**Background:**

In general, introductory accounting courses present multiple challenges for instructors such as low student motivation, attendance, participation, and knowledge retention, and high student anxiety and withdrawal rates (Brickner & Etter, 2008). From the my experience of lecturing accounting for 8 years, the biggest stumbling block with introductory accounting (also known as principles or fundamentals of accounting) is learning the double entry accounting system. Double entry is often one of the first things students encounter with accounting as it is fundamental to all other concepts subsequently learned. So what makes double entry accounting notoriously difficult to understand and anecdotally the most feared subject for some students? (Frampton & Robilliard, 2010).

While quite a lot has been written about student issues with learning introductory accounting in general, fewer studies have focused on students’ ability to master the double entry concepts of accounting. For this study, I have used phenomenographic approach to analyse and interpret data from individual semi-structured interviews with students from an introductory accounting course specifically focusing on their approaches to solving double entry accounting problems.

Prior to discussing the output of my analysis, it is important to highlight the importance of students mastering double entry accounting. It is critical that students leave these introductory courses being able to understand and apply the basic accounting concepts. Not only are they necessary for students to learn subsequent material but they also provide a strong foundation for basic business finance skills which are required for most professions. We want students to be able to transfer their knowledge and understanding of the double entry concepts to all the problems they encounter so that they can become adept at dealing with multiple double entry transactions of a basic and complex nature.

The research literature on problem solving has shown differences between experienced

(or “expert”) problem solvers and those who are inexperienced (or “novices”) both in their

procedures for solving problems and their organization of knowledge in memory (Chi, Feltovich, & Glaser, 1980; Larkin & Reif, 1979). A lot has been written about problem solving in physics education. In physics problem solving, novice students tend to spend little time representing the problem and quickly jump into quantitative expressions (Larkin, 1979; Pretz et al., 2003). Instructors have found that novice students implement problem solving techniques that include haphazard formula-seeking and solution pattern matching (Reif et al.,1976; Mazur, 1997; Van Heuvelen, 1991). In contrast, experts solve problems by interjecting an additional step of a qualitative analysis or a low-detail overview of the problem before writing down equations (Larkin, 1979; Pretz et al., 2003). This qualitative analysis used by experts, such as a verbal description or a picture, serves as a decision guide for planning and evaluating the solution (Larkin & Reif, 1979).

One of the goals in teaching double entry accounting is that we want our students to shift from this novice state of problem solving to that of being an expert. What has emerged from this study is a preliminary set of hierarchical categories that describe the students’ approaches in dealing with double entry problems. Each of these categories places the students somewhere on this continuum between being a novice or expert problem solver.

**Research Findings:**

Prior to discussing our findings, it is worth keeping in mind how we wanted students to approach solving each of these problems, i.e. using the approach they were taught in class.

The DEAD CLIC approach to double entry problem solving is a four step process as follows:

1. Identify the accounts affected by the transaction;
2. Identify the DEAD CLIC element of the financial statements involved; that is, asset, liability, income, expense, drawings or capital;
3. Understand the impact of the transaction on each account identified in Step 1 (Does the balance increase or decrease as a result of the transaction?); and
4. Apply accounting terminology of ‘debit’ and ‘credit’.

