# Integrative Learning and Interdisciplinary Information Systems Curriculum Development in Accounting Analytics

Joseph M. Woodside
joseph.m.woodside@gmail.com
Department of Business Systems and Analytics

Fred K. Augustine, Jr.
faugusti@stetson.edu
Department of Business Systems and Analytics

Valrie Chambers
valrie.chambers@stetson.edu
Department of Accounting

Monica Mendoza
monica.mendoza@stetson.edu
Department of Accounting

Stetson University
DeLand, FL 32723, US

## Abstract

This manuscript develops the structure for an integrative model information systems curriculum on Accounting Analytics, which affords students the opportunities to develop domain knowledge along with application of data analytics. As industry experiences rapid technological change, university curriculum must remain current in order to be effective. Curriculum content is further advanced and established with input from industry organizations that employ graduates of the programs. The manuscript output includes a curriculum review of top accounting programs, course curriculum map, accounting data skills matrix, and professional opportunities. To minimize disruption, existing courses can be utilized as core curriculum, enhancing key courses to complete undergraduate, graduate, or certificate programs. The Accounting Analytics customized curriculum provides students an opportunity to take advantage of the growing interdisciplinary field and student interest among accounting and analytical career paths. The integrative curriculum is developed to better prepare graduates with the critical knowledge, skills, and abilities to excel in this new-age workforce.

**Keywords:** Accounting Analytics, Integrative Learning, Interdisciplinary, Curriculum, Course Map, Career Skills

## 1. INTRODUCTION AND IMPORTANCE

Corporate leaders are increasingly adopting accounting analytics tools to drive business decisions, which supports budgeting, forecasting, planning, and now increasingly revenue generation. Organizations are utilizing data and information to attract new customers, upsell to existing customers, and improve supply chain management. Accountants are well-positioned within an organization to leverage information into actionable business and financial insights, however in order to achieve this capability, analytical skillsets must be enhanced to prepare for a successful career. The Department of Labor and Employment (DoLE) and the Bureau of Local Employment (BLE) identified data science and analytical skills as one of the ways to future proof jobs as automation occurs. (Shimamo, 2013; Vickrey, 2013; PWC, 2015; Cortez, 2019).

Environmental changes in business, accounting, and information systems requires changes in higher education. Many changes include adding skills such as analytical and IT skills such as database design, data analysis, statistical, analytical tools, and visualizations. While other changes have occurred in accounting education over the last 30 years due to financial and technology changes, big data analytics has the potential to create more significant changes than even those previous changes combined. Students require advanced analytical skills in the accounting curriculum (McKinney, et al., 2015). Analytics skills are critical for accountants, as their positions require providing management with information used in strategic decision making. Accountants may be seen as being on the forefront of analytics for their organizations, and therefore analytics competencies are a necessary prerequisite (Kokina, et al., 2017).

### Originality of Approach

This research develops the structure for an interdisciplinary curriculum in Accounting Analytics, which affords students the opportunities to develop domain knowledge along with application of data analytics. As industry experiences rapid technological change, university curriculum is required to be updated in order to be effective. Curriculum contents are further advanced and established with input from industry organizations that employ graduates of the programs.

Despite the corporate requirements for advanced accounting analytics, a literature analysis found that most accounting education articles are non-empirical, relate to similar topics, and omit issues that are important to practice, resulting in minimal impact to practice with an ever widening gap. When empirical methods are used, survey research is prominent, with few studies using experimental methods. Similarly, the accounting curriculum over the past 30 years, utilizes similar courses across a standard curriculum, creating an opportunity for research to be focused on career paths for students. Curricular opportunities are possible for integrated accounting and technology coursework, which incorporate interdisciplinary perspectives (Rebele and St. Pierre, 2015).

## 2. LITERATURE REVIEW

### Integrative Curriculum Requirements

There is often a disconnect or misalignment between skillsets that are important to professionals, educators, and accrediting agencies such as The Association to Advance Collegiate Schools of Business (AACSB). To address this disconnect or misalignment, Kearns (2014) examined the value of Accounting Information Systems and relative importance of accounting skillsets and developed three sets: Generic, Functional, and Information Technology skills. Generic skills were most highly rated by respondents, followed by IT skills, and functional skills. Generic skills include communication, teamwork, ethical behavior, critical thinking and problem solving. Functional skills include traditional accounting skills such as budgeting, tax, financial statements, auditing and variance. Information technology skills includes office productivity software, internal controls, IT security, IT audits, extensible business reporting language (XBRL), enterprise resource planning (ERP), and fraud. Spreadsheet tools were the top rated IT area with more advanced areas scoring lower, reflecting the gap between educators and professionals (Kearns, 2014).

