

Learning Trends: Transaction Analysis

To better understand and measure how students learn accounting, Quantum records and analyzes individual student work and errors during student practice/tutoring sessions and compiles class data into an assessment summary report for instructor analysis and student intervention.

Objective

- Evaluate the learning impact of the Quantum Tutors for the topic of Transaction Analysis in a real-world setting by analyzing a statistical sample of students that have used Quantum's tutoring software during one semester.
- Over 530 students were evaluated. Students were enrolled in principles or financial accounting courses at both two- and four-year colleges from August through September 2010 and completed a minimum of 18 transactions within the software.

Key Findings

- **Students improved 15% when practicing the accounting equation**, improving their initial accuracy for completing transactions from 63% to 78% (see page 2). This is where critical learning takes place to be successful in understanding the topics of transaction analysis and adjusting entries.
- For the accounting equation (see page 2), **44% of students achieved a high level of mastery** (mastered 80% or more of the transaction types attempted) and **44% were rated as medium proficiency** (mastered 40% or more of the transaction types attempted). The remaining 12% of students were rated as low mastery and require additional practice and study time.
- There were **3,391 questions asked by students** when seeking help from the software with an average of six questions per student (see page 4). Questions were wide ranging and diverse in scope.

- On average, **students spent two hours working problems and completed 51.7 transactions**.
- For the accounting equation, the three most common errors (see page 2) were:
 - 1) Reporting an increase for an account when there should have been a decrease or vice versa (31.5%).
 - 2) Included an account that is not involved in the transaction (29.5%).
 - 3) Put an account in the wrong category for the accounting equation (Assets = Liabilities + Equity) (25.4%).
- For the accounting equation, students mastered an average of eight transaction types (see page 3). Transaction types that students had the lowest success rates analyzing included:
 - Incurred expenses on account
 - Loaned cash
 - Paid cash for expenses
 - Received payment in advance of services
 - Prepaid expenses
 - Received payment on account
 - Owner withdrawals

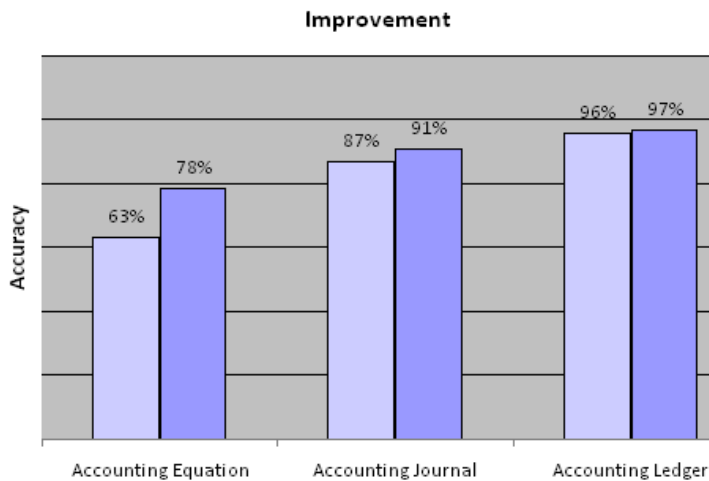
Conclusions

When examining the usage and assessment trends of students who used the Quantum Tutors this semester, **students improved 15% in their ability to analyze transactions**. More importantly, **88% of students achieved a high to medium level of mastery with an average study time of two hours**. In addition, there is a direct correlation between number of transactions completed and level of mastery achieved. The more practice with various transactions types, the higher the mastery.

“When examining the usage trends of students that used the Quantum Tutors this semester, students improved 15% in their ability to analyze transactions. More importantly, 88% of students achieved a high to medium level of mastery for Transaction Analysis with an average study time of only two hours.”

