AHIMA VLab™ – Impacts on Health Information Education

By

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AHIMA VLab™ – Impacts on Health Information Education

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ABSTRACT

Objective: To examine whether student use of AHIMA VLab™ in their academic programs impacts the pass/fail outcomes on their first-attempt national certification exams. This is a four-year longitudinal study, spanning 2017-2020.

Methods: Data were extracted from two separate databases: the AHIMA association management system (AMS) known as Aptify and the Pearson Vue™ certification testing platform. The study group were: students who had an active AHIMA VLab™ enrollment (from Aptify) before sitting for one of five national certification exams of interest and students who actually sat for an exam (from PearsonVue™). Initial analysis was performed via descriptive statistics and final analysis was performed by inferential statistics via binary logistic regressions.

Results: A statistically significant (P < .000) positive relationship exists for student use of AHIMA VLab™ and passing the CCA and RHIT exams; there is no appreciable relationship for student use of AHIMA VLab™ and passing the RHIA exam; and a statistically significant (P < .000 and P=.018 respectively) negative relationship exists for student use of AHIMA VLab™ and passing the CCS and CCS-P exams.

Conclusion: Educators are encouraged to carefully examine and select learning resources that meet learners’ needs. Multiple resources from varied sources may be required. Where any resource may fall short of fully meeting learners’ needs, supplemental learning resources are necessary. This is the lens through-which one must view AHIMA VLab™.
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DEDICATION

This dissertation is dedicated to my wife Laura Richey and our grown children Nathan and Brianna: my love for you is boundless.
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Chapter I

INTRODUCTION

1. Background

In early 2006, the American Health Information Management Association (AHIMA) and its Foundation of Research and Education (FORE) launched a pilot test of a new electronic learning (e-learning) platform known as Virtual Lab. Since then, Virtual Lab usage has grown and has undergone many updates – so much so that the e-learning platform is now a recognized trademark, AHIMA VLab™. Health information educators have assumed that AHIMA VLab™ facilitates students’ entry into the healthcare workforce by providing an e-learning platform upon which students can develop and hone their health information skills. To-date, although one formal study has been conducted on the topic of faculty user acceptance of the Virtual Lab (as it was known at the time), no formal studies have been launched or published to definitively quantify the impact the AHIMA VLab™ has on health information education.

2. Problem Statement

This work will begin to remedy that research gap by answering the research question “Does student use of AHIMA VLab™ in their academic programs impact pass/fail outcomes on their first-attempt national certification exams?” Data will be extracted and studied from two separate datasets; AHIMA’s association management system (AMS) known as Aptify and the Pearson Vue™ national certification exam score database. The study timeframe is 2017-2020.
3. Research aims

This study was mindfully and intentionally launched to accomplish the following research aims:

- contribute to the body of knowledge
- establish baseline information and knowledge on the impacts of the AHIMA VLab™ on health information education
- support continued expansion of AHIMA VLab™ into:
  - existing market segments
  - new market segments
  - interprofessional education
  - “upskilling pathways” via professional development content and continuing education units (CEUs)
- benefit the health information profession
- benefit the healthcare industry
- inspire future researchers

4. Research hypothesis

This work will ultimately answer the research question “Does student use of AHIMA VLab™ in their academic programs impact pass/fail outcomes on their first-attempt national certification exams?” More formally, the null hypothesis is: “Student use of AHIMA VLab™ in their academic programs has no impact on pass/fail outcomes on their first-attempt national certification exams. Thus, the alternative hypothesis becomes: “Student use of AHIMA VLab™ in their academic programs has an impact on pass/fail outcomes on their first-attempt national certification exams.”
5. Significance of the Study

This study is significant because it is the first of its kind to attempt to quantify the impacts of the AHIMA VLab™ on health information education, more specifically the extent to which student use of AHIMA VLab™ in their academic programs impacts pass/fail outcomes on their first-attempt national certification exams. Future research is encouraged to assure that AHIMA VLab™ continues to inform AHIMA education and enterprise strategy and support health information education going forward.
Chapter II.

REVIEW OF RELATED LITERATURE

1. Literature review liberties

The author of this research study asks readers’ permission to have taken several liberties in this literature review. First, with written permission of the original publisher, several full-text or near full-text articles are included in the Appendices section - because they are so foundational to this research study and are also provided for reader convenience. Second, “a good rule of thumb is to use sources published in the past 10 years for research in the arts, humanities, literature, history, etc.‖\(^1\) The AHIMA VLab™ e-learning platform, upon which this research study is based, was developed prior to - and ultimately went to market in 2006. This author believes it important to capture the history and evolution of the product, thus article citations commensurate with that timeframe and going forward to present day are included in this literature review. Third, to better reflect the development and evolution of the AHIMA VLab™ e-learning platform, this author has chosen a general chronological presentation of article citations. Fourth and lastly, because of the very narrow and specific topic and nature of this research study, the vast majority of the citations for this work are from a variety of AHIMA sources. This author is grateful to readers for allowing these liberties.

2. E-learning strategic foundation

In 2002, the American Health Information Management Association (AHIMA)

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\(^1\)FAQ: How old should or can a source be for my research? Accessed 5/12/21. https://libanswers.snhu.edu/faq/215024.
began investigating better ways of delivering training and education content to benefit its members and stakeholders. A foundational article to this research topic is the first published evidence that AHIMA started to view e-learning to be of strategic importance and set the stage for AHIMA’s further development of e-learning to benefit its members. In her 2002 Journal of the American Health Information Management Association (JAHIMA) article entitled “Closing the Knowledge Gap with E-learning,” former AHIMA Director of Continuing Education and Training Lana Vukovljak provided a definition of electronic learning (e-learning), described the benefits of e-learning, outlined steps organizations should take to prepare for e-learning, described ways to make e-learning more appealing to employees and provided a Checklist for E-learning Success which healthcare enterprises could use to help prepare for e-learning – see Appendix A.

Another foundational article provided additional evidence that AHIMA started to view e-learning to be of strategic importance and underscored the importance of educators’ need to carefully and thoughtfully choose the learning resources which they want to use in their teaching. It also set the stage for AHIMA’s further development of e-learning to benefit its members. Extending her work into 2004, Vukovljak and co-author James M. King continued exploring innovative ways in which AHIMA could help members and stakeholders develop and keep their skills current and relevant in the workplace. In their June 2004 JAHIMA article entitled “Tools for Lifelong Learning,” industry stakeholders were informed on the importance of aligning technology with  

learning outcomes and teaching strategies. Appendix B provides more information on learner management systems (LMS), telecommunication devices and collaboration tools and technologies – which educators could use to prepare themselves for success in an e-learning environment.

AHIMA soon recognized the future strategic importance of the preliminary groundwork contributions which Vukovljak made via her articles, which ultimately became official organization strategy. A critical AHIMA President’s Message provided bona fide evidence that AHIMA now views e-learning to be of strategic importance and also announced AHIMA’s strategic intention to develop and deploy a new e-learning platform – the virtual lab. In her February 2005 JAHIMA article entitled “Setting Our Strategic Directions,”4 Mervat Abdelhak informed industry stakeholders about strategic goals and priorities for 2005. The planned virtual lab falls under the strategic area of Education and Certification.

Two interviews were conducted under this research study, featuring interviewees who were each integral to the development and launch of the virtual lab. The first interviewee is Desla Mancilla, DHA, RHIA and the second interviewee is Sandra Kersten, MPH, RHIA. Please refer to Appendix C, Appendix D and Appendix E for the complete set of interview questions and responses from each interviewee, respectively. The Mancilla interview5 contributes to this research because:

- it outlines the collaborative and matrix nature of the e-learning platform - with contributions from educators, vendors and association staff and

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• it is additional evidence that AHIMA views e-learning to be of strategic importance.

