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SIMPLIFIED METHOD FOR TEACHING CASH FLOW STATEMENT CONSTRUCTION TO ENTREPRENEURSHIP AND NON-ACCOUNTING MAJORS

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ABSTRACT

It is a common mantra of entrepreneurs that cash is king, and educators in entrepreneurship have stressed the need to make the understanding of cash flows a central theme early in a student's education (Leauby and Wentzel, 2012; Pearl, 1986; Wouters, 2008). However, the ability to teach entrepreneurship students how to develop a statement of cash flows is viewed by many as a difficult task for educators. Many students struggle to understand the indirect method of modeling cash flows (Vent and Cocco, 1996) because the method of constructing the cash flow statement is not intuitive (Hodder, Hopkins, and Wood, 2008). Drawing upon cognitive load theory, I discuss the need to have a significantly simpler method to introduce the cash flow statement to entrepreneurship and other non-accounting majors in a format that enables students to more easily understand the impact of cash and non-cash transactions. I then present a method by which students with limited accounting acumen construct a simple cash flow statement using basic spreadsheet skills.

I. INTRODUCTION

The ability to effectively monitor the flow of cash in and out of the business is a critical skill, yet formal training in such practices is often inadequate in introductory accounting classes (Leauby and Wentzel, 2012). Traditionally, instruction in cash flow statements is reserved until later in a business student's financial training. Often times it is taught (if at all) near the end of an introductory accounting class or not until they take more advanced accounting classes (Donelan, 1993; Pearl, 1986). This is likely due to the perception that students first need an in-depth understanding of accounting basics such as debits and credits, t-accounts and ledger entries that will enable them to identify and categorize transactions that have an effect on the cash position of a company. While accounting students will certainly be exposed to a fairly thorough methodology of cash flow statement construction at some point in their curriculum, other business students who take only one or two classes in accounting

may not develop an adequate understanding of the cash flow statement or the ability to construct it.

This poses a special problem for students of entrepreneurship, whose minimal exposure to accounting methods during their course of study is inadequate to prepare them to master cash management practices critical to early-stage start-up success. Moreover, it is quite common for students to take courses in entrepreneurship before having taken accounting. For example, I examined the course catalog of 20 business schools that are members of the Mountain Plains Management Conference and found that 17 out of 20 schools offered one or more entrepreneurship / small business courses with no accounting pre-requisite.¹ In addition to entrepreneurial classes taught at the undergraduate level, many organizations offer basic business training that requires students to work with financials with minimal if any training in accounting. For example, startup accelerators, university extension programs, and classes offered by local Chambers of Commerce and Small Business Development Centers (SBDCs) offer cash management training to non-accounting subjects.

To address this, numerous efforts have been made to facilitate the novice student's ability to understand and construct a cash flow statement. Student aids such as flow charts, diagrams, t-accounts and creative rubrics have been put forward (Davis, 1983; Senatra, 1983). While these techniques succeed to some extent by developing a deeper understanding of cash flow principles, they still present an additional hurdle of memorization, impracticality, or complexity to students at the introductory level (Collins, 1985). Moreover, these techniques fail to take advantage of the most basic tools offered by computer-based spreadsheets that entrepreneurs commonly used to develop financial pro formas for new ventures.

The method I propose for teaching cash flow statement construction to entrepreneurship and other non-accounting majors addresses these issues by reducing the complexity of the task using basic spreadsheet techniques. This method simplifies the process, reduces the error rate, and allows even novice students to accurately predict cash flow and better understand how the cash flow statement connects to the income statement and balance sheet. Although the method provides only an introductory and elementary understanding of cash flow statement construction, its ease of use encourages an earlier presentation in the classroom and supports the efforts by educators to provide a balance between users and preparers of financial accounting information (Brickner and McCombs, 2004).

¹ A table of schools, course listing and link to the catalog for each school is available from the author.

The paper is presented in three parts: first, I introduce cognitive load theory to explain the difficulty of learning cash flow statement construction, second, I present a method that addresses many of these difficulties, and finally I present evidence from a lab experiment to assess the method's effectiveness.

II. CASH FLOW STATEMENTS, COMPLEXITY AND COGNITIVE LOAD

Recent research on the construction and interpretation of financial statements has examined how the theory of cognitive load can be used to explain the quality and efficiency of learning experienced by students who are presented for the first time with complex financial statements such as cash flows (Hodder et al., 2008; Hodge, Hopkins, and Wood, 2010; Mostyn, 2012). Cognitive load theory (Sweller, 1988, 1989; Sweller and Chandler, 1991) argues that the amount and complexity of information that must be held in short-term memory creates a cognitive load that increases mental effort and decreases the efficiency of learning. Over time, information is retained in long-term memory, where it can be sorted and arranged into a mental map or "schema." Individuals are able to interpret new information more quickly and accurately when they have more developed schemas into which the information can be mapped or interpreted.