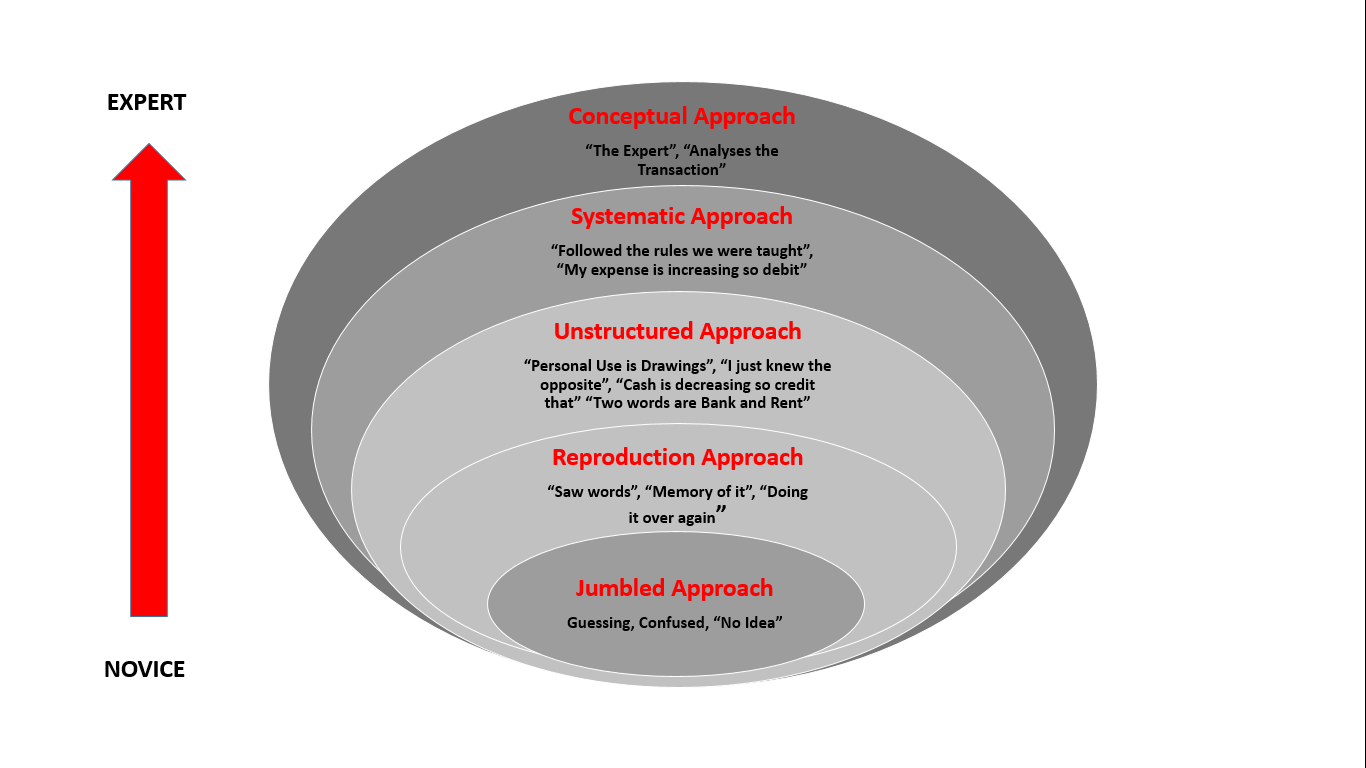
If every student left the module fully understanding double entry as it had been taught to them, then we would have expected each of them to discuss the above process in determining their answer. What has emerged as student learning is a variety of approaches. Some who have learned the process correctly and can apply it. Some who have partially learned it and try to apply it but come unstuck somewhere in the process due to jumping to solution mode too quickly and some who have relied heavily on practice and repetition of previous examples and finally some who have no clear approach and stumble through their answer. In short we have come up with four broad categories of student approaches as follows:

* Systematic Approach
* Unstructured Approach
* Reproduction Approach
* Jumbled Approach

In my proposal for this research study, I came across an interesting suggestion by Frampton & Robilliard (2010) that resonated with me and has stuck in my mind throughout this research process. Frampton & Robilliard (2010) suggest that most accounting courses gloss over, or even completely ignore the fundamentals of accounting because it can be actually difficult to teach. They infer that teachers and professionals know how it works, but they don’t know how to explain it to others – it has become an unconscious competence. Reflecting on my own personal learning journey with double entry accounting, I would have to agree with them. I have the benefit of 14 years professional experience of practicing as an accountant prior to embarking on a lecturing career. The light bulb moment with double entry accounting occurred early in my career as a practice accountant mainly as a result of it being a requirement of my job and having to post entries every day. It was simply learned by doing it. This was some 6 or 7 years after having first being introduced to it in university. If I refer to the course manual we (CIT - Cork Institute of Technology) provide to our introductory accounting students, there is little historical background or context provided. We simply instruct students to always debit assets, expenses and drawings when they are increasing and to always credit liabilities, income and owners’ equity (capital) when they are increasing. If any of these items are decreasing, then the opposite needs to occur, i.e. instead of debiting, we credit and vice versa. (The DEAD CLIC process outlined above.) Reflecting on this, it could be suggested that emphasis is frequently placed on memorizing the rules and many students have little or no practical context from which to draw and help them understand this subject (Allen et al. 2011). Having considered how this concept is presented to students, I can see where their confusion might be building – questions like, what does debit or credit mean? What’s an asset? What’s a liability? What does increasing / decreasing mean etc.

