 Case 9 - On-Call Bank Overdraft

Table I indicates no significant between group difference (p=0.06) for this case, while Table II only notes the identification of one subset group. The graphical representation noted in Table III provides little support for mean differences between groups being associated with the level of accounting knowledge. Although all groups indicated that the *on-call bank overdraft* was an item of cash, most responses were in close proximity to the scale mid-point of 3.5 indicating that all groups were not confident in their judgements. This may reflect the fact that this item is a liability and not an asset and it may have seemed counterintuitive to have classified it as an asset.

5.10 Case 10 - Preference Shares Redeemable In Three Months For Cash

A significant between group difference is noted in the one-way ANOVA results presented in Table I (p=0.00) for the last case, *redeemable preference shares*. Post hoc analysis revealed that the accountant group was significantly different to both engineering student groups (p<0.01 in each case) while no significant difference was observed between the accounting student group and any other group. Table II indicates that two subsets were identified for this case, with the first represented by the accountant and accounting student groups and the second by all student groups.

The graphical representation in Table III indicates that while all four groups agreed that the item was “not cash”, the degree of confidence in judgments appears to diminish somewhat according to the level of accounting knowledge, although not to the same degree as observed in some of the earlier cases.

6. Discussion

The above results provide strong evidence to support the claim that accounting students are adequate surrogates for accountants in certain decision-making activities. No significant difference in case responses between the accountant and accounting student groups were observed for eight of the ten cases (cases 6 and 7 were the exceptions). While case 6 (readily tradable equity securities) resulted in a significant difference between the two accounting groups (accountants and accounting students), the means for all four groups represented three separate homogeneous subset groups consisting of the accountant group, the accounting student group and the two engineering student groups. However, the accountant and accounting student groups did indicate that case item 6 was “not” an item of cash while the engineering student groups both indicated that the case item was an item of cash. This effectively confirms that the accountant and accounting students had agreed to the overall treatment of this case item (yes vs. no), irrespective of the significant difference in mean score. Also, the mean scores of the accounting students were closer to those of the accountants than were the scores of the two groups of engineering students.

Case 7 (a three month futures contract) was the only case of the ten for which the responses of the three student groups (the accounting students and the two engineering student groups) were not significantly different from each other but were significantly different to the responses of the accountants. Hence, of the ten cases, this was the only one for which, at least on this issue, the accounting students might not be seen to be suitable surrogates for experienced accountants.

The inclusion of the engineering student groups provides further evidence that accounting students, and not simply students in general, demonstrate consistency in classification with four case items grouping into two separate subset groups; the accountant and accounting student group in one of the two subset groups. This occurred in case 2 (accounts receivable), 5 (gold bullion), 8 (non-cash payments for goods and services- barter) and 10 (preference shares redeemable in three

months for a fixed amount of cash), with these cases representing somewhat more complex assets dealt with in financial accounting courses.

Also of interest is the distinctive linear relationship of the mean scores for the subject groups in seven of the ten cases (cases 1, 2, 3, 5, 6, 7, and 8), with each showing a gradual shift (in the same direction) as the level of perceived accounting knowledge decreased (from the accountant group through to the engineering students without any prior accounting knowledge). The trend is only inconsistent in the remaining four cases to the extent that one of the four subject groups does not follow the linear relationship. In all such cases, the difference between the mean score of that specific subject group and that of the next subject group in the linear relationship is not significantly different.

A significant difference occurred between the accountant group and the engineering students with accounting knowledge in six of the ten cases, while a significant difference occurred between the accountant group and engineering students with no accounting knowledge in five of the ten cases. In one of the cases with no significant difference between the accountant and engineering students (case item 6), a change in decision outcome was noted between these two groups (from “not” an item of cash for the accountant students, to “is” an item of cash for the engineering student groups).

In summary, the evidence presented in the paper points to the general suitability of accounting students as surrogates for experienced accountants, at least with respect to the types of tasks that students were presented with in this study.

The study’s research question 1 asks whether advanced level accounting students make similar accounting classification judgements to practitioners. This research question is generally supported, given that there were no significant differences in responses for the accounting practitioners and the accounting students for eight of the ten cases.