The Kersten interview\(^6\) contributes to this research because:

• it provides the unique perspective of the first person to have direct management responsibility over AHIMA virtual lab
• it outlines the direct support of the AHIMA Board of Directors and
• it is additional evidence that AHIMA views e-learning to be of strategic importance.

AHIMA continued building the virtual lab and informing its members of the strategic importance of the new e-learning platform. Another Abdelhak article contributes to the research because it describes the collaborative and matrix nature of the e-learning platform - with contributions from educators, vendors and association staff (see Appendix F). The article outlines the connection between education and workforce and it is additional evidence that AHIMA views e-learning to be of strategic importance. In her June 2005 President's Message\(^7\), then AHIMA President Mervat Abdelhak updated education stakeholders on how the virtual lab can best-prepare student graduates for entry into the workforce through use of the latest available, real-world technologies.

A November 2005 article contributes to the research because it reflects how AHIMA was in active collaboration with many stakeholders, legislators and others to assure that future graduates would indeed lead healthcare organizations into the

electronic health record (EHR) future. Dan Rode, then AHIMA Vice President of Policy and Government Relations updated AHIMA members that AHIMA is collaborating with multiple public and private organizations to bring electronic health record (EHR) education to students and professionals through the virtual lab.8

The AHIMA Academic Advisory Council met for the first time in June 2005. The goal for this talented team of education and technology partners was to kick off the AHIMA Virtual Lab project, which was being designed to make state of the art software and lessons available to HIM education programs via the Web.9

There were three essential components to build and pilot test the initial AHIMA Virtual Lab:

1) secure vendor participation and install their software onto a common access platform – the AHIMA Virtual Lab. Appendix F displays the initial participating technology partners and their software applications. AHIMA and each participating vendor signed participation agreements.

2) design lessons under the guidance of educator volunteer subject matter experts. The initial lessons that the educators developed, were all designed around the student learning outcomes and competencies identified under the new model curricula. Within each lesson, the educators incorporated instructions on how to access and use each featured software application, with the goal of providing students the opportunity to gain hands-on experience using each application. The educators also developed an assessment for each lesson that tested students’ grasp

of the concepts learned. In this way, students developed and honed the essential skills necessary to succeed in the healthcare workforce.

3) launch/activate the e-learning platform (go-live/pilot test it) with academic programs; make some fine-tuning adjustments and then market it to academic programs across the U.S.

In late 2005/early 2006, AHIMA developed a handout which contributes to this research because: it outlined the connection between education and workforce and it is additional evidence that AHIMA views e-learning to be of strategic importance. The handout described two important ways in which AHIMA and its Foundation of Research and Education (FORE) supported academic programs:

- Model curricula—skills, competencies and student learning outcomes at the associate, baccalaureate and graduate academic level
- Virtual lab – a web based suite of real-world software applications and learning activities upon which students can build their health information skills and competencies.\(^{10}\)

AHIMA continued its efforts to seek out industry information, develop education strategies and deliver resources to benefit its members and stakeholders. An article in the March 2006 AHIMA Advantage newsletter contributes to this research because it described the impacts that EHRs will have on professional practice and education, it described the need for educators to incorporate EHR training into academic programs, it described ways in which the virtual lab can meet that need and it is additional evidence

\(^{10}\)Handout. AHIMA supports health information management academic programs: Here’s what we offer.
that AHIMA views e-learning to be of strategic importance. Health information educators were encouraged to continue incorporating EHRs and other technologies into their classrooms, specifically through the virtual lab – now expanded to over 40 campuses participating in the pilot program.\(^\text{11}\)

In her June 2006 *Journal of AHIMA* article Taking Stock: Reviewing AHIMA's 2006 Accomplishments to Date then AHIMA President Jill Callahan Dennis announced to health information stakeholders that over 40 campuses are signed-up and using the virtual lab.\(^\text{12}\) This update contributes to the research because it marked the end of the “pilot test” phase of the virtual lab and set the stage for the formal launch of the AHIMA Virtual Lab.

**3. Official launch of the e-HIM® Virtual Lab**

In September 2006, Kersten, Saigal and Owens published a groundbreaking *JAHIMA* article on the official launch of the e-HIM® Virtual Lab and now referred to as the AHIMA VLab™. The article is so foundational to this research that the full-text version is included as Appendix G for reader convenience. Written permission from the publisher has been secured to do so. This article contributes to this research because it also marked the end of the “pilot test” phase of the project - and it reflected AHIMA’s substantial investment and commitment to online and e-learning via three new staff positions to support the e-HIM® Virtual Lab, specifically: Sandra Kersten in the role of Sr. Project Manager, Mohit Saigal in the role of System Administrator and Kathie


Owens in the role of Instructional Designer.\textsuperscript{13}

4. Growth and expansion across the U.S.

With the official product launch completed in September 2006, AHIMA turned its attention to growing and expanding the e-learning platform to health information academic programs at campuses across the U.S. The September 2006 \textit{JAHIMA} article entitled “Passion for Learning” by then AHIMA CEO Linda Kloss contributed to this research because it reflects and reinforces the strategic importance with which AHIMA leaders at the highest levels viewed online learning to benefit students, members and stakeholders. Kloss affirmed AHIMA’s commitment to supporting academic programs and the healthcare workforce through investments in important projects such as the virtual lab. \textsuperscript{14}

The September 2006 \textit{JAHIMA} article entitled “Work Force and Education: Promoting New Competencies, Curriculum and Tools for the New Era,” by then vice president for education and accreditation at AHIMA and executive director of the Commission on Accreditation for Health Informatics and Information Management Education (CAHIIM) Claire Dixon-Lee contributes to this research because it describes the impacts EHRs will have on professional practice and education, it describes the need for educators to incorporate EHR training into academic programs, it describes ways in which the virtual lab can meet that need and it is additional evidence that AHIMA views e-learning to be of strategic importance. Dixon-Lee discussed the impact of EHRs on the healthcare workforce, discussed the importance of a well-trained workforce, introduced


new entry-level curriculum competencies and announced the goal to expand the virtual lab to 100 campuses and 4,000 students by 2007.\textsuperscript{15}

\textbf{Appendix I} displays a line graph of the Number of AHIMA VLab\textsuperscript{TM} Campuses Subscribed from 2006 to year-end 2020. By the end of its first full year of operation, there were 69 campuses subscribed to what is now known as AHIMA VLab\textsuperscript{TM}. With the targeted marketing, communication and training efforts, steady annual growth continued until 2012 to a then-peak of 279 campuses subscribed. This is significant because there are roughly 370 CAHIIM-accredited associate, baccalaureate and graduate-level academic programs, indicating that AHIMA VLab\textsuperscript{TM} has captured around 75\% of the market.