### Accreditation Requirements

Recent developments by the Association to Advance Collegiate Schools of Business (AACSB), as exemplified by Standard A5, require learning to develop knowledge and integration of information systems within accounting, with output of data creation, data sharing, data analytics, data mining, data reporting, and data storage within and across organizations. The AACSB recommends an integrated, interdisciplinary curriculum that includes statistics, data management, analytics, and big data tools. An institution offering degrees in accounting can apply for AACSB Accounting Accreditation on a voluntary basis. Requirements include being an AACSB International member institution, and be an AACSB Business Accredited

institution or apply for both. The AACSB Accounting Accreditation follows a similar rigorous self-evaluation and peer-review process. In total 189 institutions have obtained an AACSB Accounting Accreditation (Augustine et al, 2019; AACSB, 2019ab).

The American Accounting Association (AAA) has also refocused their attention on education, understanding that critical changes are occurring within higher education. The key issues identified include the evolving accounting professoriate, use of learning technology, and accounting curricula innovation (AAAHQ, 2016). The National Association of State Boards of Accountancy (NASBA) is also looking for feedback to evolve the Certified Public Accountant (CPA) licensure, to include the need for new data analytics skills in an era of rapid technological advancement (Tysiac, 2019). The Pathways Commission developed by the American Institute of Certified Public Accountants (AICPA) and the American Accounting Association (AAA), studied accounting education and recommended that learning should be transformed to reflect both current and emerging technologies and trends in business, with technology representing the ability to gather, transform and analyze data used for decision making. The commission recommends that accounting programs integrate these technologies throughout the curriculum. A Pathways' survey of accounting practitioners recommended business analytics as one of the top two skills for students. (Pathways Commission, 2017; Janvrin, et al., 2017).

**Industry Requirements**

The demand for data-driven analytics professionals is generating recruiting and retention challenges for employers. The most critical skills employers are seeking for their teams include identifying data trends, data mining, statistical modeling, data analysis, verbal and written communication skills (Robert Half, 2016). These challenges extend to the four largest accounting firms, known as the "Big 4," whose members include PwC, Deloitte, EY, and KPMG (Big 4 Accounting Firms, 2016). Given the rapid macroeconomic changes occurring in business, leaders in these firms are recruiting individuals with the skills to help them compete. Literature from the Big 4 accounting firms were reviewed to identify the relative importance of accounting skills and included analytical, computing, quantitative, and complementary skills. For example, PwC offers accounting curriculum skills in technology and data analytics for students. In PwC's Annual Global CEO survey, 73% of respondents were concerned with finding key skillsets needed to support growth, 58% were concerned with the speed of technological change, and 80% placed data mining and analysis as one of the top 2 strategic technologies along with fluency in the use of mobile technology. However, one of the greatest barriers to using more analytics stems from lack of skillsets (PwC, 2015).

PwC recommends that universities include analytical components into current curriculum to expand core accounting skills (PwC, 2015). Most universities only offer an introduction course on computers or statistics for accounting majors, but there is a growing trend in dual majors such as Accounting and Information Systems. PwC (2015) suggests the following course curriculum map: 1. Basic Computing course (Programming, Coding, Spreadsheet, Database, Python, Java, Excel, Access, SQL, MongoDB, Hadoop). 2. Basic Statistics course (Programming, Data Gathering, Data Cleansing, Data Visualization, Descriptive Statistics, Multivariate Statistics, Data Analytics, R, Tableau, SpotFire, Qlikview). 3. Intermediate Statistics course (Analysis, Collaboration, Statistical Inference, Missing Data, Univariate Regression, Multivariate Regression, General Linear Model, Logistic Regression, Machine Learning, and Predictive Tools). 4. Additional complementary professional skills, including Leadership, Business Acumen, Global Acumen, and Relationships.

Deloitte also identified the trend of universities beginning to develop more quantitative analysts and data scientists. Technical skills identified include design thinking, visualization, and storytelling. General skills include thinking critically, collaboration, and communication (Deloitte, 2015). Specialists within Deloitte's Analytics group analyze information and provide insights using data mining, business intelligence, data warehousing, data visualization, and predictive modeling (Deloitte, 2019a). Deloitte has also transformed their auditing area to embrace advanced analytics capabilities. This allows audit professionals to data mine large sets of data, and deliver granular insights. To fill this role, auditors require enhanced data analytic skills to improve audit quality and decision making (Deloitte, 2019b).

