

An Automated Assessment Marking Approach: Using Excel to Grade an Accounting Practice Assignment

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Abstract

The purpose of this paper is to present an automated approach for the marking and grading of the commonly used accounting practice assignment for first year financial accounting. The automated system has potential benefits for the reduction in time and cost to the running of the course as well as providing students with an objective standardised marking as well as timely feedback.

Key words: *Educational triage; blended learning, learning styles.*

JEL Classification: I21

PsycINFO Classification: 3530

FoR Code: 1302; 1501

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Introduction

The initial concept of using the internet (the web) to support educational processes had very humble beginnings. The very early use of the internet was arguably nothing more than providing basic resources for students, such as tutorial solutions, lecture notes, class timetables, and even enrolment capability (Harasim, 2000; Allen & Seaman, 2010). The advent of specialised software - learning management systems (LMS), such as WebCT, Blackboard, and Moodle, lead to the development of far greater uses of online learning management systems (Cheung, 2007; Subramanian, Zainuddin, Alatawi, Javabdeh & Hussin, 2014). These Web-based Education systems now more commonly referred to as Learning Management Systems (LMS), provide for the management of learning contents as well as administrative support. These learning management systems are now part of the higher education system with thousands of higher educational institutions having implemented them as a major part of the teaching process not just support (Subramanian, Zainuddin, Alatawi, Javabdeh & Hussin, 2014).

In response to the outbreak of the COVID 19 Pandemic the Higher education system was for the most part in a state of preparedness to continue offering the education to students all be it in a fully online manner. With all the benefits assumed to be accruing from the provision of online education – the Universities, at least within the Australian sector, have closed, so called satellite campuses, reduced staff numbers by way of voluntary redundancies, early retirement, and non-renewal of contracts. One could be excused for wondering why with all these reductions in costs the student fees have not been reduced especially since a majority of students were adversely affected by the loss of income due to the COVID 19 regulations. Perhaps an explanation may be found in the view that Higher education is nothing more than a commodity (Laing & Laing, 2016) and accordingly commodity prices are likely influenced by supply and demand or economic events.

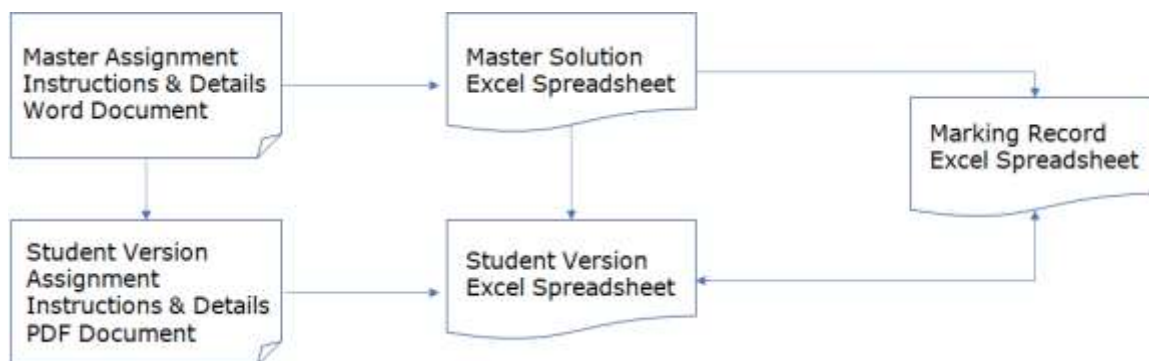
Regardless of the perceived benefits of online education a concern that has plagued the Universities is the credibility of online assessment and the need to monitor learning outcomes whilst maintaining a level of conformity, at least with regards to standards of assessment (Baleni, 2015; Fedynich, 2013). Of course, the focus as usual has been on maintaining the online initiative and the continued use of technology with the added incentive to achieve – minimum turnaround time in marking, provision of specific feedback, then providing the links to the learning outcomes usually in the form of a Rubric and a standardise (objective) application of marking.