AHIMA continued sharing the e-HIM\textsuperscript{®} Virtual Lab message with members and stakeholders. The year-end 2006 issue of \textit{AHIMA Advantage} contributes to this research by reminding stakeholders about the launch of the AHIMA e-HIM\textsuperscript{®} Virtual Lab earlier in the year, with a focus on supporting students, educators, academic programs and the workforce.\textsuperscript{16}

AHIMA also expanded its e-HIM\textsuperscript{®} Virtual Lab outreach messages into in-person meetings venues. The January 2007 AHIMA \textit{Advantage E-Alert} contributes to this research because the annual Assembly on Education (AOE) Symposium is AHIMA’s premier national networking event for health information educators and is the perfect venue to demonstrate and provide faculty training sessions on the e-HIM\textsuperscript{®} Virtual Lab.\textsuperscript{17}

\textsuperscript{16}AHIMA \textit{Advantage}. Year-end 2006;10:8.
\textsuperscript{17}AHIMA \textit{Advantage E-Alert}. 2007;9(4).
The March 2007 *JAHIMA* article entitled "Making a Difference, One Member at a Time" by then AHIMA Vice President of Policy and Government Relations Dan Rode contributes to this research because it reflects at the highest levels, AHIMA leadership’s ongoing commitment and acknowledgement of the strategic importance of the e-HIM Virtual Lab to students, educators, employers, work force, industry and other stakeholders. Rode informed industry stakeholders that AHIMA continues to collaborate with the American Medical Informatics Association (AMIA) in support of legislation which impacts health information academic programs and ultimately the healthcare workforce. Rode described how the AHIMA virtual lab helps prepare individuals to lead their employers and organizations well into the future.\^18

Additional strategic imperative was outlined within the September 2007 release of the landmark white paper *VISION 2016: A Blueprint for Quality Education in Health Information Management*. The whitepaper contributes to this research because it describes the impacts EHRs will have on professional practice and education, it describes the need for educators to incorporate EHR training into academic programs, it describes ways in which the virtual lab can meet that need and it is additional evidence that AHIMA views e-learning to be of strategic importance. The whitepaper called for health information professionals to individually commit to the training and professional development necessary to lead and thrive in the future which will collectively elevate the entire profession. Three specific focus areas were outlined: moving the profession towards the graduate level, aligning academic program content to workforce needs and increase qualified faculty. Some tactical considerations regarding the virtual lab included:

• the virtual lab was launched in 2006 in support of EHR and health information training for development of skills and competencies
• expand industry exposure to critical technologies through increased online education
• periodically add to and update virtual lab content to keep pace with rapid developments across the industry
• consider expanding the virtual lab outside of academic into professional development for practitioners.\textsuperscript{19}

The February 2008 \textit{AHIMA Advantage} newsletter entitled “Building a New Vision of HIM Education” contributes to this research because it is a call to action for educators to achieve advanced degrees, it is a call to action for educators to get hands-on exposure to cutting edge technologies, it describes the need for educators to incorporate technology training into academic programs, it describes ways in which the virtual lab can meet that need and it is additional evidence that AHIMA views e-learning to be of strategic importance. The whitepaper calls out the need for more qualified HIM faculty with advanced and doctoral degrees. While the virtual lab helps current educators keep up with technology advances, they really need more hands-on exposure to be able to lead their organizations effectively. The future of the profession depends upon it.\textsuperscript{20}

In April 2008, Claire Dixon-Lee, AHIMA Vice-President of Education and Accreditation presented an update to industry stakeholders in which she offered more context and perspective on industry trends and AHIMA responses which include the new

\textsuperscript{19}VISION 2016: A blueprint for quality education in health information management
\textsuperscript{20}AHIMA \textit{Advantage}. 2008;12:1.
e-HIM® Virtual Lab. Dixon-Lee’s presentation contributes to this research because it is a call to action for educators to get hands-on exposure to cutting edge technologies, it connects education to workforce, it describes the need for educators to incorporate technology training into their academic programs, it describes ways in which the e-HIM Virtual Lab can meet that need and it is additional evidence that AHIMA views e-learning to be of strategic importance. Dixon-Lee described several 2008 AHIMA Action Priorities including expansion of the virtual lab, also announcing that to-date, 115 campuses are signed-up. More applications were being added and educator subject matter experts continued to add more lessons and assessments. More educator training and support was available. AHIMA was exploring expansion of the virtual lab into professional development for HIM practitioners. AHIMA committed to continue such support and all were encouraged to do their part.21

The first formal research study conducted on the topic of AHIMA e-HIM® Virtual Lab was written in 2008 by Peggy L. Meli, at the time a doctoral candidate in the College of Education at the University of Central Florida, Orlando, Florida. The goal of Meli’s study was to test faculty acceptance (instructors’ perceptions, attitudes and behavioral intentions) of the AHIMA virtual lab. The significance of the Meli study can be expressed in several ways. The Meli study:

• was a pioneering research effort - the very first formal study on the topic of the AHIMA e-HIM® Virtual Lab.

• was very timely - conducted in Fall 2007, soon after the official 2006 launch of the e-learning platform and at a time when the platform was small enough to more-readily accommodate changes and modifications.

• informed strategy and tactics - provided valuable platform user data and information, summarized via actionable research insights which the AHIMA e-HIM Virtual Lab team could then use to make ongoing product and service improvements.

• set a research study baseline for the platform - upon which future research studies could be designed.

• inspired future researchers - including the principal investigator of this research study and outlined future research opportunities.

Meli encouraged future and more-specific research on the virtual lab. Concerns were expressed regarding the significant start-up and maintenance costs for the platform and future sustainability. It was also noted that significant faculty and student training were necessary to use the platform to its fullest potential and that formal instructional design may help with user friendliness.22

Wendy L. Mangin informed AHIMA stakeholders in her June 2008 JAHIMA article that 112 schools and more than 1,500 students are now using the Virtual Lab.23

This announcement contributes to this research because it reflects continued growth and expansion of the AHIMA e-HIM® Virtual Lab e-learning platform.

The September 2008 issue of the AHIMA *Academic Advisor* newsletter contributes to this research because it is evidence that AHIMA has its finger on the pulse of emerging issues and trends which affect stakeholders and it reflects AHIMA’s commitment to assure that Virtual Lab content is kept up-to-date to benefit learners and educators. In the article, AHIMA stakeholders were informed about the upcoming conversion to the *International Classification of Diseases*-version 10 (ICD-10) and that AHIMA is working closely with vendors to ensure that the Virtual Lab is updated accordingly.24

Linda Kloss shared an important update with health information stakeholders in her September 2008 *JAHIMA* article entitled “Building Mass and Flexing HIM’s Muscle.” Her update contributes to this research because it reflects AHIMA’s view of the virtual lab e-learning platform as a strategic resource, it is evidence that AHIMA has its finger on the pulse of emerging issues and trends which affect health information professionals, educators and learners, it reflects AHIMA’s commitment to assure that virtual lab content is kept up-to-date to benefit stakeholders and it states the platform’s expansion into the area of continuing education. Kloss encouraged HIM educators to continue updating their curriculum content to reflect the latest industry developments. She also announced that the virtual lab is being used by 125 HIM programs and nearly 2,000 students.25

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24 *AHIMA Academic Advisor.* 2008;ICD-10 Special Issue.
The September 2008 *JAHIMA* article by Chris Dimick entitled “Into the Laboratory: HIM Virtual Lab Offers Students EHR Experience” contributes to this research because it is the first *JAHIMA* feature article to update stakeholders following the 2006 official launch of the platform, it is evidence that AHIMA has its finger on the pulse of emerging issues and trends which affect educators, learners and health information professionals, it reflects AHIMA’s commitment to assure that Virtual Lab content is kept up-to-date to benefit stakeholders, it is additional evidence of AHIMA’s continuing view of e-learning to be of strategic importance and it provides several educators’ perspectives via several insightful quotes.26

The 2008 HIM Educator Survey summary article published in the Spring 2009 issue of *Perspectives in Health Information Management* contributes to this research because it provides further empirical evidence that the AHIMA virtual lab was indeed gaining more participating campuses, educators and learners. Houser, Tesch, Hart-Hester and Dixon-Lee described the purpose of the 2008 survey was to inform industry about issues and challenges facing HIM educators and HIM academic programs today. On the topic of the ‘Use of Virtual Learning Tools,’ 44 percent of the 402 survey respondents used the AHIMA Virtual Lab.27

The June 2009 JAHIMA article by Bonnie Cassidy contributes to this research because it outlines the new availability of billions of dollars in federal and other funding to advance health information education and professional practice, it suggests a sense of urgency to take advantage of this funding opportunity (i.e. strike while the iron is hot) and it encourages AHIMA’s continuing investment in and development of e-learning resources such as the virtual lab. Cassidy informed health information stakeholders that the American Recovery and Reinvestment Act (ARRA) provides billions of dollars for healthcare information technology and information management training and education and called upon HIM professionals to demonstrate industry leadership.28