This has led me to adding a final category to the hierarchy being a “Conceptual Approach”. This approach describes the true expert where the subject focuses on understanding broader principles or ideas (what we call “concepts”) that can later be applied to a variety of specific examples. None of the students in my study displayed this level of understanding which is partly due to this being their first accounting module but also perhaps due to how the course was presented to them as discussed above.

The picture below is a visual depiction of the Hierarchical Outcome Space beneath which the categories that emerged from the study have been discussed in detail.



**Systematic Approach:**

Students who followed a systematic approach to solving these problems recalled the DEAD CLIC approach that was taught in class and followed the steps within this approach in order to arrive at the correct answer. Out of the sample of 11 students, only two used this approach explicitly.

“I’m debiting the rent because this is an expense and my expense is increasing so it goes on the debit side, and then I’m crediting the bank because my bank account is decreasing, so it’s being credited."…referring to question 4

(Student 4)

Using this approach, students had a plan for solving the problem and were able to identify the correct variables that would be needed for the correct answer. Interestingly, while these two students could explain the answer they arrived at via the approach they used, when probed on their understanding of it, it did not always make sense to them.

“I don’t understand what a debit is” and “when someone says, “Credit,” I would say “I still owe them the money,” but “a debit wouldn’t mean anything to me”

(Student 11)

Out of 33 questions, 5 were answered using this approach and 83% were answered correctly first time. The range of correct answers were across all three questions, i.e. basic to the most complex.

**Unstructured Approach:**

In this category, students are aware of the DEAD CLIC approach but instead of following it systematically, they jump or skip steps in the process by identifying variables needed for the solution that they recognise. They then apply the debit and credit to the accounts and were able to partially explain it using the rules or logic around DEAD CLIC but not explicitly following it. In some cases, these students were so confident they had one side of the entry correct, that they just knew to debit or credit the other or opposite side which led them not to explore the double entry logic behind the solution.

“I would have, opened up an account for drawings because if he took it out for his own use, that’s what that’s called, and that is a debit straight away and then I would have to put cash under credit.”

(Student 8)

These students did make use of some of the appropriate terminology around DEAD CLIC such as expenses, assets, drawings etc and also made reference to balances increasing or decreasing in their discussion of the answer. It didn’t always makes sense to them which is probably why they have landed in this unstructured space.

“I did find confusing the increasing and decreasing. I would have said there now that their rent was decreasing because they paid it off”….referring to Question 4

(Student 6)

Their attempt at explaining the answer they arrived at was not always coherent in terms of accounting language. Out of 33 questions, 9 were answered using this approach and 44% were answered correctly first time. The range of correct answers were across the first two double entry problems which were basic and intermediate level.

**Reproduction Approach:**

Students in this category approached solving the problems by largely associating the problems with similar ones they had seen before. Some of the key techniques used by them included recognising words to help with account identification and then associating words given in the question with a particular account. This was most present in the association of drawings with personal use of the owner. In their attempts to explain the answer, some of the double entry logic was used but for the most part, they were unsure why they were debiting or crediting an account. In short, they were analysing these problems based on previous examples they had seen and then tried to fit the problem they were currently facing into a solution based on these examples. There was however evidence of students having a level of understanding of their final solution.

“Just from doing it, like, and over and over and kind of, like, having, like, the, like the memory of doing it.”