The Accounting Practice Assignment

The notion of employing an Excel spreadsheet as a way to conduct an accounting practice assignment for a first year financial accounting course was presented by Kirkham (2013). Whilst the spreadsheet proved to be a useful learning tool the feedback from students identified a problem with the marking and allocation of grades. In effect, differences existed in the allocation of marks between staff – and for an assignment that for all intents and purposes should produce a standard outcome this was an issue that required fixing. There appeared to be an unacceptable level of variation that pointed to subjective assessment rather than objective assessment being undertaken. The constraints were large and the pressure intense to find a way to overcome this subjective nature of marking where objectivity was an expected presumption. There had to be; a reduction in time taken to complete the marking; a standardised objective allocation of marking and grading; and of course the approach had to conform to university policy of providing students with appropriate feedback – and as an aside a reduction in allocation of funds for staff marking. All very commendable requirements.

The decision was to maintain the existing approach of providing students with the details of the Accounting Practice requirements – that is a pdf file that detailed the requirements and the transactions that needed to be done – and secondly, a pre-established Excel spreadsheet with all the necessary accounts, journals and ledgers as well as formatted financial reports (Income Statement, Balance Sheet, Cash Flow Statement etc). This is consistent with the approach detailed by Kirkham (2013). However, the difference is that there will now be four files involved – first the Accounting Practice requirements word document master which would be used to create the pdf file for the students an excel spreadsheet – second an excel spreadsheet in which all the transactions had been posted and the practice completed to assure the amounts – third an excel spreadsheet which has no transactions (the student version) [note experience has shown that it is best to have the opening balances in the Ledgers to avoid complications and thus providing a Trial Balance which is consistent with the major assignment details] – fourth a marking spreadsheet that would contain the software to conduct the marking and to record the marks for each student. A general overview is presented in Figure 1.

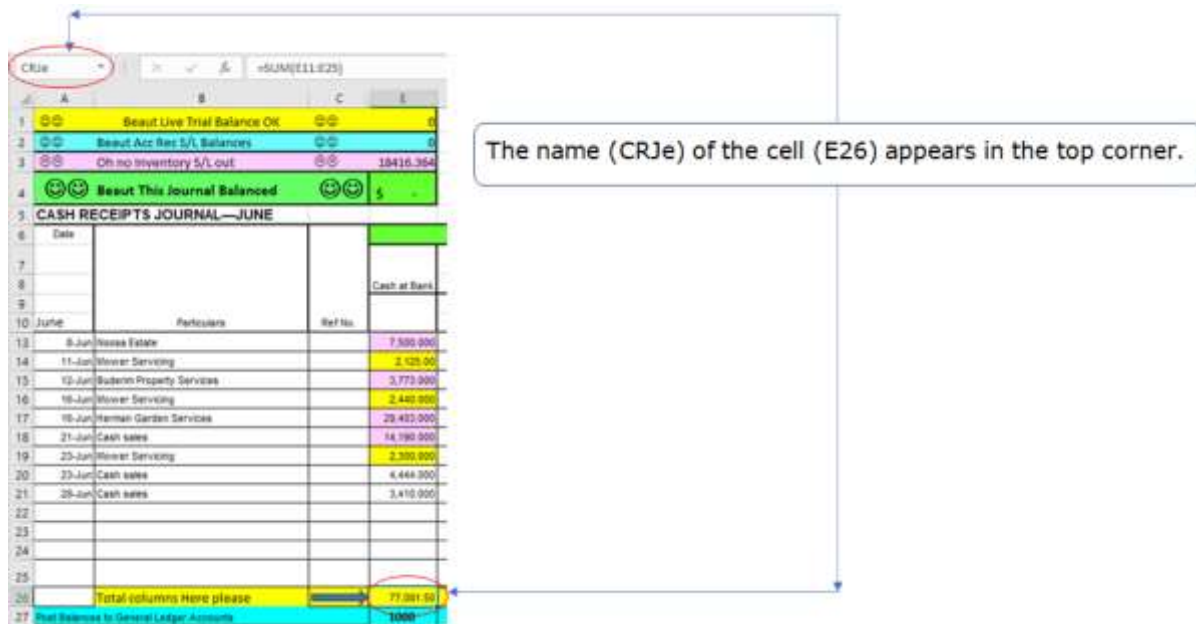
Figure 1:
Overview of Required Files



To that end a number of additional modifications were made to the student version of the Excel Spreadsheet – specifically, the first was a worksheet requiring the surname, first name, and student ID number [identified as Home] , second was a blank worksheet which was identified as "Marks" which would be the place where the allocation of the marks would be placed, and then the most important modification was the naming of specific cells that would be used for the checking and allocation of marks. This last addition was necessary for the proposed software that was being developed to conduct the marking process.