EY has incorporated analytics into their business offerings, and defines analytics as the management and use of data, statistical analysis, quantitative analysis, explanatory models, predictive models, and fact-based management (EY, 2016). In 2019 EY launched a data science challenge to identify and develop data science

talent from universities in 16 countries and regions around the world. The goal of the challenge is to help develop career data scientists whose mission is to help businesses in their transformation to the digital age.

**Table 1.** Accounting Analytics Skills

| Category | Skills |
|---|---|
| Functional | Budgeting, tax, financial, auditing, managerial, not-for-profit, accounting research skills |
| Analytical and Quantitative | Big Data, Business Intelligence, enterprise analytics, information management, machine learning, explanatory and predictive analytics, data visualization statistics, statistical analysis, statistical inference, missing data, univariate and multivariate, regression, General Linear Model, logistic regression |
| Information Technology and Computing | Microsoft Office, security, XBRL, ERP, programming, coding, database, Python, Java, Excel, Access, SQL, Hadoop, R, Tableau, SpotFire, Qlikview, QuickBooks, tax preparation software |
| Complementary and Generic | Leadership, global acumen, relationships, fact-based management, communication, teamwork, ethics, critical thinking |

KPMG has incorporated analytics into their business offerings, which include Big Data, business intelligence, enterprise analytics, and information management (KPMG, 2016). At a graduate course level, KPMG has also developed a Master of Accounting with Data and Analytics Program collaborating with universities to offer a forward-thinking data analytics program, with specialized curriculum, use of state of the art analytics technology, and real-world client experience through KPMG tools and data sets. The curriculum framework includes: Data Analysis and Visualization, Systems for Data Analytic, Auditing through Information Systems, Probability and Uncertainty and Statistical Decision Making, Auditing with KPMG Automated Audit Procedures, The Future of Data and Analytics, The Future of Data and Analytics in the Tax Practice, Data Mining for Business Intelligence, and Fraudulent Financial Reporting. While much focus has been prepared at the graduate level, additional opportunities exist for undergraduate coursework (KPMG, 2017). A combined set of core accounting information systems and analytics skills are developed and are shown in Table 1. The skillset categories include functional, analytical and quantitative, information technology and computing, and complementary and generic.

## 3. RESEARCH METHODOLOGY

### Text Analytics

Text analytics is a relatively recent term and is an umbrella term which includes information retrieval, information extraction, data mining, and text mining. Estimates are that 85% of data are stored in unstructured text documents, organizations that utilize the information in these sources, e.g. to spot trends, opportunities and weaknesses, can gain an advantage and improve decision-making (Sharda, 2014). Text mining is an extension of data mining and is an automated method used to find and extract useful patterns, models, directions, trends or rules from unstructured text. Typically, the text mining process consists of the following steps: data selection, data cleansing, data transformation, data mining, and results evaluation. Applications of text mining for information processing and analysis include classification/clustering, text summarization, link analysis, learning platform messages, and classification analysis of e-learning literature (Hung, 2008; Abdous & He, 2011).

In general, a text mining process consists of three steps: 1.) Establish the corpus, 2.) create the term-by-document matrix (TDM), and 3.) Extract patterns. The first step is establishing the corpus or the set of text documents used for discovery. All relevant documents in varying formats are included here such as HTML, XML, e-mail, documents, etc. After collection, all documents are organized into a set of directories and formatted into a standard text file format such as ASCII. The second step utilized the corpus to generate a TDM, whereby the rows are the documents, columns are the terms, and indices are the relationship between the terms and documents measured commonly in terms of frequency. During this step, standard and expert driven stop words are removed to improve differentiating value. The output of the TDM includes each unique term excluding stop terms, each unique document, and the frequency count of each term within each document. The TDM matrix dimensionality is further reduced to

improve underlying value. The last step of pattern extraction relies on methods including classification, clustering, association, and trend analysis.

**Corpus**

A set of the top twenty-five accounting programs were selected from the US News Accounting Rankings and Accounting Degree Accounting Rankings. US News is a recognized leader in university rankings, and Accounting Degree is an independent source for prospective accounting students (US News, 2017; Accounting Degree, 2018). All programs were searched and selected following identification of their web-accessible accounting course listing and descriptions. All course titles and descriptions were placed as text documents in a common repository.