The exciting announcement posted in the July 2009 AHIMA Advantage E-Alert newsletter contributes to this research because it reflects AHIMA’s commitment to assure that virtual lab content is kept up-to-date with current health information practice and it is additional evidence of AHIMA’s continuing view of e-learning to be of strategic importance via meaningful collaborations with industry leaders who prefer their software applications to be hosted on the platform. The newsletter article proudly announced AHIMA’s plan to add the 3M coding software to the AHIMA Virtual Lab, to be available in the Fall.29

The “Curriculum Resources” section of the July 2009 issue of AHIMA Resources for HIM Faculty contributes to this research because it reflects AHIMA’s ongoing efforts to market and expand the virtual lab to additional campuses, academic programs,

29 AHIMA Advantage E-Alert. 2009;11(29).
educators and students. Health information educators were informed about the content and features of AHIMA virtual lab and the related applications, activities and assessments. Subscription information was also outlined.30

The July 2009 article entitled “HIM Role in Assisting Regional Extension Centers” contributes to this research because it reinforces AHIMA’s view of e-learning to be of strategic importance and also national in scope. AHIMA informed industry stakeholders about the new American Recovery and Reinvestment Act (ARRA) provisions which pertain to HIM professionals. Opportunities were explored which could likely benefit AHIMA, CAHIIM, HIM academic programs and the workforce.31

The Fall 2009 AHIMA Academic Advisor newsletter featured an article by Kim Joyner, MAEd, RHIA (at the time a full-time practitioner and part-time educator at East Carolina University and adjunct faculty in the health information technology program at Pitt Community College, both located in Greenville, NC). The article contributes to this research because it is a “detailed story” – by an actual HIM educator and for other educators. Joyner’s story and ideas demonstrated several creative ways to incorporate the virtual lab across multiple courses and across multiple semesters - essentially throughout a curriculum/program. Joyner specifically mentions the competencies and skills to which all virtual lab lessons are designed. Joyner calls-out the importance of students applying the theories learned in the classroom via hands-on real-world learning activities and her ideas were likely to inspire other HIM educators across the country to consider doing the same or something similar. Joyner shared the importance of AHIMA virtual lab as a safe

30 AHIMA Resources for HIM Faculty. 2009.
practice environment where students could develop their skills using real-world health information software applications. She also described how students could apply the theories learned in the classroom through practicing on the virtual lab activities. Students could also enter patient data into the EHRs on the platform and then view it later.\textsuperscript{32}

The September 2009 \textit{AHIMA Advantage} newsletter, 2008 Annual Report – Bright Spots in Tough Times contributes to this research because it is bone-fide evidence that AHIMA views the virtual lab to be of strategic importance and national in scope. The annual report described the realities and opportunities brought on by the economic downturn. There were areas of strength and areas of challenge. Membership continued to grow. The virtual lab expanded to 150 HIM academic programs and more 2,000 students while keeping costs down.\textsuperscript{33}

The September 2009 \textit{JAHIMA} article by Chris Dimick entitled “Help wanted: Schools struggle placing students in PPEs” contributes to this research because it describes how the AHIMA e-HIM® Virtual Lab assists academic programs with securing and maintaining program-level accreditation. In the article, Karen Patena, RHIA, the HIM undergraduate program director at the University of Illinois at Chicago (UIC) shared some of her insights about the importance of professional practice experiences (PPEs), a required component for academic program accreditation. Patena described the connection between student training on the virtual lab and success in the workplace. She also described the continuing difficulty in placing students into facilities for their PPE. PPEs are a great way for students to see if HIM is the right career choice for them.

\textsuperscript{32} AHIMA Academic Advisor. 2009.
\textsuperscript{33} 2008 Annual report – bright spots in tough times. AHIMA Advantage. 2009.
Barb Glondys, RHIA who is the manager of e-learning curriculum and training at AHIMA, a Virtual Lab staff member and PPE coordinator at UIC for 13 years described how some schools use the AHIMA virtual lab to supplement their PPE activities, due to ongoing placement challenges. Kathy Cliggett, MA, RHIA, an HIM assistant professor at Gwynedd-Mercy College and also serves on AHIMA Virtual Lab Strategic Advisory Committee, cautioned that the virtual lab cannot completely replace the live PPE. Live PPEs provide a much richer learning experience than can be had anywhere else.\textsuperscript{34}

The October 2009 \textit{JAHIMA} article by Genna Rollins entitled “ARRA and the HIM Workforce” contributes to this research because it outlines the new availability of billions of dollars in federal and other funding to advance health information education and professional practice, it suggests a sense of urgency to take advantage of this funding opportunity (i.e. strike while the iron is hot), it encourages AHIMA’s continuing investment in and development of e-learning resources such as the e-HIM® Virtual Lab and it suggests a way in which the AHIMA e-HIM® Virtual Lab could be adapted to provide an online training environment for healthcare workers across the country. In the article, Rollins informed health information stakeholders of the need for AHIMA and other associations to ramp-up workforce training to meet the long-term needs of the healthcare system. Rollins described the two divisions of ARRA, the Health Information Technology for Economic and Clinical Health (HITECH) Act and title IV, which provides for meaningful use of EHRs incentive reimbursements to healthcare organizations starting in 2011. Funding is available to college campuses to expand or

\textsuperscript{34}Dimick C. Help wanted: Schools struggle placing students in PPEs. \textit{J ahima}. 2009;80(9):34-39.
establish health information education programs at all academic levels, especially programs which can be developed quickly, as well as online programs. The idea is to rapidly infuse the healthcare workforce with well-trained health information professionals. The article also noted that the AHIMA e-HIM® Virtual Lab already does so and has expanded to 175 college programs."

The October 2009 AHIMA Position Statement entitled “Take Action to Educate and Expand the Health Information Management (HIM) Professional Workforce contributes to this research because it outlines the new availability of billions of dollars in federal and other funding to advance health information education and professional practice, it is a call to action - to take advantage of this funding opportunity, it encourages AHIMA’s continuing investment in and development of e-learning resources such as the e-HIM® Virtual Lab and it asserts AHIMA’s thought leadership position to transition the healthcare industry from paper-based to electronic health information. The position statement informs industry stakeholders about the importance of EHRs to the U.S. healthcare system. Success will take technology as well as a highly-trained workforce. HIM professionals are needed to meet the exponentially higher demands in the healthcare workplace of the future. New legislation such as ARRA and industry trends such as increasing retirements and fewer graduates are combining to create a perfect storm shortage of health information professionals to support the demand. The AHIMA e-HIM® Virtual Lab was developed and launched in 2006 to train more health information professionals. Nearly 200 schools use it to-date. Others should consider doing so.36

36 Take action to educate and expand the health information management (HIM) professional workforce. AHIMA position statement. 2009.
The November 2009 article entitled “Role-based Model for ICD-10 Implementation: Academic Timeline for Educators” contributes to this research because it informed industry stakeholders, especially educators, of the critical steps necessary to facilitate the smooth transition from one codeset to another and demonstrated how the AHIMA e-HIM® Virtual Lab can be a valuable resource to support the codeset transition efforts. The article informed educators about the importance of training themselves on the new codeset first and then modifying curriculum, course content and syllabi to train students for such coding in healthcare facilities.\textsuperscript{37}