Mostyn (2012, p. 233) observes that the statement of cash flows is a particularly challenging statement to learn because it requires assembling in short-term memory a number of complex and interrelated concepts:

(1) definition of operating, investing, and financing; (2) ability to identify operating, investing, and financing transactions; (3) understanding the difference between accrual and cash basis accounting; (4) understanding the relationship between an income statement and a balance sheet; and (5) the procedures for converting changes in accrual basis account balances into their cash flow equivalents.

Until students develop adequate schemas for each of these concepts, the intrinsic load on novice learners will be high. Moreover, there are other challenges that add extraneous loads such as the fact that the necessary information is often times scattered across various statements. This has been shown to increase the extraneous load and decrease efficiency and accuracy (Hodge et al., 2010). Hodder, et al. (2008) note that the accepted format of indirect cash flow statements requires the reversal of non-cash and non-operating accounts. They contend that this non-intuitive process adds additional complexity that retards the development of interpretive schema. Finally, even with the best intention, instructors who attempt to give the most thorough and detailed explanation of the cash flow statement may themselves be

unnecessarily increasing the student's cognitive load, which in turn decreases learning and efficiency (Kalyuga, Ayres, Chandler, and Sweller, 2003).

III. REDUCING COGNITIVE LOAD

Clearly, when teaching students how to interpret and construct a cash flow statement for the first time, a preferred method is one that reduces the intrinsic cognitive load students will face and removes, to the extent possible, extraneous factors that increase cognitive load. The method proposed here seeks to diminish the cognitive load experienced by novice students in several ways. First, in this method, all required information is seen on a single computer screen. According to the proximity compatibility principle (Wickens and Carswell, 1995), items which can be seen all at one time can be more easily integrated, which then lowers the cognitive load and improves learning and performance (Hodge et al., 2010).

Second, this method reduces cognitive load by calculating the effect on cash flow caused by changes in balance sheet accounts with only two formulas. This compares to the ten to twenty formulas required when students perform an item-by-item determination of whether to subtract last year's balance from this year's, or this year's balance from last year's. This simplification is a type of early stage "chunking" (Cowan, 2001) that reduces cognitive load in the early phase of learning by aggregating related concepts together. The confusing nature of reversing accounts is reduced by seeing all similar accounts treated with one consistent process. For example, students can better understand why increasing accounts payable has the same effect on cash flow as raising capital when the same formula is used (this year's value – last year's).

Third, accounts on the balance sheet that belong on the cash flow statement are easily identified using a simple visual "trick." By visually inspecting the formulas in the balance sheet, students select only the accounts whose values are directly entered into the cell rather than calculated with a formula. This visual, rather than the theoretic process, allows students with minimal accounting backgrounds to understand better why accounts such as net fixed assets or retained earnings, along with all other subtotals and totals do not appear on the cash flow statement.

Fourth, the process outlined below develops a trial balance much earlier in the process, allowing students to more quickly identify errors before they are compounded. Students are able to determine if they have correctly identified the total change in cash flow before the somewhat challenging task of sorting the accounts into operating, investing or financing categories, and the creation of subtotals and totals for the cash flow statement. This diminishes cognitive load by greatly reducing the time and effort needed to achieve the key payoff (the correct change in cash).

Finally, cognitive load is reduced by the insertion of minimal instruction directly onto the workspace, as well as the spreadsheet formulas themselves. Cognitive load is reduced because these visuals can be processed simultaneously with verbal instructions (Mostyn, 2012). Moreover, students can gain insight into the interconnectedness of various accounts by viewing and manipulating the formulas they have already entered.

IV. THE PROCESS

The process begins by providing students with an income and balance sheet, preferably aligned in a single worksheet in Excel or any common computer-based spreadsheet. In this example, this worksheet is labeled IS_BS. The spreadsheet should have formulas for totals and subtotals, and appropriate linkages should be made between the income statement and balance sheet. For example, on the balance sheet, accumulated depreciation is calculated by adding last year's accumulated depreciation to this year's depreciation expense as reported on the income statement. Similarly, retained earnings is calculated on the balance sheet by adding last year's retained earnings to this year's net income minus any dividends paid out.

Next, the formulas for the income statement and balance sheet should be displayed so that students can see which items are calculated from other numbers and which items have their value entered directly as a number. This is accomplished in Excel

FIGURE 1

Simplified Cash Flow.xlsx - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View