**Table 2.** Term by Document (TDM) Top 15 Results

| Keyword | Frequency of Occurrences | Number of Program Documents |
|---|---|---|
| Accounting | 418 | 25 |
| Financial | 300 | 25 |
| Statement | 130 | 22 |
| Business | 119 | 25 |
| Information | 112 | 25 |
| Report | 98 | 23 |
| System | 97 | 24 |
| Tax | 83 | 21 |
| Analysis | 81 | 23 |
| Decision | 76 | 23 |
| Control | 66 | 20 |
| Audit | 64 | 22 |
| Management | 64 | 21 |
| Income | 57 | 23 |
| Principle | 56 | 21 |

**Term-by-Document Matrix**

Following data collection, a Term-by-Document Matrix (TDM) was generated. Several passes were made to remove "stop words." Stop words are the most common words in language, such as "the" and "and." They do not efficiently add value to a search, and actually make searches less efficient by including distracting information that is not relevant to the core search. Stemming, which is the act of reducing key terms to their base root, was also performed. This procedure simplifies the search by automatically searching for plurals and various verb tenses of key search terms. Row counts were performed, identifying the top 15 occurrences based on frequency and presence in program documents. For example, the term "accounting" occurred 418 items within all 25 program documents, whereas "tax" occurred 83 times within 21 program documents.

## 4. RESULTS

**Extract Patterns**

Cluster analysis is one technique that can be utilized to segment a corpus into mutually exclusive groups and further extract patterns (Baltzan, 2015). Cluster analysis was performed using a hierarchical clustering algorithm, which groups the records together based on similarity of courses text as measured by distance between coordinates. Each record begins as a cluster, with the two nearest clusters merged, repeating until distinct clusters are formed. As an unsupervised machine learning algorithm, cluster analysis is often iterative and exploratory (Woodside, 2018). Cluster analysis was run in iterations beginning with k=2 to identify clusters with segmented centroid distances, a minimum of n=2 records within each cluster, and individual records representative of descriptive terms to allow naming. A final cluster analysis with k=3 was selected based on this criteria. Following cluster analysis generation and results review, three primary clusters were identified and named based on record selection: 1.) General Accounting, 2.) Operational/Internal Audit, and 3.) Financial/External Audit as shown in Appendix Table 3. Financial audit or external audit reviews the financial statements of an organization through an external auditor using a standard framework. Operational audit or internal audit reviews the internal controls, fraud, compliance, financial information, risk management, operations, and governance through employees of the organization and covers several topics outside of a financial statements focus (Types of Audit Engagements, 2017).

*See Appendix Table 3*

**Results Discussion and Interpretation of Findings**

Based on the text analysis, gaps between the curriculum course descriptions and the accounting analytics skillsets are identified. Functional skillsets of accounting are well established; however, there exists curriculum gaps in the analytical, quantitative, computing and complementary skillsets in the core accounting programs, with skillset categories identified in Table 4.

**Table 4.** Accounting Analytics Skillset and Curriculum Gaps

| Skillset Category | Skillset Category Gaps |
|---|---|
| Functional | -- |
| Analytical and Quantitative | Analytics, data visualization, statistical analysis |
| Information Technology and Computing | Programming and coding |
| Complementary and Generic | Leadership, global knowledge |

**Undergraduate Program Recommendations**

Following review, a summary undergraduate program plan and recommendations are developed to address the gaps identified and professionally prepare students. A sample accounting analytics course sequence and curriculum map is shown in Appendix Figure 1. The knowledge areas are segmented into accounting domain knowledge with seven units, analytics and computing knowledge with five units, and global knowledge and ethical leadership with three units. Given the increased focus on analytical curriculum skills, an analytics area of emphasis or concentration may be denoted on the student's transcript to further certify their capabilities in this area.

*See Appendix Figure 1*

**Limitations**

Accounting programs are limited in the number of hours that they can offer, and they use those hours to emphasize courses that prepare students for the rigorous Uniform CPA examination with college credit requirements varying by state (Roger CPA Review, 2009). For those programs, complete implementation of the curriculum recommendations may be unachievable for those students without a double major or at least a minor in analytics. As an alternative for universities with credit hour constraints, analytics projects could be incorporated into existing accounting courses much the same way that manual accounting projects in principles courses were eventually automated. For example at Duquesne University courses have been updated to include additional skillsets, such as including advanced Excel skills within managerial/cost accounting courses, and including Enterprise Resource Planning (ERP) systems within AIS and Auditing coursework (AICPA, 2015). Extending the analytics project integration to accounting analytics, Chambers, et al. (2018) developed a budgeting case using the Internal Revenue Service's Statistics of Income, which is a free database providing aggregate statistics on income and common expenses by industry type and company size as shown in Appendix Figure 2. Development of these types of cases are still in an early stage, and requires a firm foundation within the core business curriculum as well as interdisciplinary collaboration between analytics and accounting faculty (Chambers, et al., 2018).