Mary Stanfill’s December 2009 testimony to the Standard Subcommittee of the National Committee on Vital and Health Statistics on the topic of converting from the ICD-9-CM codeset to the ICD-10-CM codeset contributes to this research because it demonstrates to legislators/government/industry stakeholders AHIMA’s thought leadership to transition the healthcare industry from the ICD-9-CM codeset to the ICD-10-CM codeset and it demonstrates to stakeholders AHIMA’s continuing investment in and development of e-learning resources such as the e-HIM® Virtual Lab. Stanfill described to legislators the importance of carefully planning the transition training content, featuring exercises from the old codeset, exercises from the new codeset and side-by-side comparisons and analysis. Using actual workplace tools (codebooks, online encoders, etc.) is also advised. Trainees should also practice on the same patient record types they have in their workplaces. Stanfill also pointed out that the AHIMA Virtual Lab

\textsuperscript{37}Role-based model for ICD-10 implementation: Academic timeline for educators. AHIMA. 2009.
will soon feature an ICD-10-CM/PCS encoder.\textsuperscript{38}

While AHIMA continued focusing on marketing and expansion of the AHIMA e-HIM\textsuperscript{®} Virtual Lab to more and more campuses and programs across the country, it was also an important goal to train educators on how to more robustly incorporate the e-learning platform into courses, curriculum and program. The Spring 2010 \textit{AHIMA Academic Advisor} newsletter contributes to this research because it reflects AHIMA’s ongoing commitment to educators – to assure that they have opportunities to incorporate e-learning content and functionality into their academic programs. The annual Assembly on Education (AOE) brings together AHIMA staff, participating vendor representatives and educators from around the country - to network, learn, explore, ask and get questions answered, which educators can then take back to their campuses to strengthen their academic programs. In the article, educators were encouraged to attend the in-person Virtual Lab Sessions scheduled at the 2010 Assembly on Education.\textsuperscript{39}

The June 2010 Practice Brief “Advancing the Academic Transition to ICD-10-CM/PCS” contributes to this research because it is a call to action – for educators to begin planning for an industry-critical codeset transition, it reflects AHIMA’s continuing investment in and development of e-learning resources such as the e-HIM\textsuperscript{®} Virtual Lab and it asserts AHIMA’s thought leadership position to transition the healthcare industry from one codeset to another. The practice brief informed industry stakeholders about the conversion to the ICD-10-CM/PCS codeset, effective October 1, 2013. The practice brief

\textsuperscript{38} Testimony of Mary H. Stanfill, MBI, RHIA, CCS, CCS-P on behalf of the American Health Information Management Association (AHIMA) to the Standard Subcommittee of the National Committee on Vital and Health Statistics. December 9, 2009.

\textsuperscript{39} AHIMA \textit{Academic Advisor}. 2010.
outlined certain student and staff learning resource considerations stakeholders should make during the transition, such as textbooks, workbooks, codebooks for both codesets, availability of online encoders and availability of the AHIMA virtual lab.40

The October 2010 issue of AHIMA Advantage newsletter included the AHIMA 2009 Annual Report, which contributes to this research because it reflects AHIMA’s continuing investment in and development of the e-HIM® Virtual Lab and it is evidence that the e-learning platform is expanding to more and more campuses and students across the U.S. The annual report informed industry stakeholders about AHIMA annual finances. The report also outlined a major investment – the implementation of the Virtual Lab – now adopted by 205 HIM academic programs and more than 7,500 students.41

The Question & Answer (Q&A) section of the Winter 2010 issue of the AHIMA Academic Advisor newsletter contributes to this research because it demonstrates how the AHIMA e-HIM® Virtual Lab can be used to support students PPEs within academic programs and since the PPEs are an essential curriculum component and accreditation standard, it also demonstrates how the AHIMA e-HIM® Virtual Lab can support academic program accreditation. The newsletter featured several Q&A exchanges between educators and subject matter experts on the topics of the use of the AHIMA virtual lab in partial fulfillment of the acute care coding component of the PPE requirements, the coding hours requirement, use of authentic records and coding the appropriate number of cases.42

41 AHIMA Advantage. 2010;14:5.
42 AHIMA Academic Advisor. 2010.
The *Clinical Practice Sites/Professional Practice Experience (PPE) Guide*, Version II: January 2011 contributes to this research because it demonstrates how the AHIMA e-HIM® Virtual Lab can be used to support students PPEs within academic programs and since the PPEs are an essential curriculum component and accreditation standard, it demonstrates how the AHIMA e-HIM® Virtual Lab can support academic program accreditation. The guide provides steps, best practice examples and other information for educators, students and PPE site supervisors to assure that the PPE provides the student with meaningful opportunities to apply the theories learned in the classroom in professional practice within the workplace.\(^{43}\)

The July 2011 issue of *AHIMA Advantage E-Alert* contributes to this research because it reflects AHIMA’s ongoing commitment to educators – to assure that they have opportunities to incorporate e-learning content and functionality into their academic programs and it brings together AHIMA staff, participating vendor representatives and educators from around the country - to network, learn, explore, ask and get questions answered, in which educators can then take back to their campuses to strengthen their academic programs. HIM educators were encouraged to attend and learn about the latest regulations, industry trends, classroom preparation, teaching strategies and the latest AHIMA virtual lab developments.\(^{44}\)

The July 2011 AHIMA newsletter article by Chris Dimick entitled "Presenters Discuss ICD-10 Documentation Needs" contributes to this research because it reflects AHIMA’s ongoing commitment to educators – to assure that they have opportunities to

\(^{43}\)Clinical practice sites/professional practice experience (PPE) guide. 2011;(II).

\(^{44}\)AHIMA Advantage E-Alert. 2011.
incorporate e-learning content and functionality into their academic programs and it brings together AHIMA staff, participating vendor representatives and educators from around the country - to network, learn, explore, ask and get questions answered, in which educators can then take back to their campuses to strengthen their academic programs. The article features several Q&A exchanges between educators and subject matter experts, primarily on the topic of conversion to the new ICD-10-CM/PCS codeset. Other exchanges covered how educators can apply what is learned at the annual AOE Symposia into daily work routines, specifically new developments on the AHIMA virtual lab.  

The Fall 2011 AHIMA Academic Advisor newsletter contributes to this research because it reflects AHIMA’s ongoing commitment to educators – to assure that they are supported in their efforts to keep academic curricula current and to assure that they have opportunities to incorporate e-learning content and functionality into their academic programs. The article suggested best practices for educators to keep themselves up to speed on the latest industry trends, with suggestions and tactics for incorporating this content into courses and curriculum.  

The October 2011 JAHIMA article by Bonnie Cassidy entitled "Teaching the Future: An Educational Response to the AHIMA Core Model" contributes to this research because it is a call to action – for AHIMA and educators to meet the demand for a highly trained research faculty and data analysts, it reflects AHIMA’s continuing investment in and development of e-learning resources such as the e-HIM® Virtual Lab.