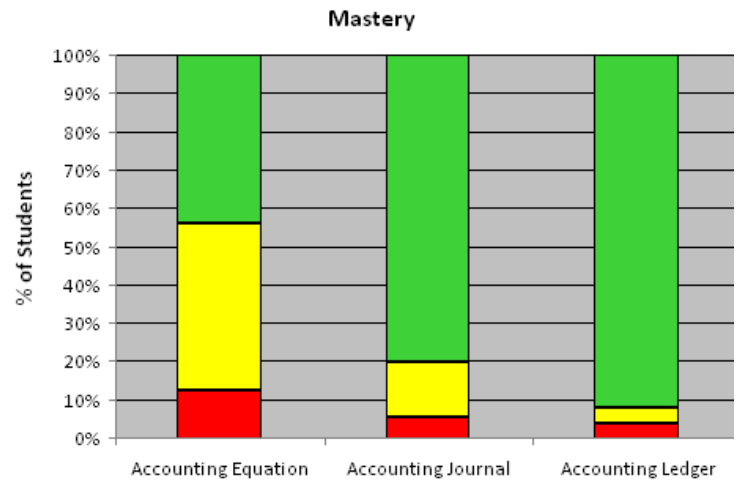
— **Benny G. Johnson, Ph.D.**
President and CEO
Quantum Simulations, Inc.

Overall Student Improvement and Mastery



| | Accounting Equation | Accounting Journal | Accounting Ledger |
|-------------------------|---------------------|--------------------|-------------------|
| Initial Accuracy | 63% | 87% | 96% |
| Final Accuracy | 78% | 91% | 97% |
| Improvement | 15% | 4% | 1% |

Students improved 15% when practicing the accounting equation. This is where most of the critical learning takes place and why success is high for the accounting ledger and journal.



| | Accounting Equation | Accounting Journal | Accounting Ledger |
|---------------|---------------------|--------------------|-------------------|
| High | 44% | 80% | 92% |
| Medium | 44% | 14% | 4% |
| Low | 12% | 5% | 4% |

For the accounting equation, 44% of students achieved a high level of mastery, 44% were rated as medium, and the remaining 12% of students were rated as low mastery and require additional practice and study time.

Errors by Concept

| Accounting Equation | | | |
|--|----------------------------|-------------------|-----------------|
| Error Description | Students Making This Error | Overall Frequency | % of All Errors |
| Reported an increase for an account when there should have been a decrease or vice versa | 495 | 3477 | 31.5% |
| Included an account that is not involved in the transaction | 484 | 3262 | 29.5% |
| Put an account in the wrong A/L/E category | 460 | 2805 | 25.4% |
| Reported the incorrect amount for an account | 254 | 730 | 6.6% |
| Put an account in the accounting equation more than once for a transaction | 150 | 352 | 3.2% |
| Tried recording the effect of a non-transaction | 83 | 313 | 2.8% |
| Did not enter a numerical value for the amount | 74 | 114 | 1.0% |

| Accounting Journal | | | |
|---|----------------------------|-------------------|-----------------|
| Error Description | Students Making This Error | Overall Frequency | % of All Errors |
| Put debit or credit amounts in the wrong journal column | 278 | 805 | 34.2% |
| Included an account in the journal that is not involved in the transaction | 256 | 559 | 23.8% |
| Did not put debits first for a journal entry | 240 | 439 | 18.7% |
| Entered the wrong debit or credit amount in the journal | 148 | 253 | 10.8% |
| Put negative amounts for debits and credits in the journal | 85 | 129 | 5.5% |
| Put an account in a journal/ledger entry more than once for a transaction | 46 | 52 | 2.2% |
| Entered both a debit and credit amount for a single account | 26 | 44 | 1.9% |
| Did not enter a numerical value for the debit or credit amount in a journal entry | 38 | 41 | 1.7% |
| Did not enter a debit or credit amount | 29 | 30 | 1.3% |

| Accounting Ledger | | | |
|--|----------------------------|-------------------|-----------------|
| Error Description | Students Making This Error | Overall Frequency | % of All Errors |
| Put debit or credit amounts in the wrong ledger column | 184 | 590 | 67.8% |
| Entered the wrong debit or credit amount in the ledger | 101 | 193 | 22.2% |
| Put negative amounts for debits and credits in the ledger | 17 | 31 | 3.6% |
| Did not enter a numerical value for the debit or credit amount in a ledger entry | 24 | 31 | 3.6% |
| Entered both a debit and credit amount for a single account | 14 | 25 | 2.9% |