Research question 2 asks whether the level of accounting knowledge gained at an undergraduate level impacts on the accounting classification judgements of student subjects. This research question is again generally supported. There were seven of the ten cases for which there was more than one homogeneous subset in responses. Only for three cases (1, 3 and 9) was there no significant difference between all four groups. For four of the seven cases for which significant differences arose, the accounting student responses were significantly different to those of the engineering students who had completed accounting studies. In all four cases (cases 4, 5, 6 and 8), the accounting student responses were closer to the accountants than were the responses of the engineering students who had completed accounting studies. In two of the other three cases (cases 2 and 10), the responses of the accounting students were not significantly different from those of the accountants, while those of the engineering students who had studied accounting were. Again, this points to the responses of the accounting students being closer to those of the accountants than were those of the engineering student group. Only for one case (case 7) were the mean responses of both the accounting and engineering student groups not significantly different to each other but significantly different to the accountants.

7. Conclusion

Using an experimental task consisting of 10 cases and four subject groups, this study sought to further our understanding of the circumstances in which it is appropriate to use surrogates in accounting behavioural research. The results confirmed that advanced level accounting students may be suitable as surrogates for accounting practitioners in relatively structured decision contexts. Further, the inclusion of engineering students with no accounting knowledge as the control group permitted the conclusion that accounting students, and not simply students in general, were acceptable surrogates for accounting practitioners due to similarities in their level of general domain knowledge.

In interpreting and generalising the study's findings the nature of the research design and the subjects must be considered. As an experiment, the study is subject to well documented limitations associated with experimental studies (Kerlinger and Lee, 2000). Further, no attempt was made to measure and analyse the effect of each subject's familiarity and/or experience with the experimental task. Similarly, the study did not measure individual differences between subjects, such as various personality traits that may have influenced the relationships of interest in the study. Last, as the study was administered over the Internet, full experimental control was not possible.

Future studies may look to extend the generalisability of the study's findings by, for example, varying the nature of the experimental task, considering the impact of potentially relevant psychosocial variables, and conducting a controlled experiment in the presence of the researcher. In common with other decisions, the judgment task in this study consisted of intelligence, design, and choice phases (Simon, 1977). In practice, each of these phases may vary in their degree of structure. Whether all or some of these phases need to be structured in order to replicate the findings of the current study is an empirical question and open to future research.

The study's results have important implications for the development of particular areas of accounting research. For example, Liyanarachchi (2007, p. 60) notes "…that an ability to make judgements consistent with professional standards is an important quality of [accounting] decisions" and that our knowledge of the impact of incentives on accounting judgements involving the interpretation and application of professional accounting standards "…can be advanced rapidly by conducting student-based experiments". The findings of this study support the use of accounting students to this end.

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Appendix A – Extract of research instrument

Accounting Concept: "CASH" – As it relates to the cash flow statement

Definition provided in NZ IAS 7

"Cash comprises cash on hand and demand deposits"

"Cash equivalents are short-term, highly liquid investments that are readily convertible to know amounts of cash and which are subject to an insignificant risk of change in value." (Para 6)

Based on the above definition, please indicate the DEGREE to which you believe the following items represent an item of "CASH", as it relates to the cash flow statement.

		Clearly an item of cash					**Clearly NOT an item of cash**
		1	**2**	**3**	**4**	**5**	**6**
1.	Coins and notes on deposit	○	○	○	○	○	○
2.	Accounts receivable	○	○	○	○	○	○
3.	A four month treasury bill	○	○	○	○	○	○
4.	Reserve Bank bill	○	○	○	○	○	○
5.	Gold bullion	○	○	○	○	○	○
6.	Readily tradable equity securities	○	○	○	○	○	○
7.	A three month futures contract	○	○	○	○	○	○
8.	Non-cash payments for goods and service (Barter)	○	○	○	○	○	○
9.	On-call bank overdraft	○	○	○	○	○	○
10.	Preference shares redeemable in three months for a fixed amount of cash	○	○	○	○	○	○