For the marking process to work it was necessary to give the specific cells a name that could be used by the marking software to find and match the values to the correct values in order to allocate a mark. Key values throughout the spreadsheet were assigned with specific names and then those names along with the correct values were recorded in the marking spreadsheet. For example, in the Cash Receipts Journal an especially important value is the Total value of the Cash at Bank Column subsequently the cell where this value is to be found is therefore given a specific name – the example is provided in Figure 2.

Figure 2:
Example of Using a Cell Name



The Financial Accounting Practice major assignment in effect comprised:

- Assignment Instructions and Details:
 - Instructions explained what students were required to do to complete the spreadsheet and submit it on the LMS
 - Details encompassed a list of daily transactions for the specific month.
- The student version excel spreadsheet contained the following worksheets:
 - Home – which is where the student is required to enter his/her first name; family name; and Student Identification Number.
 - Marks – this page is blank and reserved for the inclusion of a marking summary and rubric (see Appendix A).
 - Chart – this is the chart of accounts and includes the opening balances for the various accounts (*this can be in the form of a Trial Balance with Debits and Credits in separate columns or can be just one column with amounts not showing Dr or Cr*).
 - General Journal – this is the established general journal format and as explained in the instructions to students is not to be used where a special journal is available.
 - Cash Receipts Journal – this is for recording cash only (including cheques, credit card or direct transfers) received by the business.
 - Cash Payments Journal – this is used for recording cash only (including cheques, credit card or direct transfers) being paid by the business.
 - Sales Journal – used to record the sale of inventory only on credit only – a Sales Returns and Allowances Journal is also included on this worksheet.
 - Purchases Journal – used to record the purchase of inventory only on credit only – a Purchases Returns and Allowances Journal is also included on this worksheet.

- General Ledger – this contains the Ledger accounts for Assets; Liabilities; Equity; Revenue; and Expenses.
- Subsidiary Ledgers – on the one worksheet the following subsidiary ledgers are Accounts Receivable and Accounts Payable.
- Subsidiary Ledger Inventory – this worksheet provides the account format for inventory items using a 12 column format.
- Bank Statement – this worksheet contains the bank statement which is also in the student pdf details with a formatted bank reconciliation which students have to complete at the end of the month.
- Cash Flows – this is a very basic cash flow record which should assist students in checking that the cash flows have been recorded properly.
- Live Trial Balance – this should reflect the values of the General Ledger Account balances at all times (note this means that when the end of month processing has been done the Revenue and Expense accounts should all be blank (zero amounts)).
- Unadjusted Trial Balance – this is to allow the students to copy and paste the values from the Live Trial Balance before they conduct the end of month adjustments (very useful for checking purposes).
- Adjusted Trial Balance – this is to allow students to capture the values after the adjustments have been done but before they close revenue and expense accounts required for the end of month process.
- Financial Reports – this worksheet contains standardised formats for the Income Statement; Equity Statement; and Balance Sheet.
- W Sheet – this is the 10 column worksheet that is used to check the required adjustment entries and their effect on the account balances – the required closing entries and their effect on the account balances – the Income Statement values (Profit or Loss); and the Balance Sheet values.
- Wages – this is a form of subsidiary ledger used to calculate the wages figures for each member of staff and the contributions, deductions and tax (this provides a means to check the correctness of wage payments – which if students are keen should be consistent with the bank statement).
- Depreciation – this worksheet contains effectively a card for each of the non-current assets and blank cards for any that may have been purchased during the month.
- Depreciation Calculator – this worksheet provides a set of formulas for 4 commonly used methods of depreciations (straight line; units of production; reducing balance; and sum-of-years-digits. This gives students a helping hand in the depreciation calculations to be done for the various non-current asset items.
- Review – this is where students have to calculate and provide the specified financial ratios then answer questions about the ratios in relation to the operations of the business and the meaning behind the relevant ratios.