D4

	A	B	C	D	E
1	Dodge St Printing				
2	Income Statements				
3	For the Years 2011 and 2012				
4		2011	2012		
5	Sales	\$2,350,000	\$2,900,000		
6	Cost of Goods	1,645,000	2,030,000		
7	Gross Profit	705,000	870,000		
8	Depreciation	58,000	62,000		
9	Selling & Admin. Expense	390,000	425,000		
10	Lease Expense	65,000	65,000		
11	Net Operating Income	192,000	318,000		
12	Interest Expense	68,000	112,000		
13	Earnings Before Taxes	124,000	206,000		
14	Taxes	43,400	72,100		
15	Net Income	\$80,600	\$133,900		
16					
17	Notes:				
18	Tax Rate	35.00%	35.00%		
19	Shares	30,000	38,000		
20	Earnings per Share	2.69	3.52		
21	Dividend		\$19,000		
22					
23	Dodge St Printing				
24	Balance Sheet				
25	For the Year Ended December 31, 2012				
26		2011	2012		
27	Assets				
28	Cash	\$41,000	\$46,000		
29	Marketable Securities	21,000	25,000		
30	Accounts Receivable	372,000	420,000		
31	Inventory	420,000	502,000		
32	Total Current Assets	854,000	993,000		
33	Gross Fixed Assets	2,170,000	2,680,000		
34	Accumulated Depreciation	485,000	547,000		
35	Net Plant & Equipment	1,685,000	2,133,000		
36	Total Assets	\$2,539,000	\$3,126,000		
37					
38	Liabilities & Owner's Equity				
39	Accounts Payable	\$310,000	\$505,000		
40	Accrued Expenses	30,000	35,000		
41	Total Current Liabilities	340,000	540,000		
42	Long-term Debt	1,061,000	1,168,100		
43	Total Liabilities	1,401,000	1,708,100		
44	Common Stock (\$2 par)	60,000	76,000		
45	Additional Paid-in-Capital	542,000	691,000		
46	Retained Earnings	536,000	650,900		
47	Total Owner's Equity	1,138,000	1,417,900		
48	Total Liab. & Owner's Equity	\$2,539,000	\$3,126,000		
49					
50					

Ready | IS BS | Sheet2 | 95%

FIGURE 2

Dodge St Printing
Income Statements
For the Years 2011 and 2012

	2011	2012	
Sales	2350000	2900000	
Cost of Goods	1645000	2030000	
Gross Profit	=B5-B6	=C5-C6	
Depreciation	58000	62000	
Selling & Admin. Expense	390000	425000	
Lease Expense	65000	65000	
Net Operating Income	=B7-SUM(B8:B10)	=C7-SUM(C8:C10)	
Interest Expense	68000	112000	
Earnings Before Taxes	=B11-B12	=C11-C12	
Taxes	=B13*B18	=C13*C18	
Net Income	=B13-B14	=C13-C14	
Notes:			
Tax Rate	0.35	0.35	
Shares	30000	38000	
Earnings per Share	=B15/B19	=C15/C19	
Dividend		=C19*0.5	