Table I Results of one-way ANOVA and post hoc analysis

	Accountants N=86 (Group = 1)		Accounting students N=58 (Groups = 2)		Engineering students - some accounting knowledge N=78 (Group = 3)		Engineering students - no accounting knowledge N=60 (Group = 4)		ANOVA			
Case	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean square	*F*	*P*	Scheffé's pairwise group comparisons [a]
1. Coins and notes on deposit	1.00	0	1.02	0.13	1.06	0.29	1.17	0.91	0.37	1.82	0.15	-
2. Accounts receivable	4.55	1.33	3.88	1.83	3.35	1.63	3.23	1.66	27.87	10.98	0.00	1<3**, 1<4**
3.A four month treasury bill	4.69	1.32	4.57	1.61	4.31	1.42	4.10	1.59	4.82	2.23	0.09	-
4. Reserve Bank bill	2.35	1.22	2.12	1.55	2.92	1.67	2.87	1.76	10.31	4.35	0.01	2<3*
5. Gold bullion	4.79	1.32	4.33	1.56	3.06	1.72	3.08	1.74	57.59	23.13	0.00	1>3**, 1>4**, 2>3**, 2>4**
6. Readily tradable equity	4.93	1.3	4.05	1.2	3.14	1.3	3.05	1.4	60.1	33.9	0.0	1>2**, 1>3**, 1>4**,

securities				1		3		9	0	1	0	2>3**, 2>4**
7. A three month futures contract	5.52	0.98	4.93	1.28	4.69	1.22	4.47	1.36	15.83	11.03	0.00	1>2*, 1>3**, 1>4**
8. Non-cash payments for goods and service (barter)	5.51	0.93	5.53	0.99	4.40	1.6	4.30	1.67	32.04	18.13	0.00	1>3**, 1>4**, 2>3**, 2>4**
9. On-call bank overdraft	3.27	1.97	2.50	1.37	2.77	1.56	2.90	1.75	7.40	2.55	0.06	-
10. Preference shares redeemable in three months for a fixed amount of cash	4.51	1.34	3.97	1.14	3.64	1.37	3.72	1.56	12.47	6.73	0.00	1>3**, 1>4**

[a] Only differences significant at $p<0.05$ are shown.

**,* indicate significance at the 0.01 and 0.05 levels, respectively.

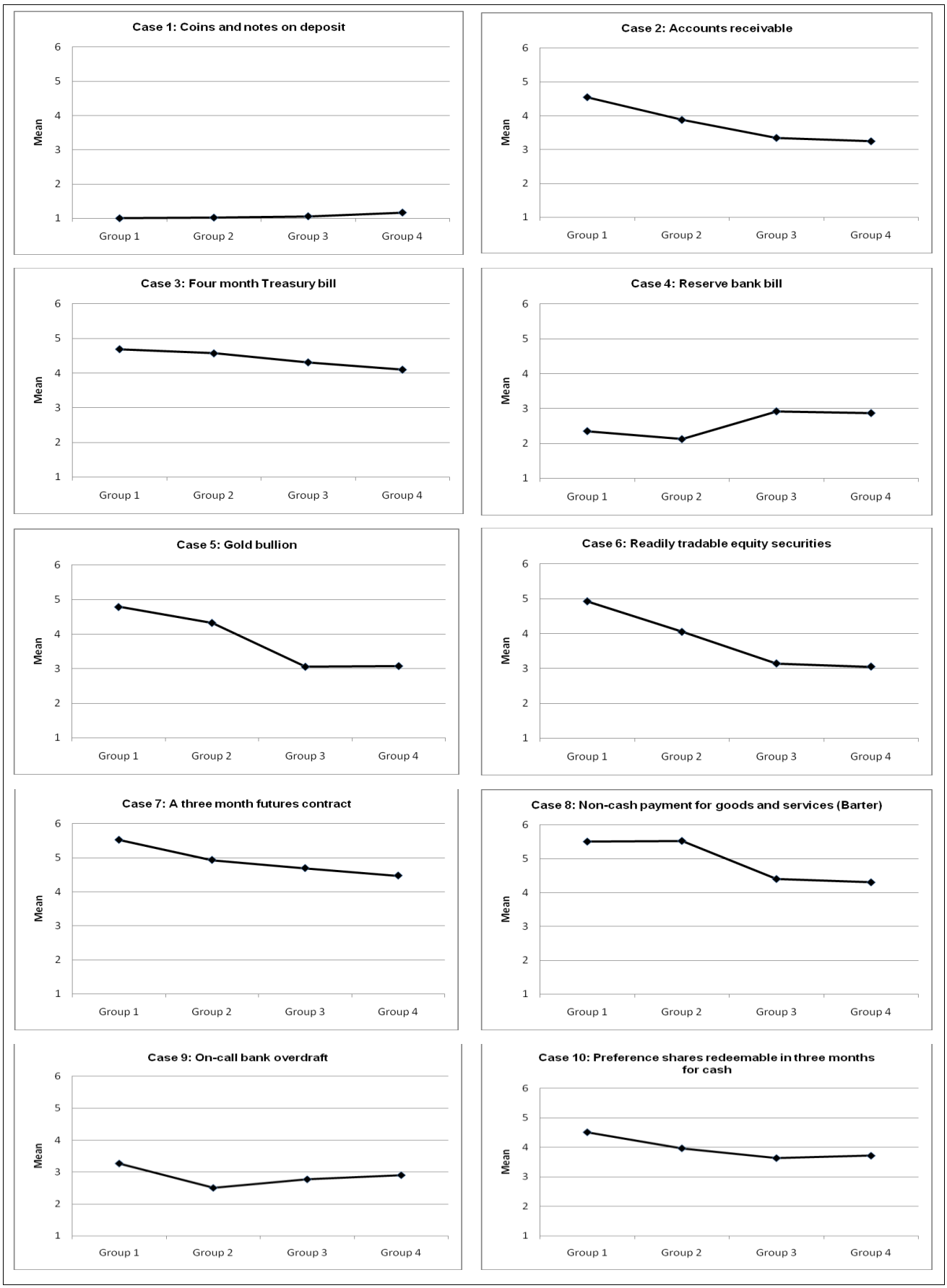
Table II Means for groups in homogenous subsets with Scheffé's post hoc tests[a]