With so many worksheets and so many components it is easy to see that the manual marking of the assignment spreadsheet will take some considerable time. In fact, staff were allotted a mere 15 minutes per assignment with an additional 5 minutes to upload and download the spreadsheet from the LMS and record the marks in a master file.

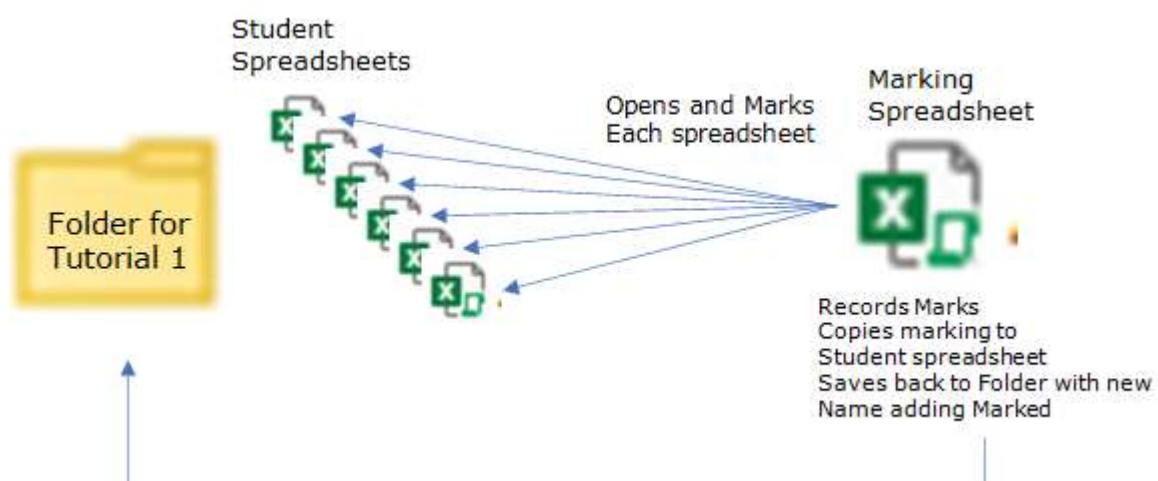
The automated marking system still required the assignment spreadsheets to be uploaded and downloaded however, this was done using the LMS which allowed the spreadsheets to be done in tutorial groups as one action and saved in a file for each tutorial group. This was done by one person not every tutor – thus reducing time and instead of taking 2 or 3 weeks to have the marking done and uploaded in the LMS for students to access it could be completed in 1 week.

The marking of the spreadsheet involved the following:

- Using the LMS assignments by tutorial group were downloaded into a folder for marking;
- Using the Marking spreadsheet the marking of all spreadsheets in a specific tutorial folder were then completed – for each student’s assignment this involved:
 - The automated marking software is directed to a folder containing the spreadsheets to be marked (eg Tutorial 1);
 - It then opens and reads the values in each of the key cells comparing them against the correct values (see Appendix B);
 - It records a mark for each cell (either 1 or 0) in a special marking worksheet;
 - It places the names and ID number for that student in the marking worksheet;
 - It then calculates the totals relative to the marking rubric quadrants in the marking worksheet;
 - It then copies this and pastes it to the marking worksheet in the student’s spreadsheet;
 - It records the marks for that student in the master worksheet of the marking spreadsheet;
 - It then renames the student spreadsheet with the extra word marked and saves it in the tutorial folder;
 - It then repeats this action until it has completed marking every spreadsheet in that folder.

This process is repeated for each and every tutorial group and once the particular tutorial is completed the marked spreadsheets are uploaded to the student files on the LMS using the LMS system. So instead of taking 20 minutes to mark and record one individual assignment an entire tutorial group comprising on average 22 student assignments can be marked and recorded. Refer to Figure 3 for a general overview.

Figure 3:
Marking Process General Overview



The Review worksheet asked for the calculation of 8 financial ratios and that was followed by 5 multiple choice questions that were provided in the pdf Assignment document. These questions were concerned with the interpretation of the ratios; the relevance to the operational performance and efficiency of the business – what action would be appropriate to rectify any problems identified; and also asked for any additional ratios that might be beneficial. To strengthen the validity of the use of multiple choice questions there were seven choices to each with answers that required an explicit and in depth knowledge of the topic. The benefit and justification for using seven is addressed from a psychological aspect in the research by Miller (1956). The students were simply required to insert their answers in the spaces provided in the worksheet to allow the marking system to complete the marking process (refer Appendix C).