Dodge St Printing
Balance Sheet
For the Year Ended December 31, 2012

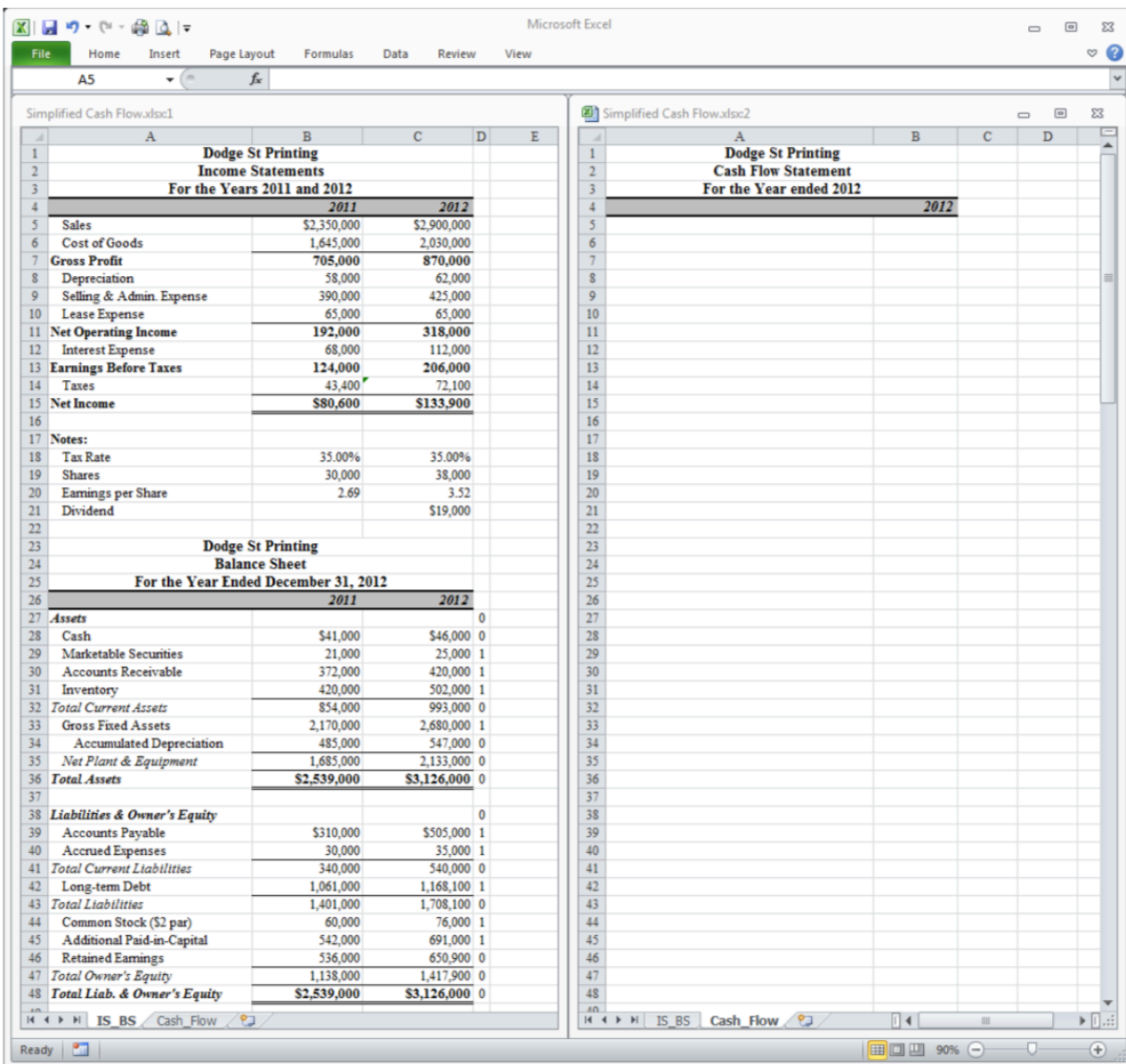
	2011	2012	
Assets	=B4	=C4	
Cash	41000	46000	0
Marketable Securities	21000	25000	1
Accounts Receivable	372000	420000	1
Inventory	420000	502000	1
Total Current Assets	=SUM(B27:B31)	=SUM(C27:C31)	0
Gross Fixed Assets	2170000	2680000	1
Accumulated Depreciation	485000	=B34+C8	0
Net Plant & Equipment	=B33-B34	=C33-C34	0
Total Assets	=B32+B35	=C32+C35	0
Liabilities & Owner's Equity			
Accounts Payable	310000	505000	1
Accrued Expenses	30000	35000	1
Total Current Liabilities	=SUM(B39:B40)	=SUM(C39:C40)	0
Long-term Debt	1061000	1168100	1
Total Liabilities	=B41+B42	=C41+C42	0
Common Stock (\$2 par)	60000	76000	1
Additional Paid-in-Capital	542000	691000	1
Retained Earnings	536000	=B46+C15-C21	0
Total Owner's Equity	=SUM(B44:B46)	=SUM(C44:C46)	0
Total Liab. & Owner's Equity	=B41+B42+B47	=C41+C42+C47	0

Code the items as follows:
0 - Cash
0 - Blank cells
0 - Cells with formulas
1 - Other items

by pressing the Ctrl and ~ buttons simultaneously. Once students have entered this view, instruct them to create a helper column to the right of the balance sheet. Students are asked to place a 0 in the cell of the adjacent helper column if the data in

the most recent year is cash, a blank, or a formula. The remaining items are cells with values that have been directly entered into the spreadsheet and do not contain a formula. For each of these cells they are to put a 1 in the adjacent cell in the helper column. This provides a good opportunity to explain to the students why including items such as accumulated depreciation, retained earnings, or subtotals and totals would cause some accounts to be double counted and are not to be included in the cash flow statement. When they are done creating the helper column, press Ctrl~ again to revert back to display the value of the cells.

FIGURE 3



The third step is to open a new worksheet within the same workbook and label it “Cash_Flow”. Create the appropriate titles at the top of the worksheet for a cash flow statement. Open a new window in Excel by going to the ribbon and selecting View – New Window. Then, while in the View tab of the ribbon, select Arrange All – Vertical. In the window on the left, keep the IS_BS worksheet open. In the window on the right, open the worksheet labeled Cash_Flow. This will allow students to see in one screen the cash flow statement and the sources from which it is created.

In the Cash_Flow worksheet, use simple “=” formulas in column A to directly bring the labels for net income, depreciation and dividends from column A in the IS_BS worksheet. In column B of the Cash_Flow worksheet, again use “=” formulas to also bring over the 2012 values for these three accounts, which in this case are in column C of the IS_BS worksheet. If the value for dividends is not a negative number, be sure to put a negative sign after the “=” sign, as it is an outflow of cash (see Figure 4 for an example of this). Leave a row blank and do the same for all the labels from the balance sheet in column A. The formula need only be written once and can be copied using the fill handle from assets down to total liabilities and owners’ equity.