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46 AHIMA Academic Advisor. 2011.
and it asserts AHIMA’s thought leadership position on health information education and training to benefit industry stakeholders. Cassidy informed industry stakeholders about industry trends and ways in which the AHIMA core model (information governance and education) can help educators to plan and respond. Cassidy also explored the expansion of the AHIMA virtual lab beyond academic programs into the area of professional development for current HIM practitioners.47

The Create Opportunities: Volunteer! recruitment presentation, published in November 2011 by the AHIMA Volunteer Leadership & Development House Team, contributes to this research because it is a call to action – to volunteer one’s time and expertise to benefit industry stakeholders and it reflects AHIMA’s continuing investment in and development of the e-HIM® Virtual Lab via the AHIMA VLab Strategic Advisory Committee, a group of dedicated volunteer educators who advise on additions and improvements to the e-learning platform.48

The January 2012 article by Jackie Moczygemba and Susan Fenton entitled "Lessons Learned from an ICD-10-CM Clinical Documentation Pilot Study" published in Perspectives in Health Information Management contributes to this research because it demonstrates how the AHIMA e-HIM® Virtual Lab can be used to support research studies and it demonstrates AHIMA’s thought leadership position to support the ICD-10-CM/PCS codeset transition efforts. Moczygemba and Fenton informed industry stakeholders about a pilot study of the clinical documentation requirements needed for

48 Create Opportunities: Volunteer! 2010-2011 volunteer & leadership development house team - recruitment presentation.
coding with the ICD-10-CM/PCS codeset. One set of records used for the study was the
redacted records housed on the AHIMA virtual lab. Study findings suggest a much higher
level of documentation detail is required, as well as higher levels of coder training.\(^{49}\)

The March 2012 AHIMA *Academic Advisor* newsletter contributes to this
research because it demonstrates how students can make significant and meaningful
contributions to the development and support of the AHIMA e-HIM® Virtual Lab and it
announces that there are presently 9,000 registered users - indicating the continuing
growth and expansion of the e-learning platform. The article informed industry
stakeholders how two students at the College of DuPage in Glyn Ellen, IL worked with
their instructor to develop a coding and abstracting answer key using two virtual lab
applications, QuadraMed’s Quantim encoder and the Solcom electronic document
management system (EDMS). In a second project, a group of students at West Virginia
Northern Community College worked on reviewing, redacting and preparing a number of
new records for addition to the Solcom EDMS.\(^{50}\)

The May 2012 issue of AHIMA *Academic Advisor* newsletter contributes to this
research because it reflects AHIMA’s ongoing commitment to educators – to assure that
they have opportunities to incorporate e-learning content and functionality into their
academic programs, it brings together AHIMA staff, participating vendor representatives
and educators from around the country - to network, learn, explore, ask and get questions
answered, which educators can then take back to their campuses to strengthen their

\(^{49}\) Moczygemba J. Lessons learned from an ICD-10-CM clinical documentation pilot

\(^{50}\) AHIMA *Academic Advisor*. 2012.
academic programs. Industry stakeholders were encouraged to attend and learn about the latest developments on the AHIMA virtual lab, participate in hands-on training, meet participating vendors and meet virtual lab staff.\textsuperscript{51}

The June 2012 AHIMA \textit{Academic Advisor} newsletter contributes to this research because it reflects AHIMA’s ongoing commitment to educators – to assure that they have opportunities to incorporate e-learning content and functionality into their academic programs and it brings together AHIMA staff, participating vendor representatives and educators from around the country - to network, learn, explore, ask and get questions answered, which educators can then take back to their campuses to strengthen their academic programs. Industry stakeholders were encouraged to visit the virtual lab staff and booth in the exhibit area, attend the virtual lab presentation and attend presentations from virtual lab participating vendors and fellow educators.\textsuperscript{52}

The article entitled “Climbing Higher: Bridging the Gap to Advanced Degrees in HIM” of the August 2012 issue of \textit{JAHIMA} contributes to this research because it reflects the emergence of online learning as a convenient and, for some, a preferred delivery format for education content, it describes how the role of educator has evolved into a more facilitative, learner-centered role and it suggests that educators should carefully consider the education content delivery format they use to best-benefit their learners and ultimately employers, the broader HIM profession and the healthcare industry. The article compared and contrasted for HIM education stakeholders the pros and cons of traditional

\textsuperscript{51} AHIMA \textit{Academic Advisor}. 2012.  
\textsuperscript{52} AHIMA \textit{Academic Advisor}. 2012.
in-person course delivery with online/distance learning and hybrid/mixed/blended course delivery.\textsuperscript{53}

The September 2012 AHIMA \textit{Academic Advisor} newsletter contributes to this research because it reflects AHIMA’s continuing investment in and development of the e-HIM\textsuperscript{®} Virtual Lab to benefit learners, educators and ultimately employers, the broader HIM profession and the healthcare industry. HIM education stakeholders were informed about new applications, lessons and other resources recently added onto the AHIMA virtual lab platform. Specifically outlined were improvements to HealthPort ROI – eSmartLog, the QuadraMed Quantim encoder, the Cerner/Academic EHR, the QuadraMed MPI Suite and the virtual training management system (VTMS).\textsuperscript{54}

The July 2013 Special AOE Issue of the AHIMA \textit{Academic Advisor} newsletter contributes to this research because it reflects AHIMA’s continuing investment in and development of the e-HIM\textsuperscript{®} Virtual Lab to benefit learners, educators and ultimately employers, the broader HIM profession and the healthcare industry, it ties the virtual lab learning activities to the competencies and knowledge clusters from the AHIMA Education Strategy Committee and it brings together AHIMA staff, participating vendor representatives and educators from around the country - to network, learn, explore, ask and get questions answered, which educators can then take back to their campuses to strengthen their academic programs. Industry stakeholders were invited to attend to learn about the latest industry trends, the latest regulations and other useful information. The article included several Q&A exchanges with AHIMA staff and a subject matter expert

\textsuperscript{53} AHIMA. Climbing higher: Bridging the gap to advanced degrees in HIM. \textit{J ahima.} 2012;83(8):48-54.

\textsuperscript{54} AHIMA \textit{Academic Advisor}. 2012.
who is presenting the session ‘The Virtual Lab – Moving Ahead’ which educators were encouraged to attend to share ideas on new virtual lab activities to help students achieve the new HIM academic curricula competencies.\textsuperscript{55}

The August 2013 \textit{JAHIMA} article by Barbara Manger and Kathleen Kirk entitled "Reengineering the Professional Practice Experience: With Participation Declining, One HIM Program Decided to Revamp its PPE Offering" contributes to this research because it demonstrates how the AHIMA e-HIM® Virtual Lab can serve as a vital component of PPEs within academic programs and since the PPEs are an essential curriculum component and accreditation standard, it demonstrates how the AHIMA e-HIM® Virtual Lab can support academic program accreditation. The article described how faculty at Rutgers University reengineered their PPEs using input from alumni, current students, faculty and employer/site supervisors. The overall goal was to ensure that the PPE was a meaningful and valuable experience for all involved. Two components were pivotal under the new PPE model – use of the AHIMA virtual lab and flexible scheduling for students and site supervisors.\textsuperscript{56}

An article by Deborah Green in the September 2013 issue of the AHIMA \textit{Academic Advisor} newsletter contributes to this research because it emphasizes AHIMA’s continuing view of the e-HIM® Virtual Lab e-learning platform as a strategic resource, it reflects AHIMA’s commitment to actively and directly involve stakeholders in planning for improvements and upgrades to the e-learning platform and it reflects

\textsuperscript{55}AHIMA \textit{Academic Advisor}. Special AOE Issue. 2013.
\textsuperscript{56}Manger BJ, Kirk KM. Reengineering the professional practice experience: With participation declining, one HIM program decided to revamp its PPE offering. \textit{Jahima}. 2013;84(8):32-34.