*See Appendix Figure 2*

## 5. FOLLOW-UP RESEARCH OPPORTUNITY: ADAPTATION OF A STANDARD ACCOUNTING PROJECT TO INTEGRATE IT

To further outline pathways and opportunities for research, a specific example of adapting a standard federal individual income tax assignment to include more technology is provided. An accounting faculty member with only moderate technology savvy using this type of adaptation would not need additional training or monetary investment. Several technologies are incorporated in this example, but all are at a basic level so as not to distract students from accounting content or sidetrack faculty with technology questions. This adaptation is scheduled to be launched at one private university in Fall 2019 and includes a brief research task as promoted by accountants. The key to this Research task can come from IRS Publications at a basic level for undergraduates, or from the Internal Revenue Code as tested on the Regulation section of the Uniform CPA exam for a more rigorous challenge. While Parts 3 and 4 rely on Part 2, Parts 2 and 5 may be assigned separately or in combination as shown here, with or without Part 3 and/or 4 if a smaller change to current assignments is desired.

*See Appendix Table 5*

## 6. CONCLUSION AND ORIGINAL CONTRIBUTIONS

While many graduates are initially employed in public accounting, long-term most are employed in the private sector. Analytics and information systems skillsets have been identified as fundamental to accounting and are incorporated into all career areas, however most accounting programs focus on superficial coverage beyond introductory courses, as faculty are not provided detailed area content coverage and ways to integrate within the accounting curriculum (Rebele and St. Pierre, 2015). The Accounting Analytics customized curriculum addresses the

prior research gaps, and provides students an opportunity to take advantage of the growing interdisciplinary field and student interest among accounting, business, and technical career paths. The curriculum is developed to better prepare graduates with the critical knowledge, skills, and abilities to be successful in this new-age workforce. Originality of the approach and contributions include the advancement of accounting information systems research, through research that contains an empirical focus via text analytics, demonstrating AASCB accreditation requirements, and through a formalized curriculum map addressing key skills gaps to align accounting analytics coursework with industry-required skills.

## 7. REFERENCES

AACSB. (2019a). Accounting Accreditation. http://www.aacsb.edu/accreditation/accounting.

AACSB. (2019b). Eligibility procedures and accreditation standards for accounting accreditation.

Abdous, M. and He, W. (2011). Using text mining to uncover students' technology-related problems in live video streaming. *British Journal of Educational Technology*, 42 (1): 40–49.

AICPA. (2015). How one accounting department is preparing students for the updated CPA Exam. https://www.aicpa.org/interestareas/accountingeducation/newsandpublications/duquesne-accounting-program-cpa-exam.html

American Accounting Association. (2016). http://aaahq.org/tlc

Anon. (2017). Types of Audit Engagements. Accounting-Simplified.com. http://accounting-simplified.com/audit/introduction/types-of-audits.html

Anon. (2018). Best Undergraduate Accounting Programs Super Ranking (2018). https://www.accounting-degree.org/best-accounting-schools/

Augustine, F.K., Woodside, J.M., Mendoza, M., Chambers, V. (2019). Analytics, Accounting and Big Data: Enhancing Accounting Education. Journal of Management and Engineering Integration.

Baltzan, P. & Phillips, A. (2012). Business Driven Technology. New York, NY: McGraw-Hill Irwin.

Burgess, B. (2019). EY announces the launch of a global data science challenge. https://www.ey.com/en_gl/news/2019/03/ey-announces-the-launch-of-a-global-data-science-challenge-to-identify-and-develop-top-talent-in-analytics-and-artificial-intelligence

Chambers, V., Woodside, J.M., Mendoza, M. (2018). Using IRS big data as a budgeting tool for managers. American Accounting Association Southeast Region Meeting.

Cortez, G.M. (2019). Data science skills seen critical to future-proofing jobs. Business World. https://www.bworldonline.com/data-science-skills-seen-critical-to-future-proofing-jobs-dole/https://www.bworldonline.com/data-science-skills-seen-critical-to-future-proofing-jobs-dole/

Deloitte. (2015). Universities Step Up. Deloitte development group.

Deloitte. (2019a). Deloitte Analytics. https://www2.deloitte.com/global/en/pages/deloitte-analytics/careers/opportunities-bound.html

Deloitte. (2019b). The power of advanced audit analytics. https://www2.deloitte.com/us/en/pages/deloitte-analytics/articles/us-the-power-of-advanced-audit-analytics.html

EY. (2016). Big Data and Analytics. http://cdn.ey.com/digital/analytics.html

Janvrin, D.J., Watson, M.W. (2017). Big Data: A new twist to accounting. *Journal of Accounting Education*, 38: 3-8.