Errors by Transaction

| Accounting Equation | | | | | |
|---|--------------|--------------------------|--------------------|------------------|-----------------------|
| Transaction | Completed | Failed to Reach Solution | Requested Solution | Solved with Help | Solved with No Errors |
| Paid cash for expenses | 3257 | 4.6% | 6.2% | 26.7% | 62.5% |
| Borrowed cash | 2187 | 0.8% | 5.8% | 12.1% | 81.3% |
| Stockholder investment | 1844 | 0.2% | 5.1% | 6.8% | 87.9% |
| Prepaid expense | 1694 | 7.3% | 7.5% | 19.6% | 65.6% |
| Owner investment | 1688 | 1.3% | 7.5% | 6.6% | 84.7% |
| Received payment in advance of services | 1560 | 4.6% | 8.6% | 23.9% | 62.9% |
| Performed services on account | 1442 | 3.8% | 8.1% | 18.3% | 69.8% |
| Received payment for services | 1398 | 1.5% | 4.1% | 10.7% | 83.6% |
| Paid on accounts payable | 1371 | 1.8% | 8.0% | 18.5% | 71.8% |
| Purchased supplies on account | 1309 | 0.7% | 3.4% | 9.0% | 86.9% |
| Received payment on account | 1115 | 5.7% | 9.1% | 18.6% | 66.7% |
| Paid cash for equipment | 1079 | 2.2% | 3.9% | 12.2% | 81.6% |
| Purchased a building with cash and a note | 1009 | 3.7% | 6.3% | 17.2% | 72.7% |
| Not a transaction | 995 | 1.4% | 10.9% | 5.9% | 81.8% |
| Incurred expenses on account | 970 | 9.9% | 10.6% | 33.2% | 46.3% |
| Purchased equipment with cash and a note | 789 | 1.5% | 4.2% | 15.2% | 79.1% |
| Owner withdrawals | 716 | 3.2% | 6.1% | 23.3% | 67.3% |
| Paid dividends | 703 | 1.4% | 5.8% | 18.3% | 74.4% |
| Paid cash for supplies | 542 | 1.3% | 2.6% | 7.0% | 89.1% |
| Purchased equipment on account | 377 | 0.8% | 2.9% | 11.9% | 84.4% |
| Purchased furniture on credit | 279 | 1.4% | 3.6% | 10.4% | 84.6% |
| Purchased inventory on account | 256 | 0.0% | 3.5% | 8.6% | 87.9% |
| Purchased equipment with a note | 224 | 0.4% | 2.2% | 8.0% | 89.3% |
| Loaned cash | 209 | 10.5% | 8.1% | 29.2% | 52.2% |
| Purchased land with a note | 173 | 0.0% | 1.2% | 2.9% | 96.0% |
| Sold equipment | 130 | 2.3% | 5.4% | 20.0% | 72.3% |
| Total | 27316 | 3.0% | 6.4% | 16.2% | 74.4% |

| Accounting Journal | | | | | |
|---|--------------|--------------------------|--------------------|------------------|-----------------------|
| Transaction | Completed | Failed to Reach Solution | Requested Solution | Solved with Help | Solved with No Errors |
| Paid cash for expenses | 2975 | 0.5% | 1.9% | 7.3% | 90.3% |
| Borrowed cash | 2007 | 0.3% | 2.4% | 5.8% | 91.4% |
| Stockholder investment | 1734 | 0.3% | 2.9% | 4.2% | 92.6% |
| Owner investment | 1500 | 0.4% | 3.3% | 3.5% | 92.8% |
| Prepaid expense | 1495 | 0.6% | 2.1% | 6.0% | 91.3% |
| Received payment in advance of services | 1342 | 0.2% | 1.9% | 3.1% | 94.7% |
| Performed services on account | 1280 | 0.5% | 2.0% | 7.1% | 90.5% |
| Received payment for services | 1250 | 0.2% | 1.3% | 3.4% | 95.1% |
| Purchased supplies on account | 1219 | 0.2% | 2.3% | 4.8% | 92.7% |
| Paid on accounts payable | 1210 | 0.7% | 2.7% | 7.5% | 89.0% |
| Paid cash for equipment | 1021 | 0.3% | 2.1% | 5.5% | 92.2% |
| Received payment on account | 958 | 0.2% | 1.0% | 4.1% | 94.7% |
| Purchased a building with cash and a note | 913 | 1.5% | 3.1% | 12.8% | 82.6% |
| Incurred expenses on account | 865 | 1.5% | 2.8% | 20.8% | 74.9% |
| Purchased equipment with cash and a note | 734 | 0.3% | 1.6% | 9.0% | 89.1% |
| Paid dividends | 661 | 0.6% | 2.6% | 6.7% | 90.2% |
| Owner withdrawals | 632 | 0.3% | 1.7% | 7.4% | 90.5% |
| Paid cash for supplies | 508 | 0.4% | 0.6% | 4.1% | 94.9% |
| Purchased equipment on account | 351 | 1.1% | 1.1% | 6.8% | 90.9% |
| Purchased inventory on account | 245 | 0.4% | 2.4% | 6.1% | 91.0% |
| Purchased furniture on credit | 244 | 0.0% | 1.2% | 4.5% | 94.3% |
| Purchased equipment with a note | 218 | 0.0% | 0.5% | 6.9% | 92.7% |
| Loaned cash | 199 | 0.5% | 1.0% | 15.6% | 82.9% |
| Purchased land with a note | 166 | 0.0% | 1.8% | 3.6% | 94.6% |
| Sold equipment | 119 | 0.0% | 4.2% | 0.8% | 95.0% |
| Total | 23846 | 0.5% | 2.2% | 6.5% | 90.9% |