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AHIMA’s ongoing commitment to educators – to assure that they have opportunities to incorporate e-learning content and functionality into their academic programs. Green informed industry stakeholders about a recent meeting in which education stakeholders considered the AHIMA virtual lab, its current state, content and maintenance aims and future development strategy. The desired future state for AHIMA virtual lab includes more applications relative to outpatient practice, content and data sets to support analytics and informatics and a wider scope to accommodate clinical disciplines.57

The November 2013 issue of the AHIMA Academic Advisor newsletter contributes to this research because it reflects AHIMA’s continuing investment in and development of the e-HIM® Virtual Lab to benefit health information learners, educators and other stakeholders and it broadens the e-learning platform from “a product” to “a product and a service.” Deborah Green informed industry stakeholders about the new service hours for AHIMA virtual lab technical support.58

The March 2014 Evaluation of the Information Technology Professionals in Health Care (“Workforce”) Program - Summative Report published by the National Opinion Research Center (NORC) at the University of Chicago contributes to this research because it demonstrates AHIMA’s thought leadership to industry stakeholders across the public and private sectors, academe, associations, members and other stakeholders, it demonstrates AHIMA’s commitment to be part of the solution by actively engaging and collaborating with participating industry stakeholders, it suggests that online learning is becoming an increasingly attractive education delivery format and is

57 AHIMA Academic Advisor. 2013.
58 AHIMA Academic Advisor. 2013.
thus aligned with AHIMA’s continuing investment in and development of the e-HIM® Virtual Lab and it is an opportunity to create “learning and professional development pathways” for learners and professionals to “upskill” into new and emerging health information roles of the future. The report also informed industry stakeholders about the new Workforce Program as authorized under ARRA. The program’s primary goal is to quickly infuse the healthcare workforce with well-trained health IT professionals.59

The June 2014 issue of the AHIMA Advantage E-Alert newsletter contributes to this research because it marks a major product improvement and upgrade to the AHIMA e-HIM® VLab e-learning platform, it reflects AHIMA’s ongoing commitment to educators – to assure that they have opportunities to incorporate e-learning content and functionality into their academic programs and it brings together AHIMA staff, participating vendor representatives and educators from around the country - to network, learn, explore, ask and get questions answered, which educators can then take back to their campuses to strengthen their academic programs. The article invited HIM educator stakeholders to attend and take advantage of available training on the brand new AHIMA virtual lab Gateway, which allows for much easier user access to the virtual lab applications, instructions and lessons.60

The August 2014 issue of the AHIMA Academic Advisor newsletter contributes to this research because it marks a major product improvement and upgrade to the AHIMA e-HIM® VLab e-learning platform, it reflects AHIMA’s ongoing commitment

59 Evaluation of the information technology professionals in health care ("workforce") program - Summative report. National Opinion Research Center (NORC) at the University of Chicago. 2014.

60 AHIMA Advantage E-Alert. 2014.
to educators – to assure that they have opportunities to incorporate e-learning content and functionality into their academic programs and it brings together AHIMA staff, participating vendor representatives and educators from around the country - to network, learn, explore, ask and get questions answered, which educators can then take back to their campuses to strengthen their academic programs. In the article, AHIMA informed industry stakeholders about the new and improved virtual lab platform known as the Gateway, which provides for much easier user access. Assessment auto-grading and student performance analytics will also become available to educators.61

Mary Butler’s October 2014 JAHI MA article entitled "Taking the Grow-Your-Own-Coder Movement to High School" contributes to this research because it demonstrates how the AHIMA virtual lab supports learners, educators and professionals in small, rural environments. AHIMA informed industry stakeholders that small critical access hospitals (CAHs) experience staffing challenges for clinicians as well as HIM professionals. And small college campuses experience the same thing in securing credentialled HIM faculty. The article described how a local HIM professional worked in a CAH and had a very wide range of job responsibilities as compared to many of her colleagues who worked in urban environments. The same person was asked if she was interested in starting an HIM academic program at a local campus, which she did. In this role, the educator also had a wide range of job responsibilities. The curriculum and practicum which she designed featured use of the AHIMA virtual lab as well as job shadowing. Of course, students who took the practicum benefitted by their training using AHIMA VLab and the local employers who hired the students benefitted by new hires

61 AHIMA Academic Advisor. 2014.
who were already well-trained. For a chance to enjoy a broad range of job responsibilities, consider employment in a small working environment such as a CAH or a small community college.62

The December 2014 issue of the AHIMA Advantage newsletter entitled “2014 in Review: AHIMA Drives Home Strategic Messages” contributes to this research because it emphasizes AHIMA’s continuing view of the e-HIM® Virtual Lab e-learning platform as a strategic resource, it marks a major product improvement and upgrade to the e-learning platform and it reflects AHIMA’s ongoing commitment to educators – to assure that they have opportunities to incorporate e-learning content and functionality into their academic programs. In the article, education stakeholders were informed that AHIMA and Pearson have collaborated to update the AHIMA virtual lab platform. Users should experience much easier access.63

Lisa Eramo’s February 2015 JAHIMA article entitled "HIM After Retirement: No Needlepoint for These Retirees, Who are Finding New Ways to Contribute to the Profession ... On Their Own Terms" contributes to this research because it identifies serving on the AHIMA Virtual Lab Strategic Advisory Committee as a volunteer opportunity. The article describes the careers of several HIM professionals who found themselves teaching after retirement. Each came to teaching via very different and unique pathways. Most previously served as HIM director/manager/supervisor. One worked for AHIMA, one was a consultant, another served in volunteer roles. Regardless of professional practice background, more HIM educators are needed at all academic levels.

Following a long and storied career, teaching is a terrific way to give back to the profession.64

The October 13, 2016 issue of the AHIMA Advantage E-Alert newsletter contributes to this research because it marks a major product improvement and upgrade to the AHIMA e-HIM® VLab e-learning platform and it reflects AHIMA’s ongoing commitment to educators – to assure that they have opportunities to incorporate e-learning content and functionality into their academic programs. The article informed education stakeholders that the instance of Meditech EHR housed on AHIMA virtual lab was recently upgraded to Meditech Expanse - the latest Meditech EHR available. Sisu Healthcare IT collaborated with AHIMA to spearhead the upgrade. Meditech Expanse is the flagship EHR hosted on the AHIMA virtual lab.65

The December 1, 2016 issue of the AHIMA Advantage E-Alert newsletter contributes to this research because it marks additional major product improvements and upgrades to the AHIMA e-HIM® VLab e-learning platform and it reflects AHIMA’s ongoing commitment to educators – to assure that they have opportunities to incorporate e-learning content and functionality into their academic programs. The article informed industry stakeholders that the ARGO enterprise master patient index (EMPI) is being added onto the AHIMA virtual lab platform, providing students opportunities to work on and resolve MPI duplicates, overlaps and overlays. The article announced the retirement of the QuadraMed MPI application, which is no longer being supported by the vendor.66

64 Eramo LA. HIM after retirement: No needlepoint for these retirees, who are finding new ways to contribute to the profession ... On their own terms. J ahima. 2015;86(2):38-41.
65 AHIMA Advantage E-Alert. 2016.
The “Inspire Big Thinking to Launch Our Future - AHIMA 2016 Annual Report” contributes to this research because it marks additional major product improvements and upgrades to the AHIMA e-HIM® VLab e-learning platform, it emphasizes AHIMA’s continuing view of the e-HIM® Virtual Lab e-learning platform as a strategic resource and it reflects AHIMA’s ongoing commitment to educators – to assure that they have opportunities to incorporate e-learning content and functionality into their academic programs. The report informed industry stakeholders that in 2016, AHIMA added several new applications to the AHIMA virtual lab, specifically the ARGO MPI, the Meditech Expanse EHR, the drchrono outpatient physician office practice management system and the Find-A-Code encoder. New activities and assessments have been added as well.67

The “Inspire Innovate Lead - AHIMA 2017 Annual Report” contributes to this research because it marks additional major product improvements and upgrades to the AHIMA e-HIM® VLab e-learning platform, it emphasizes AHIMA’s continuing view of the e-HIM® Virtual Lab e-learning platform as a strategic resource and it reflects AHIMA’s ongoing commitment to educators – to assure that they have opportunities to incorporate e-learning content and functionality into their academic programs. The report informed industry stakeholders there were significant improvements to AHIMA virtual lab in 2017, including new applications such as the Meditech Expanse EHR and the ARGO enterprise master patient index (EMPI) system. The encoder only purchase option was added. Students can take advantage of over 50 learning activities (lessons) available on the platform and a record 280 schools were actively subscribed to AHIMA VLab.68