Kearns, G. S. (2014). The Importance of Accounting Information Systems in the Accounting Curricula: A CPA Perspective. *AIS Educator Journal*, 9(1): 24-40.

Hung, J. (2012). Trends of e-learning research from 2000 to 2008: Use of text mining and bibliometrics. *British Journal of Educational Technology*, 43(1): 5–16.

Kokina, J., Pachamanova, D., Corbett, A. (2017). The role of data visualization and analytics in performance management: Guiding entrepreneurial growth decisions. *Journal of Accounting Education*, 38: 50-62.

KPMG. (2016). Analytics. http://advisory.kpmg.us/managementconsulting/capabilities/article-analytics.html

KPMG. (2017). KPMG Master of Accounting with Data and Analytics Program. http://www.kpmgcampus.com/your-career-with-kpmg#accounting.

McKinney, E., Yoos, C.J., Snead, K. (2017). The need for 'skeptical' accountants in the era of Big Data. *Journal of Accounting Education*, 38: 63-80.

Pathways Commission. (2014). Charting a national strategy for the next generation of accountants. http://commons.aaahq.org/posts/a3470e7ffa.

PwC. (2015). Data driven: What students need to succeed in a rapidly changing business world.

Rebele, J.E., St. Pierre, K.E.. (2015). Stagnation in accounting education research. Journal of Accounting Education Volume 33: 128–137.

Robert Half. (2016). Business Analytics in Accounting. https://www.roberthalf.com/blog/salaries-and-skills/business-analytics-in-accounting-boost-your-skills-and-your-career

Roger CPA Review. (2009). What Accounting Classes Should I Take to Prepare for the CPA Exam? https://www.rogercpareview.com/blog/what-accounting-classes-should-i-take-prepare-cpa-exam

Sharda, R., Delen, D., Turban, E. (2014). Business Intelligence a Managerial Perspective on Analytics. Pearson, Upper Saddle River, NJ.

Shimamo, D.C. (2013). How CPAs Can Drive Business Intelligence. CPAs and Business Intelligence. AICPA.

The Big 4 Accounting Firms. (2017). http://www.big4accountingfirms.org/

Tysiac, K. (2019). NASBA and AICPA seek input on evolving licensure model. Journal of Accountancy News Post.

US News. (2017). Best Colleges. http://colleges.usnews.rankingsandreviews.com/best-colleges/rankings/business-accounting/data

Vickrey, W. (2013). Should CFOs Oversee Big Data And Accounting Analytics? CFOs and Analytics. Business Analytics and Financial Reporting.

Woodside, J. (2018). Applied Health Analytics and Informatics Using SAS. SAS Press, Cary NC.

# Appendix

**Table 3.** Cluster Output

| Cluster Description | Keywords | # Records | % Records | Universities |
|---|---|---|---|---|
| 1 – General Accounting | Understanding, Accounting Information, Tools, Focus, Services, Decision, Issues, Principles, Reporting, Control | 7 | 28% | Miami University Ohio, New York University, St. Joseph's University, University of Illinois-Urbana-Champaign, University of Notre Dame, Indiana University-Bloomington, Virginia Tech |
| 2 – Operational / Internal Audit | Financial accounting, topics, taxation, cost, financial statements, financial, managerial, accounting, concepts, auditing | 12 | 48% | Brigham Young University-Provo, Michigan State University, The University of Mississippi, University of Texas-Austin, University of Pennsylvania, University of Michigan-Ann Arbor, University of Florida, University of Georgia, University of Missouri, University of Washington, University of Virginia-McIntyre, Wake Forest University |
| 3 – Financial / External Audit | External, Reporting, research, systems, tax, introduction, issues, analysis, principles, control | 6 | 24% | Ohio State University, Texas A&M University, University of Southern California, University of California Berkeley, University of Wisconsin, University of Alabama |