Concluding Remarks

Upon reflection the use of the automated marking system addressed a number of complaints that had been enshrined in the manual marking – in particular:

- *Delays in marks and feedback being given to students* – instead of taking two or more weeks the marks and the feedback was available to students on the LMS within 5 days;
- *Inconsistent marking by different staff (lack of consistency and general subjectivity)* – the automated marking was consistent and based on an objective predetermined marking allocation. Students had very clear evidence of what and how the marks were allocated.

These were the two main points of complaints in the past and the automated system addressed these and took away the time wasting that had occurred in previous years dealing with student complaints. There were still some complaints however they were found to be due to students who had not followed instructions or had been penalised for late submission.

In terms of the impact on the course itself the added benefit was the reduction in time and subsequently cost associated with marking and dealing with complaints. Where it had taken an average of 20 minutes to mark and upload the mark and feedback for each individual student onto the LMS it now took on average 15 minutes to process an entire tutorial group of 20 students without the requirement for any staff member other than the co-ordinator to be involved. Taken to its logical conclusion that means that for a cohort of 300 students the savings on marking would be $300 \times 20 = 6,000$ minutes or a total of 100 hours marking for which the pay rate would have been \$35 per hour which is a saving of approximately \$3,500.00 not a large amount but in these times of cost cutting it is a contributing factor.

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APPENDIX A

Marking Rubric

Major Assignment - Rubric					
Issue / Criteria	Excellent	Very Good	Good	Satisfactory	Less than Satisfactory
Journal Transactions 40% (A), (B) & (C) Mark:	Exemplary work! Demonstrated highly astute knowledge with comprehensive level of application & understanding.	Demonstrated comprehensive level of application and understanding.	Demonstrated understanding & ability to apply knowledge.	Mostly Correct. Demonstrated minimum/ limited understanding and knowledge.	Not correct. Mostly wrong. Understanding & knowledge not demonstrated.
Subsidiary Ledgers & Internal Reports 14% (A), (B) & (C) Mark:	Exemplary work! Demonstrated highly astute knowledge with comprehensive level of application & understanding.	Demonstrated comprehensive level of application and understanding.	Demonstrated understanding & ability to apply knowledge.	Mostly Correct. Demonstrated minimum/ limited understanding and knowledge.	Not correct. Mostly wrong. Understanding & knowledge not demonstrated.
Financial Reports & Non-accounting Reports 26% (A), (B) & (C) Mark:	Exemplary work! Demonstrated highly astute knowledge with comprehensive level of application & understanding.	Demonstrated comprehensive level of application and understanding.	Demonstrated understanding & ability to apply knowledge.	Mostly Correct. Demonstrated minimum/ limited understanding and knowledge.	Not correct. Mostly wrong. Understanding & knowledge not demonstrated.
Knowledge + Critical Thinking + General Comprehension (combined component) 20% (A), (B) & (C) Mark:	Demonstrated and astutely applied comprehensive knowledge of topic. A compelling result.	Demonstrated and applied comprehensive knowledge of topic. A convincing result.	Demonstrated and applied knowledge of topic. A pertinent valid result.	Demonstrated and partially applied knowledge of topic. A mostly valid result.	Lacked evidence of understanding & knowledge. Poor result.

(A) Creative and Critical Thinking

A way of thinking that generates new and innovative ideas. You develop the *ability to reason logically, to analyse, to deconstruct, synthesise and evaluate data, evidence and arguments* and potentially create new objects

(B) Empowered

Assessment linked to empowered gives you the opportunity to apply theory to practice; to consider authentic contexts and develop and *demonstrate cognitive and technical skills, attitudes and abilities directly related to your field of study.*

(C) Knowledgable

The knowledgable quality *demonstrates core theoretical, content and practical elements in a discipline.* While advanced knowledgable demonstrates an understanding of the value of multidisciplinary knowledge.