Unlike items from the income statement, balance sheet accounts that appear on the cash flow statement are not entered directly using values from the most recent year. Instead, the cash flow statement records the change in balance sheet accounts from one year to the next. To do this, only two formulas will be used; one for assets, and one for liabilities and equities. For assets, insert a formula in column B of the Cash_Flow worksheet that subtracts the current year’s values for assets in the IS_BS worksheet from the prior year’s values. Copy the formula from the first asset down to total assets using the fill handle. For liabilities and equity, subtract the prior year’s values on the IS_BS worksheet from the current year’s. Copy this formula from the first liability down to total liabilities and shareholders’ equity. Finally, in the column to the right of the cash flow statement (in this case column C of the Cash_Flow worksheet), include a simple “=” formula that brings the values from the helper column previously coded on the IS_BS worksheet.

The next step is to highlight all the rows in the Cash_Flow worksheet containing items from the balance sheet and sort them from smallest to largest using the values in the helper column created in column C of the Cash_Flow worksheet. The cash flow statement should now look like Figure 5.

Highlight all the rows in the Cash_Flow worksheet whose helper column value is zero and delete them. At this point, we have removed all balance sheet accounts that do not belong in the cash flow statement. Summing the remaining accounts will reflect the total change in cash from 2011 to 2012. Here the instructor can begin to lead students in a discussion of the impact the changes in balance sheet accounts have

on the cash position of the firm, saving the organizing and formatting for a later discussion if so desired.

FIGURE 4

	A	B	C	D	E	F	G	H
1	Dodge St Printing							
2	Cash Flow Statement							
3	For the Year ended 2012							
4		2012			Column A	Column B	Column C	
					Formulas	Formulas	Formulas	
5	Net Income	133,900			=IS_BS!A15	=IS_BS!C15		
6	Depreciation	62,000			=IS_BS!A8	=IS_BS!C8		
7	Dividend	-19,000			=IS_BS!A21	=IS_BS!C21		
8								
9								
10	Assets	0	0		=IS_BS!A27	=IS_BS!B27-IS_BS!C27	=IS_BS!D27	
11	Cash	-5,000	0		=IS_BS!A28	=IS_BS!B28-IS_BS!C28	=IS_BS!D28	
12	Marketable Securities	-4,000	1		=IS_BS!A29	=IS_BS!B29-IS_BS!C29	=IS_BS!D29	
13	Accounts Receivable	-48,000	1		=IS_BS!A30	=IS_BS!B30-IS_BS!C30	=IS_BS!D30	
14	Inventory	-82,000	1		=IS_BS!A31	=IS_BS!B31-IS_BS!C31	=IS_BS!D31	
15	Total Current Assets	-139,000	0		=IS_BS!A32	=IS_BS!B32-IS_BS!C32	=IS_BS!D32	
16	Gross Fixed Assets	-510,000	1		=IS_BS!A33	=IS_BS!B33-IS_BS!C33	=IS_BS!D33	
17	Accumulated Depreciation	-62,000	0		=IS_BS!A34	=IS_BS!B34-IS_BS!C34	=IS_BS!D34	
18	Net Plant & Equipment	-448,000	0		=IS_BS!A35	=IS_BS!B35-IS_BS!C35	=IS_BS!D35	
19	Total Assets	-587,000	0		=IS_BS!A36	=IS_BS!B36-IS_BS!C36	=IS_BS!D36	
20								
21	Liabilities & Owner's Equity	0	0		=IS_BS!A38	=IS_BS!C38-IS_BS!B38	=IS_BS!D38	
22	Accounts Payable	195,000	1		=IS_BS!A39	=IS_BS!C39-IS_BS!B39	=IS_BS!D39	
23	Accrued Expenses	5,000	1		=IS_BS!A40	=IS_BS!C40-IS_BS!B40	=IS_BS!D40	
24	Total Current Liabilities	200,000	0		=IS_BS!A41	=IS_BS!C41-IS_BS!B41	=IS_BS!D41	
25	Long-term Debt	107,100	1		=IS_BS!A42	=IS_BS!C42-IS_BS!B42	=IS_BS!D42	
26	Total Liabilities	307,100	0		=IS_BS!A43	=IS_BS!C43-IS_BS!B43	=IS_BS!D43	
27	Common Stock (\$2 par)	16,000	1		=IS_BS!A44	=IS_BS!C44-IS_BS!B44	=IS_BS!D44	
28	Additional Paid-in-Capital	149,000	1		=IS_BS!A45	=IS_BS!C45-IS_BS!B45	=IS_BS!D45	
29	Retained Earnings	114,900	0		=IS_BS!A46	=IS_BS!C46-IS_BS!B46	=IS_BS!D46	
30	Total Owner's Equity	279,900	0		=IS_BS!A47	=IS_BS!C47-IS_BS!B47	=IS_BS!D47	
31	Total Liab. & Owner's Equity	587,000	0		=IS_BS!A48	=IS_BS!C48-IS_BS!B48	=IS_BS!D48	
32								
33								
34								
35								
36								
37								

When ready to lecture on the three sections of the cash flow statement, the helper column can quickly categorize and arrange the accounts. Delete all the values in the helper column in the Cash_Flow worksheet and recode each item with a 1 if it belongs in the Operations section, a 2 if it belongs in the Investing section, and a 3 if it belongs in the Financing section of the cash flow statement. Because the students have not had to struggle with determining whether to subtract this year's values from last

year's values or vice versa, students will have a greater ability to listen and apply a discussion of what differentiates the three sections of the cash flow statement.