(Student 7)

**“**I just saw that there was two different words, rent and cheque, and then cheque is always bank, so that was the two accounts”

(Student 9)

“it’s the owner taking it out for his own use, so usually when I see that, I think drawings.”

(Student 9)

“ I found when I was doing the T accounts, the other one wouldn’t necessarily match up to CLIC, we’ll say, if the other one was DEAD so like, here now, rent is expense but bank isn’t, isn’t in liability, income, or capital so.”

(Student 6)

When DEAD CLIC was shown to the students in this category during the interview, they recalled it but generally did not use it to solve problems. Students in this category were mostly successful in answering the first two problems due to their less complex nature by remembering a process or similar problem that they had encountered. Out of 33 questions, 15 were answered using this approach and 53% were answered correctly first time. The range of correct answers were across the first two questions.

**Jumbled Approach:**

Students falling into this category had no clear approach or strategy for answering these problems. Traits demonstrated by them included guessing based on the words they were looking at in the question or coming up with their own jumbled logic for debiting or crediting an account;

“the way I remember bank is that “Bank” starts with B, but you don’t … Like, C comes after B, that’s why I know I had to credit bank.”

(Student 5)

“I always find that I only ever, I kind of guess these ones.” “Because you use the two words that would come out most.” “like, the rent and the cheque to kind of put into your double entry”

(Student 10)

“no idea what to do with this one…..I didn’t know what that was, do you know, that the asset was decreasing so you would put in Credit. I thought you just kept it in Debit because of what it was.”

(Student 2)

These students were able to get into discussion on the answers and the interviewer was able to tease things out with them but in all cases, having no clear approach to solving the problem led them to the incorrect answer. Out of 33 questions, 4 were answered using this approach and there were no correct answers.

**Comparing and Contrasting the Categories:**

I followed an extremely iterative process in coming up with these categories in order to place the students approach to solving the problems in the correct space. This has involved me going back to the interview scripts multiple times and sometimes moving students around the categories based on my increased level of understanding of the approaches they were using as I read and re-read the transcripts. What I did find throughout this process is that there was one similarity across all the categories. Students in all categories tended to use a level of a memory based approach based on their past experience with double entry problems to arrive at their solution. The use of memory from the repetition and practice of questions was more strategic for students at the top end of the hierarchy as they have used their recall of past examples to help to answer the question but they were still able to explain the answer in relation to the double entry logic. Students at the lower end of the hierarchy tended to use memorisation as their main strategy for getting to the answer, i.e. when asked for an explanation of the answer this is where they fell short and lacked the logic to explain it because they had not gone to the trouble of seeking a deep level of understanding of the double entry process to begin with.

It is not surprising then that some students moved between categories in their approach to answering the different questions. Refer to the table below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Table: Overview of Approaches used by Students** | | | | |
|  | **Systematic** | **Unstructured** | **Reproduction** | **Jumbled** |
| Student 1 |  | Q4, 7, 8 |  |  |
| Student 2 |  |  | Q4, 8 | Q7 |
| Student 3 |  | Q4, 7 | Q 8 |  |
| Student 4 | Q4, 8 | Q7 |  |  |
| Student 5 |  |  | Q8 | Q4, 7 |
| Student 6 |  |  | Q4, 7, 8 |  |
| Student 7 |  |  | Q4, 7, 8 |  |
| Student 8 |  | Q4, 7, 8 |  |  |
| Student 9 |  |  | Q4, 7, 8 |  |
| Student 10 |  |  | Q7, 8 | Q4 |
| Student 11 | Q4, 7, 8 |  |  |  |

In total 6 students stuck to one approach in solving these problems. For those that moved between approaches their movement between categories remained close to where they generally sat on the hierarchy, i.e. students either moved between Systematic and Unstructured or Unstructured and Reproduction or Reproduction and Jumbled, they did not move between extremes on the continuum. This talks to the whole nature of the hierarchy and what it means. Each category is linked or could be considered a subset of each other as students move from having a jumbled level of understanding right up to having a logical and systematic approach for solving the double entry problems, i.e. moving from this novice to expert level in dealing with double entry transactions.