APPENDIX B

Marking Worksheet

Button used to start the Visual Basic code for the Marking process

	A	B	C	D	E
1			SN	Last Name	Sassa
2	Import Data		FN	First Name	George
3			ID	Student ID	12345678
4	Total Mark /35			18.55	Total Mark /35
5	PART (A):			Mark	
6	JOURNALS	Cell Ref	Values	Allocation	
7	General Journal: Adjusting Entries				
8	Supplies Expenses DR \$620.00	GJAEa	620	1	1
9	Wages Expenses DR \$9,724.16	GJAEb	9,724.16	1	1
10	Insurance Expenses DR \$3,500.00	GJAEc	3,500.00	1	1
11	Rent Expense DR \$1,000.00	GJAEd	1,000.00	1	1
12	Advertising Expense DR \$5,000.00	GJAEe	5,000.00	1	1
13	Bad Debts Expense DR \$349.66	GJAEf	349.66	1	1
14	General Journal: Closing Entries				
15	Close Revenue Accounts CR \$954,261.93	GJCEa	954,261.93	2	2
16	Close Expense Accounts DR \$925,531.66	GJCEb	925,531.66	2	0
17	Close P&L Summary DR \$28,730.27	GJCEc	28,730.27	2	0
18	Close Drawings DR \$93,100.00	GJCEd	93,100.00	2	2
19					
20	Cash Receipts Journal: Totals				
21	Cash at bank \$112,645.43	CRJe	112,645.43	1	1
22	Disc Exp GST \$63.80	CrJi	63.8	1	1
23	Disc Expense Net \$638.00	CRJj	638	1	1
24	Accounts Receivable \$77,680.00	CRJk	77,680.00	1	1
25	Inventory \$19,852.44	CRJl	19,852.44	1	0
26	Cash Sales - Revenue \$24,530.00	CRJm	24,530.00	1	1
27	Service Revenue \$7,894.75	CRJn	7,894.75	1	1
28	Parts \$2,400.00	CRJo	2,400.00	1	1
29	Service Labour \$4,465.00	CRJp	4,465.00	1	1
30					
31	Cash Payments Journal: Totals				
32	Cash at bank \$134,981.80	CPJf	134,981.80	1	1
33	Disc Revenue GST \$27.12	CPJg	27.12	1	1
34	Disc Revenue Net \$271.18	CPJh	271.18	1	1
35	Acc Payable \$49,430.00	CPJp	49,430.00	1	1

Marking Worksheet - continued

36	Advertising	\$10,000.00	CPJq	10,000.00	1	1
37	Wage Exp	\$24,310.40	CPJr	24,310.40	1	1
38	Service Costs	\$200.00	CPJt	200	1	1
39	GST Paid	\$5,324.86	CPJy	5,324.86	1	0
40						
41	Purchases Journal:					
42	Parts	\$2,400.00	PJf	2,400.00	1	1
43	Inventory	\$53,240.00	PJg	53,240.00	1	1
44	GST Paid	\$5,564.00	PJh	5,564.00	1	1
45	Acc Payable	\$61,204.00	PJi	61,204.00	1	1
46	Sales Journal:					
47	Sales Revenue	\$70,560.00	SJf	70,560.00	1	1
48	GST Collected	\$7,056.00	SJi	7,056.00	1	1
49	Acc Receivable	\$77,616.00	SJj	77,616.00	1	1
50	Inventory	\$56,860.67	SJk	56,860.67	1	0
51	COGS	\$56,860.67	SJl	56,860.67	1	0
52						
53	Subsidiary Ledgers:					
54	Accounts Payable correct	\$56,804.00	APTtotal	56,804.00	2	2
55	Accounts Receivable correct	\$54,546.00	ARTotal	54,546.00	2	2
56	Inventory correct	\$31,486.89	INVTot	31,486.89	2	0
57	Total Wages Exp - L. Datar	\$9,826.88	WageLDTOT	9,826.88	2	2
58						
59	Internal Reports					
60	Unadj Trial Balance Totals	\$1,570,898.17	UnAdjTBDR	1,570,898.17	1	0
61			UnAdjTBCR	1,570,898.17	1	1
62	Adj Trial Balance Totals	\$1,604,674.68	AdjTBDR	1,604,674.68	1	0
63			AdjTBCR	1,604,674.68	1	1
64	Live Trial Balance Totals	DR Equals CR	LiveTBDR	LiveTBCR	2	2
65						
66	Financial Reports					
67	Income Statement:					
68	Total Sales Revenue - Net	\$951,761.93	ISTSRNet	951,761.93	2	2
69	Gross Profit	\$370,463.82	ISGP	370,463.82	2	0
70	Total Expenses	\$341,733.55	ISTotExp	341,733.55	2	0
71	Net Profit	\$28,730.27	ISNP	28,730.27	2	0
72	Balance Sheet:					
73	Total Current Assets	\$437,905.36	BSTotCA	437,905.36	1	0
74	Total Non-Current Assets	\$53,551.46	BSTotNCA	53,551.46	1	1
75	Total Current Liabilities	\$114,010.40	BSTotCL	114,010.40	1	1
76	Net Assets	\$377,446.42	BSNetAssets	377,446.42	1	0
77	Total Shareholders' Equity	\$377,446.42	BSTotSE	377,446.42	1	0
78	Cash Flow Statement:					
79	Net Cash Flow from Operations	(\$11,736.37)	CFSTotOp	-11,736.37	1	0
80	Net Cash Flow from Financing	(\$10,600.00)	CFSTotFin	-10,600.00	1	0
81	Cash Balance 2016	\$283,504.39	CFSTotBal	283,504.39	1	1
82	Non-Accounting Reports					
83	Bank Reconciliation - O/S Dep	\$3,410.00	BROSDep	3,410.00	3	3
84	Bank Reconciliation - U/P Chq	\$1,413.50	BRUPChq	1,413.50	3	3
85	10 Column Worksheet	correct Balances	WSBalancesDR	WSBalancesCR	4	0