Case	Subject Group[b]	Subset 1	Subset 2	Subset 3
1. Coins and notes on deposit	Group 1	1.00		
	Group 2	1.02		
	Group 3	1.06		
	Group 4	1.17		
	Significance	*0.20*		
2. Accounts receivable	Group 1	4.55		
	Group 2	3.88	3.88	
	Group 3		3.35	
	Group 4		3.25	
	Significance	*0.11*	*0.13*	
3.A four month treasury bill	Group 1	4.69		
	Group 2	4.57		
	Group 3	4.31		
	Group 4	4.10		
	Significance	*0.15*		
4. Reserve Bank bill	Group 1	2.35	2.35	
	Group 2	2.12		
	Group 3		2.92	
	Group 4		2.87	
	Significance	*0.860*	*0.19*	
5. Gold bullion	Group 1	4.79		
	Group 2	4.33		
	Group 3		3.06	
	Group 4		3.08	
	Significance	*0.40*	*1.00*	
6. Readily tradable equity securities	Group 1	4.93		
	Group 2		4.05	
	Group 3			3.14
	Group 4			3.05
	Significance	*1.00*	*1.00*	*1.00*
7. A three month futures contract	Group 1	5.52		

	Group 2		4.93
	Group 3		4.69
	Group 4		4.47
	Significance	*1.00*	*0.16*
8. Non-cash payments for goods and service (barter)	Group 1	5.51	
	Group 2	5.53	
	Group 3		4.40
	Group 4		4.30
	Significance	*1.00*	*0.98*
9. On-call bank overdraft	Group 1	3.27	
	Group 2	2.50	
	Group 3	2.77	
	Group 4	2.90	
	Significance	*0.08*	
10. Preference shares redeemable in three months for a fixed amount of cash	Group 1	4.51	
	Group 2	3.97	3.97
	Group 3		3.64
	Group 4		3.72
	Significance	*0.14*	*0.28*

[a] Significance level = 0.05.
[b] Group 1 = Accountants, Group 2 = Accounting students, Group 3 = Engineering students (some accounting knowledge), and Group 4 = Engineering students (no accounting knowledge).

Table III Mean classification judgements across groups[a]



[a] Group 1 = Accountants, Group 2 = Accounting students, Group 3 = Engineering students (some accounting knowledge), and Group 4 = Engineering students (no accounting knowledge).