FIGURE 5

The image shows two Excel spreadsheets for Dodge St Printing. The left spreadsheet contains the Income Statements and Balance Sheet for 2011 and 2012. The right spreadsheet contains the Cash Flow Statement for the year ended 2012.

Dodge St Printing Income Statements For the Years 2011 and 2012			
	2011	2012	
Sales	\$2,350,000	\$2,900,000	
Cost of Goods	1,645,000	2,030,000	
Gross Profit	705,000	870,000	
Depreciation	58,000	62,000	
Selling & Admin. Expense	390,000	425,000	
Lease Expense	65,000	65,000	
Net Operating Income	192,000	318,000	
Interest Expense	68,000	112,000	
Earnings Before Taxes	124,000	206,000	
Taxes	43,400	72,100	
Net Income	\$80,600	\$133,900	
Notes:			
Tax Rate	35.00%	35.00%	
Shares	30,000	38,000	
Earnings per Share	2.69	3.52	
Dividend		\$19,000	

Dodge St Printing Balance Sheet For the Year Ended December 31, 2012			
	2011	2012	
Assets			
Cash	\$41,000	\$46,000	0
Marketable Securities	21,000	25,000	1
Accounts Receivable	372,000	420,000	1
Inventory	420,000	502,000	1
Total Current Assets	854,000	993,000	0
Gross Fixed Assets	2,170,000	2,680,000	1
Accumulated Depreciation	485,000	547,000	0
Net Plant & Equipment	1,685,000	2,133,000	0
Total Assets	\$2,539,000	\$3,126,000	0
Liabilities & Owner's Equity			
Accounts Payable	\$310,000	\$505,000	1
Accrued Expenses	30,000	35,000	1
Total Current Liabilities	340,000	540,000	0
Long-term Debt	1,061,000	1,168,100	1
Total Liabilities	1,401,000	1,708,100	0
Common Stock (\$2 par)	60,000	76,000	1
Additional Paid-in-Capital	542,000	691,000	1
Retained Earnings	536,000	650,900	0
Total Owner's Equity	1,138,000	1,417,900	0
Total Liab. & Owner's Equity	\$2,539,000	\$3,126,000	0

Dodge St Printing Cash Flow Statement For the Year ended 2012			
	2012		
Net Income	133,900		
Depreciation	62,000		
Dividend	19,000		
Assets			
Cash	-5,000	0	
Total Current Assets	-139,000	0	
Accumulated Depreciation	-62,000	0	
Net Plant & Equipment	-448,000	0	
Total Assets	-587,000	0	
Liabilities & Owner's Equity			
Total Current Liabilities	200,000	0	
Total Liabilities	307,100	0	
Retained Earnings	114,900	0	
Total Owner's Equity	279,900	0	
Total Liab. & Owner's Equity	587,000	0	
Marketable Securities	-4,000	1	
Accounts Receivable	-48,000	1	
Inventory	-82,000	1	
Gross Fixed Assets	-510,000	1	
Accounts Payable	195,000	1	
Accrued Expenses	5,000	1	
Long-term Debt	107,100	1	
Common Stock (\$2 par)	16,000	1	
Additional Paid-in-Capital	149,000	1	

FIGURE 6

Dodge St Printing		
Cash Flow Statement		
For the Year ended 2012		
2012		
Net Income	133,900	
Depreciation	62,000	
Dividend	-19,000	
Marketable Securities	-4,000	1
Accounts Receivable	-48,000	1
Inventory	-82,000	1
Gross Fixed Assets	-510,000	1
Accounts Payable	195,000	1
Accrued Expenses	5,000	1
Long-term Debt	107,100	1
Common Stock (\$2 par)	16,000	1
Additional Paid-in-Capital	149,000	1
Total Change in Cash	5,000	

FIGURE 7

Dodge St Printing		
Cash Flow Statement		
For the Year ended 2012		
2012		
Net Income	133,900	1
Depreciation	62,000	1
Dividend	-19,000	3
Marketable Securities	-4,000	1
Accounts Receivable	-48,000	1
Inventory	-82,000	1
Gross Fixed Assets	-510,000	2
Accounts Payable	195,000	1
Accrued Expenses	5,000	1
Long-term Debt	107,100	3
Common Stock (\$2 par)	16,000	3
Additional Paid-in-Capital	149,000	3
Total Change in Cash	5,000	

Sort all of the rows based on the new values of the helper column so that the worksheet looks like Figure 8.