Commonly Asked Student Questions

| Question | Frequency | % of All Questions |
|--|-----------|--------------------|
| Will this transaction cause liabilities or equity to change? | 462 | 13.6% |
| How will this affect the business' assets? | 406 | 12.0% |
| What accounts are changed here? | 338 | 10.0% |
| What clued you in that this event was not a transaction? | 277 | 8.2% |
| Which financial statements did this transaction affect? | 220 | 6.5% |
| Is this an operating, investing or financing activity? | 166 | 4.9% |
| What's the difference between the journal and the ledger? | 159 | 4.7% |
| Does this transaction affect the income statement? | 139 | 4.1% |
| Does this transaction affect the statement of retained earnings? | 119 | 3.5% |
| Does this transaction affect the balance sheet? | 102 | 3.0% |
| Does this transaction affect the cash flow statement? | 95 | 2.8% |
| Shouldn't we have used Services Revenue instead of Unearned Revenue? | 93 | 2.7% |
| What did the business give and receive in this transaction? | 78 | 2.3% |
| How do I check if this transaction kept the accounting equation in balance? | 74 | 2.2% |
| How do you determine the balance of a T-account? | 67 | 2.0% |
| How can I tell if this is actually a business transaction? | 64 | 1.9% |
| How did you know that Cash was a debit? | 61 | 1.8% |
| Is Accounts Receivable a cash equivalent? | 54 | 1.6% |
| How can I tell which side of a T-account is its normal balance side? | 40 | 1.2% |
| Why is this still called Rewinding Expense if it has just been paid? | 36 | 1.1% |
| Hold it! If Cash goes up, how can that be a debit? Shouldn't that be a credit? | 34 | 1.0% |
| Was there really an effect on the accounting equation here if the net change in assets was zero? | 29 | 0.9% |
| Why do total debits and total credits always have to be equal? | 29 | 0.9% |
| Are total debits and total credits equal for this transaction? | 25 | 0.7% |
| Is one of the debits or credits easy to figure out in this transaction? | 24 | 0.7% |
| What is something important to look for? | 21 | 0.6% |
| Why is Prepaid Insurance an asset account? | 17 | 0.5% |
| How did you know that Notes Payable was a credit? | 16 | 0.5% |
| How did you know that Services Revenue was a credit? | 15 | 0.4% |
| How did you know that Common Stock was a credit? | 14 | 0.4% |
| How did you know that Accounts Payable was a debit? | 13 | 0.4% |
| Isn't Cash always supposed to be written first in the journal entry? | 12 | 0.4% |
| How did you know that Utilities Expense was a debit? | 10 | 0.3% |
| Will Wages Expense be a debit or a credit here? | 9 | 0.3% |
| How do I post to the Cash T-account? | 8 | 0.2% |
| How did you know that Dividends was a debit? | 8 | 0.2% |
| How did you know that Unearned Revenue was a credit? | 8 | 0.2% |
| How did you know that Accounts Receivable was a debit? | 7 | 0.2% |
| How did you know that Weightlifting Equipment was a debit? | 4 | 0.1% |