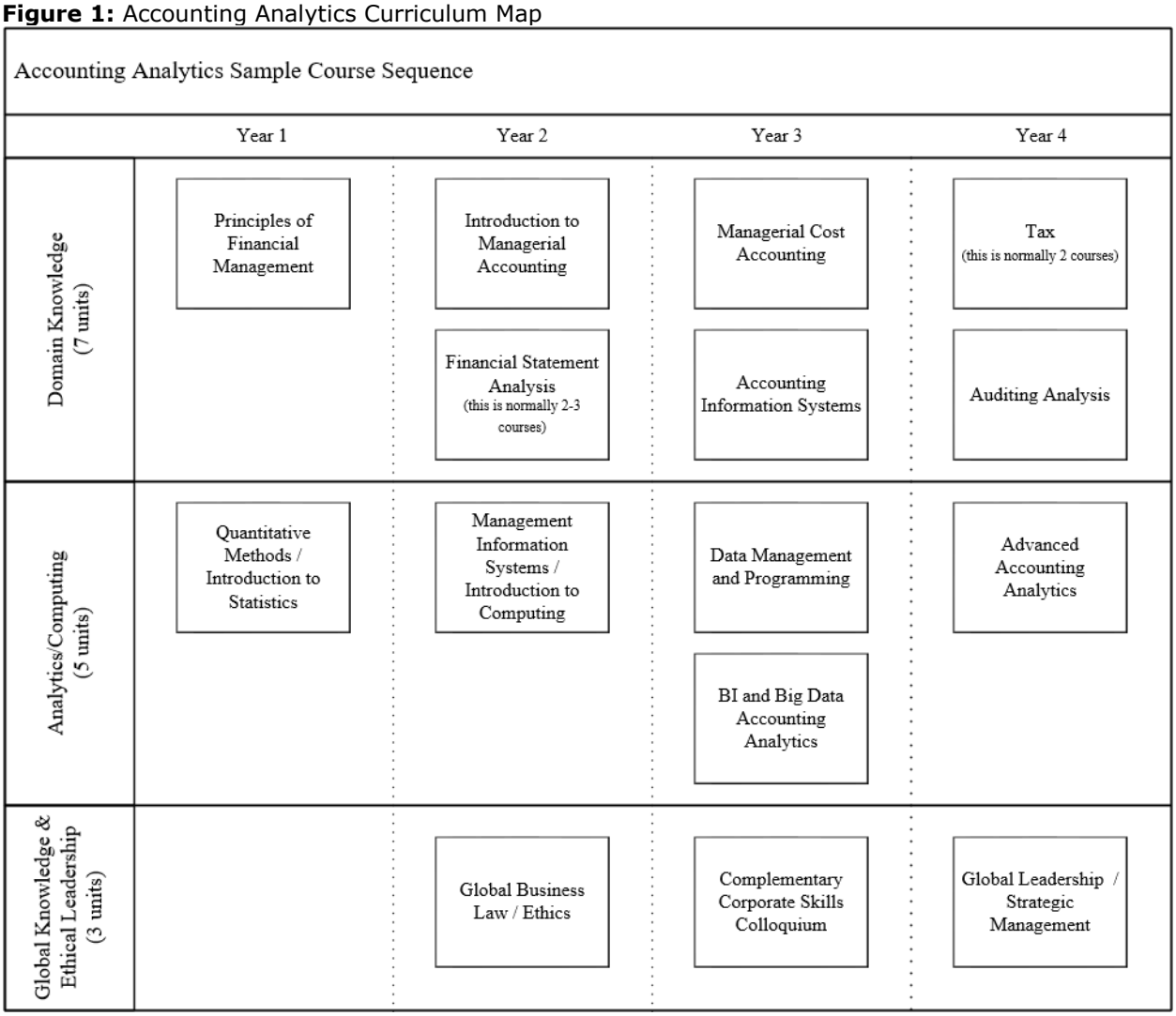
**Table 5.** Standard Tax Preparation Assignment Adapted to Integrate Additional Technology

| Required Task | AACSB A7 Skill | Kearns (2017 Skill) | IT Software | Points |
|---|---|---|---|---|
| 1. Prepare hypothetical tax return with Schedule C (no change from original project) | Data creation & Data reporting | Functional | ProSeries, TaxAct or other professional tax preparation software | 75 |
| 2. Find the latest Statistics of Income for this business (for Architect, e.g. use https://www.irs.gov/pub/irs-pdf/p1136.pdf). Provide a screenshot (see Figure 1) and import the data into Excel | Data mining | IT – mining | Web and Excel | 5 |
| 3. Create a comparative spreadsheet where Column A is the specific revenue or expense category, Col. B is the client figures from the 1040, Col. C are the amounts from the SOI table | Data analytics | IT – transformation | Excel | 5 |

ISSN: 2473-3857
v5 n4915

| | | | | |
|---|---|---|---|---|
| above, and Col. D is the % difference between Cols. B & C. | | | | |
| 4. Graph the most important variance | Data analytics | IT- visualization; Generic – critical thinking and communication | Excel or other visualization software | 5 |
| 5. Research and write a one-page or less essay answering these questions: a) With whom can a tax preparer share 1040 data? b) How long must a preparer keep copies client tax returns? c) What other data security rules apply to client tax returns? Cite sources. | Data sharing Data storage | Generic – problem solving and communication | Web, and Internal Revenue Code if added to the task | 5 |