APPENDIX C***Review Worksheet Requirements***

	A	B	C
1	Ratios	Answer	
2	Gross Profit Margin		1
3	Net Profit Margin		1
4	Debt to Equity Ratio		1
5	Current Ratio		1
6	Quick Ratio		1
7	Debt to Equity Ratio		1
8	Accounts Receivable Collection		1
9	Inventory Turnover Ratio		1
10			8
11			
12	Multiple Choice Questions	Answer	
13	MCQ 1		2
14	MCQ 2		2
15	MCQ 3		2
16	MCQ 4		2
17	MCQ 5		2
18	MCQ 6		2
19			12

APPENDIX D

Student Worksheet Instructions

The Major Assignment is to be completed using the spreadsheet provided on the LMS under the heading Major Assignment.

- First download the spreadsheet from the LMS and save it to your own folder – change the name of the file to you surname and student ID
 - for example Paradim 12345678
- Do not change the spreadsheet by that I mean
 - do not add lines (you have been given sufficient lines to complete the various journals and ledgers;
 - do delete lines;
 - do not change any cell names.
- Complete the worksheet “Home” by filling in your surname; first name; and student ID number in the spaces provided.
- Do not delete or move the worksheet “Marks” this will be used to provide you with the feedback in terms of your marks as they have been allocated to your work, a rubric will also be added to this area upon completion of the marking.
- Once you have completed the required work save your spreadsheet (make sure it has your name and student ID) and the upload it to the LMS.

Accounting Requirements - FOR JUNE

1. Record all the necessary entries in the relevant journals and ledgers, excluding balance day adjustments, to maintain proper accounting records for June. Please note that you may need to create new accounts using subsequent account numbers where necessary. Complete a bank reconciliation at the end of the month.
2. Prepare an Unadjusted Trial Balance on the worksheet provided.
3. Record all the necessary balance day adjustments for June in the General Journal and post to the General Ledger accounts.
4. Prepare an Adjusted Trial Balance on the Worksheet provided and complete the worksheet.
5. Record all closing entries in the General Journal, however, **do not** post them to the relevant general ledger accounts until you have checked that the balances are all correct.
6. Prepare the Income Statement (using the *Functional* format) for the month ending 30 June 2013.
7. Prepare the Statement of Changes in Equity for the month ending 30 June 2013.
8. Prepare the classified Balance Sheet as at 30 June 2013.
9. Complete the ratios and justify their relevance to the operations of the business as a form of analysis – ratios and multiple choice questions provided.