FIGURE 8

Dodge St Printing		
Cash Flow Statement		
For the Year ended 2012		
2012		
Net Income	133,900	1
Depreciation	62,000	1
Marketable Securities	-4,000	1
Accounts Receivable	-48,000	1
Inventory	-82,000	1
Accounts Payable	195,000	1
Accrued Expenses	5,000	1
Gross Fixed Assets	-510,000	2
Dividend	-19,000	3
Long-term Debt	107,100	3
Common Stock (\$2 par)	16,000	3
Additional Paid-in-Capital	149,000	3
Total Change in Cash	5,000	

Finally, format the cash flow statement by adding titles and subtotals for each section. Replace the total change in cash calculation at the bottom with a formula that adds the changes in cash from operations, investing and financing. If desired, enter additional rows that calculate the change in cash directly from the balance sheet and see if it is the same or different from the value calculated on the cash flow statement.

FIGURE 9

The image shows two Excel spreadsheets side-by-side. The left spreadsheet, 'Simplified Cash Flow.xlsx1', contains financial data for Dodge St Printing. It includes an Income Statement for 2011 and 2012, and a Balance Sheet for the year ended December 31, 2012. The right spreadsheet, 'Simplified Cash Flow.xlsx2', contains a Cash Flow Statement for the year ended 2012, detailing cash from operations, investing, and financing activities.

Dodge St Printing Income Statements For the Years 2011 and 2012		
	2011	2012
Sales	\$2,350,000	\$2,900,000
Cost of Goods	1,645,000	2,030,000
Gross Profit	705,000	870,000
Depreciation	58,000	62,000
Selling & Admin. Expense	390,000	425,000
Lease Expense	65,000	65,000
Net Operating Income	192,000	318,000
Interest Expense	68,000	112,000
Earnings Before Taxes	124,000	206,000
Taxes	43,400	72,100
Net Income	\$80,600	\$133,900
Notes:		
Tax Rate	35.00%	35.00%
Shares	30,000	38,000
Earnings per Share	2.69	3.52
Dividend		\$19,000

Dodge St Printing Balance Sheet For the Year Ended December 31, 2012		
	2011	2012
Assets		
Cash	\$41,000	\$46,000
Marketable Securities	21,000	25,000
Accounts Receivable	372,000	420,000
Inventory	420,000	502,000
Total Current Assets	854,000	993,000
Gross Fixed Assets	2,170,000	2,680,000
Accumulated Depreciation	485,000	547,000
Net Plant & Equipment	1,685,000	2,133,000
Total Assets	\$2,539,000	\$3,126,000
Liabilities & Owner's Equity		
Accounts Payable	\$310,000	\$505,000
Accrued Expenses	30,000	35,000
Total Current Liabilities	340,000	540,000
Long-term Debt	1,061,000	1,168,100
Total Liabilities	1,401,000	1,708,100
Common Stock (\$2 par)	60,000	76,000
Additional Paid-in-Capital	542,000	691,000
Retained Earnings	536,000	650,900
Total Owner's Equity	1,138,000	1,417,900
Total Liab. & Owner's Equity	\$2,539,000	\$3,126,000

Dodge St Printing Cash Flow Statement For the Year ended 2012	
2012	
Cash from Operations	
Net Income	133,900
Depreciation	62,000
Marketable Securities	-4,000
Accounts Receivable	-48,000
Inventory	-82,000
Accounts Payable	195,000
Accrued Expenses	5,000
Total Cash from Operations	261,900
Cash from Investing	
Gross Fixed Assets	-510,000
Total Cash from Investing	-510,000
Cash from Financing	
Dividend	-19,000
Long-term Debt	107,100
Common Stock (\$2 par)	16,000
Additional Paid-in-Capital	149,000
Total Cash from Financing	253,100
Total Change in Cash	5,000

V. EXPERIMENT

A computer lab experiment was conducted to assess the effectiveness of the method.

1. SAMPLE

An email was sent out to 1,700 undergraduates offering them \$10 to participate in a computer lab experiment. One hundred eleven students responded, 40 agreed to attend on the selected date and 24 actually attended one of the four sessions. A pre-test collected demographic information including the number of accounting classes, Excel expertise, age, gender and year in college. A set of t-tests showed no significant differences in these variables between the group of students implementing the cash

flow method presented in this paper and the students using the traditional textbook method.

2. METHOD

Each group was given the same PowerPoint lecture that provided an overview of the cash flow statement. Sessions one and three taught the method described above to 11 students, while 13 students in sessions two and four received instructions based on the textbook by Mayes, *Financial Analysis with Microsoft Excel 2012*. Students were then asked to construct a cash flow statement in Excel while the instructor demonstrated in front of the class. Once completed, students were given a new balance sheet and income statement and asked to create a new cash flow statement on their own using the instructions they had been given. Students in each session were encouraged to ask for help if they needed it.