**Figure 1:** Accounting Analytics Curriculum Map



ISSN: 2473-3857
v5 n4915

**Figure 2:** Screenshot of Table 2 Excerpt from the IRS: Statistics of Income

**Table 2. Nonfarm Sole Proprietorships: Income Statements, by Industrial Sectors, Tax Year 2016—Continued**
[All figures are estimates based on samples—money amounts are in thousands of dollars]

| Net income status, item | Professional, scientific, and technical services—continued | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Architectural, engineering, and related services | | | | | | | |
| | Total | Architectural services | Engineering services | Drafting, building inspections, and geophysical surveying | Surveying and mapping (except geophysical) services | Testing laboratories | Specialized design services | Computer systems design services |
| | (96) | (97) | (98) | (99) | (100) | (101) | (102) | (103) |
| **BUSINESSES WITH AND WITHOUT NET INCOME** | | | | | | | | |
| **Number of returns [1]** | **280,184** | **129,573** | **90,208** | **47,176** | **7,272** | **5,954** | **265,140** | **280,871** |
| **Business receipts, total [1,2]** | **16,384,728** | **8,033,296** | **5,824,908** | **1,579,742** | **434,146** | **512,638** | **10,336,499** | **12,403,274** |
| Income from sales and operations [1] | 16,211,318 | 7,873,243 | 5,812,334 | 1,579,673 | ** 946,068 | ** | 10,178,124 | 12,382,642 |
| Other business income (loss) [1] | 173,410 | 160,053 | 12,574 | * 68 | ** 716 | ** | 158,375 | 20,631 |
| **Business deductions, total [1,2]** | **11,267,744** | **6,001,433** | **3,688,253** | **822,748** | **305,990** | **449,321** | **7,885,318** | **7,322,694** |
| Cost of sales and operations, total | 3,486,585 | 1,804,350 | 1,496,772 | ** 185,463 | ** | * [4] | 3,771,361 | 1,852,685 |
| Inventory, beginning of year | 86,024 | * 14,162 | ** 71,861 | ** | 0 | 0 | 104,282 | 115,637 |
| Cost of labor | 412,553 | 293,698 | ** 118,855 | ** | 0 | 0 | 167,459 | 574,986 |
| Purchases | 1,132,646 | 516,516 | 582,017 | 14,136 | 659 | * 19,319 | 2,285,178 | 698,541 |
| Materials and supplies | 932,816 | 737,751 | 133,001 | * 7,019 | ** 55,045 | ** | 706,221 | 75,720 |
| Other costs | 1,006,359 | 254,710 | 662,526 | ** 89,124 | 0 | ** | 623,540 | 516,175 |
| Inventory, end of year | 83,814 | * 12,488 | ** 71,327 | ** | 0 | 0 | 115,319 | 128,374 |
| Advertising expenses | 112,734 | 70,177 | 21,622 | 17,376 | * 610 | * 2,949 | 128,202 | 188,598 |
| Car and truck expenses | 767,547 | 410,023 | 169,769 | 135,697 | 9,760 | * 42,299 | 450,674 | 527,677 |
| Commissions | 66,212 | 59,472 | 4,857 | ** 1,885 | ** | 0 | 53,779 | 78,853 |
| Contract labor | 800,643 | 317,850 | 257,349 | 67,098 | 78,387 | * 79,958 | 350,668 | 707,515 |
| Depletion | * 151 | ** | 0 | ** 151 | 0 | 0 | 0 | * 26 |
| Depreciation | 548,593 | 375,067 | 79,613 | 21,293 | * 47,041 | * 25,579 | 207,408 | 155,871 |
| Employee benefit programs | 78,097 | 38,847 | 31,626 | * 4,565 | * 1,122 | * 1,936 | 8,344 | 44,398 |
| Insurance | 298,884 | 185,385 | 66,522 | 30,750 | 12,678 | 3,550 | 42,942 | 42,735 |
| Legal and professional services | 237,287 | 124,311 | 89,056 | 16,338 | 3,765 | 3,817 | 113,365 | 114,886 |
| Meals and entertainment deducted | 90,387 | 41,906 | 34,497 | 12,202 | 569 | * 1,213 | 70,334 | 93,539 |
| Mortgage interest | 28,709 | 10,470 | * 6,861 | * 11,154 | ** 224 | ** | 6,962 | 5,164 |
| Other interest paid on business indebtedness | 55,906 | 28,254 | 20,082 | * 2,402 | * 367 | * 4,801 | 30,463 | 24,129 |