3. ANALYSIS

Two measures of performance were collected; the number of students whose first attempt to calculate change in cash was in error and the total time to calculate correctly the change in cash. An error was counted and coded 1 if the total change in cash was incorrect on the first attempt, otherwise 0. Time was calculated as the amount of time in minutes it took students to complete the exercise. A dummy variable for method was also created, with 0 assigned to the textbook method and 1 to the method described in this paper. Descriptive, t-tests and a partial correlation controlling for Excel skill were calculated.

TABLE 1
DESCRIPTIVE STATISTICS AND T-TESTS

	All Participants	New Method	Textbook Method
Sample Size	24	11	13
Mean of Time	18.9	17.2	20.4
Standard Deviation of Time	4.3	2.7	4.9
<i>t</i> -statistic (p-value)	<i>t</i> = 1.93 (0.067)		
	All Participants	New Method	Textbook Method
Sample Size	24	11	13
Mean of Error Rate	0.50	0.27	0.69
Standard Deviation of Error Rate	0.51	0.47	0.48
<i>t</i> -statistic (p-value)	<i>t</i> = 2.16 (0.042)		

TABLE 2
PARTIAL CORRELATIONS

	<u>Correlation with Method, Controlling for Excel Skill</u>		
	<u>Correlation</u>	<u>p-value^a</u>	<u>Degrees of Freedom</u>
Time	-.495	.016	21
Error	-.419	.046	21

4. RESULTS

Errors: Of the 11 students using the method described in this paper, 8 (73%) correctly calculated the change in cash on their first attempt while 3 (27%) students failed to calculate the correct change in cash on their first attempt. Notably, two of the three students with an error ranked themselves very low in Excel skills. Of the 13 students using the textbook method, 4 (31%) correctly calculated the change in cash on the first attempt, while nine (69%) were either missing an item that belonged in the cash flow statement or had included an item that did not belong.

Time: On average, students using the method described in this paper completed the cash flow statement in 17.2 minutes while students using traditional instruction finished in 20.4 minutes.

T-tests between the two groups show a significant decrease in the error rate ($p = .042$), though not a significance difference in time ($p = .067$). When the students' Excel skill was controlled for using partial correlation analysis, there was a significant decrease in both error ($p = .046$) and time ($p = .016$).

In addition to this experiment, this method has also received a good response not only from multiple sections of undergraduate entrepreneurship classes, but in presentations to groups such as the Mountain Plains Management Conference and the Nebraska Economic Developers Association. Sample comments include:

“I think that constructing a Cash Flow Statement is complicated and it is very easy to make simple mistakes no matter what method you use. But I think this method is less complicated and leaves less room for error, and also is a much faster process than the textbook.”

“Easy to follow, easy to practice. Regardless if things were miscategorized, still able to find correct resolution.”

“It is easy to follow along and the computer does the work.”

VI. DISCUSSION AND CONCLUSION

This method of teaching cash flows is advantageous for entrepreneurship and other non-accounting students because it reduces the initial complexity and extraneous cognitive loads that typically accompany their introduction to the topic. To summarize what we have done, this method:

- Presents all data in a single screen (proximity compatibility principle)
- Gives minimal instructions delivered directly in the worksheet (proximity compatibility principle, e.g. Figure 2)
- Makes use of a visual “trick” to identify accounts that belong on the cash flow statement (simplified schema)
- Uses only two formulas to convert balance sheet accruals to cash basis (reduced complexity)
- Provides a rapid result that allows students to more quickly arrive at the “payoff” of the exercise (reduced complexity, e.g. Figure 6)
- Readily facilitates the understanding of accounts and simplifies the process of categorizing them

The key benefit of using this method in entrepreneurship classes has been that students can focus on assessing the condition of a company much more quickly and with much less frustration in only a few short steps (as shown in Figure 6). The result is that students can spend their time developing a better understanding of the accounts that impact their cash flow without first needing to master the structure of cash flow statements. An additional benefit is that the cash flow statement created is actively linked to the income statement and balance sheet. This allows students to model changes to these statements and directly see the impact on the cash flow statement. Modeling is an excellent mechanism by which students can develop schemas that increase their ability to assimilate and interpret financial statements (Hodder et al., 2008). Similarly, if additional time periods are added to create pro forma projections, the student need only use the fill handle to drag the completed cash flow statement formulas out to the right and the next period’s change in cash will be correctly calculated.

While this method is particularly useful for the introduction of cash flow creation to students with limited accounting or finance background, it can be extended to more moderately complex financial statements. As students begin to develop schemas by which to interpret financial data, they will be able to handle increasing complexities on the income and balance statements, such as the inclusion of non-operating revenues on the income statement. In addition to its scalability, this method’s use of standard spreadsheet software prepares entrepreneurship and other non-accounting

majors to not only be more fluent users of financial statements, but also capable of basic financial modeling and analysis.

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