67 Inspire big thinking to launch our future - AHIMA 2016 annual report.
68 Inspire innovate lead - AHIMA 2017 annual report.
The February 2018 “AHIMA Career Prep Workbook” contributes to this research because it suggests to job-seekers how the AHIMA e-HIM® VLab e-learning platform can help set themselves apart from the competition and it emphasizes AHIMA’s continuing view of the e-HIM® Virtual Lab e-learning platform as a strategic resource. The workbook contains helpful tips, tools, suggestions and tactics, all helpful to job-seekers. The workbook also features résumé tips, example cover letters, social media tips as well as suggestions for emphasizing how AHIMA virtual lab favorably impacted preparations for entry into the workforce.\(^{69}\)

The “AHIMA 2018 Annual Report” contributes to this research because it marks an all-time record in the number of campuses subscribed to the AHIMA e-HIM® VLab, it emphasizes AHIMA’s continuing view of the e-HIM® Virtual Lab e-learning platform as a strategic resource and it reflects AHIMA’s ongoing commitment to educators – to assure that they have opportunities to incorporate e-learning content and functionality into their academic programs. The report informed industry stakeholders about a new training offering for educators - Virtual Lab Office Hours, which are periodic one-hour online sessions for educators to ask any AHIMA virtual lab related questions. For the first time, a new AHIMA virtual lab demo station was featured at the AHIMA annual conference. And another first – AHIMA virtual lab reached a record 307 campuses subscribed, the highest ever.\(^{70}\)

\(^{69}\)AHIMA Career Prep Workbook. 2018.

\(^{70}\)AHIMA 2018 annual report.
AHIMA CEO Dr. Wylecia Wiggs-Harris’ *Education and Career News* article entitled “Giving Health Information Students Real-World Experience” is of such strategic importance to this research work that the full-text article is provided for reader convenience as Appendix H. The article is significant because it is a message from AHIMA’s current CEO Dr. Wylecia Wiggs-Harris to industry stakeholders, it announces the exciting 2020 enhancements to the e-learning platform, it connects education to workforce, it describes the need for educators to incorporate technology training into academic programs, it describes ways in which the AHIMA VLab™ can meet that need and it is additional evidence that AHIMA views e-learning and the AHIMA VLab™ to be of strategic importance.71

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5. Summary

This literature review began with a 2002 article in which AHIMA started to view e-learning as of strategic importance; that strategic view culminated with the 2006 launch of the AHIMA e-HIM™ Virtual Lab and that strategic view continues to the present day. **Appendix J**, the AHIMA 2020-2023 Strategic Plan displays the AHIMA Mission and Vision Statements, three Strategic Outcomes and several multi-year strategies. The AHIMA VLab™ is an integral component of Strategic Outcome 2. Shape the health information profession by growing the influence and competitiveness of health information skillsets. AHIMA VLab™ is an integral component of the two related multi-year strategies:

- Align professional development and educational programs with shifting market needs to advance hard and soft skillsets and support rebranding of the profession and
- Deepen audience engagement, elevate member expertise and develop the next generation of change leaders.
Appendix J, the AHIMA 2020-2023 Strategic Plan

For a convenient graphic of significant AHIMA VLab™ milestones over the years from launch to the present day, see Appendix K, the AHIMA VLab™ Timeline.
Appendix K: AHIMA VLab™ Timeline
Chapter III.

METHODS

1. Nature of the variables

This work will ultimately answer the research question “Does student use of AHIMA VLab™ in their academic programs impact pass/fail outcomes on their first-attempt national certification exams?” More formally, the null hypothesis is: “Student use of AHIMA VLab™ in their academic programs has no impact on pass/fail outcomes on their first-attempt national certification exams.” Thus, the alternative hypothesis becomes: “Student use of AHIMA VLab™ in their academic programs has an impact on pass/fail outcomes on their first-attempt national certification exams.”

Any research study begins with an examination of the variables or measures. “A question might be – ‘why does one need to know about types of variables or measures?’ The answer is – it is important in order to evaluate the appropriateness of the statistical techniques used and consequently whether the conclusions derived from them are valid.”

a) Dependent (outcome) variables

“One needs to discriminate between outcomes like gastric ulcers, on the one hand and other variables that may or may not affect that outcome. The variables that are the causal factors, or that you may manipulate are called the independent

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72 Biostatistics for the clinician. The University of Texas-Houston Health Science Center, School of Biomedical Informatics. Accessed May 14, 2021. https://www.uth.tmc.edu/uth_orgs/educ_dev/oser/L1_2.HTM.
variables. The outcomes of the treatments or the responses to changes in the independent variables are called the dependent variables, because their values presumably depend on what happens to the independent variables.” **For the purposes of this research study, the dependent (outcome) variable is the ‘pass/fail outcomes on national certification exams.’ The pass/fail outcomes presumably depend upon what happens with the independent variables.**

**b) Independent (predictor) variables**

“Variables that are the causal factors, or that one can manipulate are called the independent (predictor) variables.” **For the purposes of this research study, the independent variable is “student use of AHIMA VLab™.” The pass/fail outcomes on national certification exams may or may not be impacted by (predicted by) student use of AHIMA VLab™.**

**c) Dichotomous scale/variables**

One final aspect of variables important to understand for this research study is dichotomous scale/variables, “for which members fall into one of only two groups. Examples of dichotomous variables include gender (two groups: ‘males’ and ‘females’), presence of heart disease (two groups: ‘yes’ and ‘no’), personality type (two groups: ‘introversion’ or ‘extroversion’), body composition (two groups: ‘obese’ or ‘not

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72Biostatistics for the clinician. The University of Texas-Houston Health Science Center, School of Biomedical Informatics. Accessed May 14, 2021. https://www.uth.tmc.edu/uth_orgs/educ_dev/oser/L1_2.HTM.
obese’) and so forth.”

For the purposes of this research study:

- the dependent (outcome) variable is the ‘pass/fail outcomes on first-attempt national certification exams.’ This is an example of a dichotomous variable – where the result of an exam attempt can be either pass or fail. It is also of the nominal variable type which falls under the qualitative variable category.
- the independent variable in this research study is “student use of AHIMA VLab™.” This is also an example of a dichotomous variable – where the student use of AHIMA VLab™ is either yes or no. It is also of the nominal variable type which falls under the qualitative variable category.
- this work will ultimately answer the research question “Does student use of AHIMA VLab™ in their academic programs (yes/no) impact the outcomes (pass/fail) on their first-attempt national certification exams?”

2. Datasets for the study

In order to complete this study, data were accessed and extracted from two separate databases: the AHIMA association management system (AMS) known as

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Aptify and the AHIMA certification exam test results hosted on the Pearson Vue™ certification testing platform. The AHIMA Aptify dataset will be described first. Once an educator adopts AHIMA VLab™ as their e-learning platform of choice, students gain access by creating an AHIMA account on the AHIMA website and then purchasing and redeeming an AHIMA VLab™ “enrollment code.” Each student’s AHIMA VLab™ access is active for 365 calendar days from the date the enrollment code is redeemed. If the educator chooses to use AHIMA VLab™ in year two of their curriculum, each student would purchase and redeem a second enrollment code. The act of redeeming the enrollment code establishes the student as an active AHIMA VLab™ user within AHIMA’s Aptify AMS. Figure 1 Study Datasets, Timeframe and Includes/Excludes excerpted from Appendix L shows that HIM students with no AHIMA VLab™ enrollment code (as well as those who redeemed their enrollment code after taking their certification exam) were in the control group and those with an AHIMA VLab™ enrollment code redeemed before they took their certification exam were in the study group.
The Pearson Vue™ certification testing platform is the second dataset which supports this study. Once each student graduates then subsequently sits for their AHIMA national certification exam, their certification exam pass/fail results are recorded on the Pearson Vue™ certification testing platform. One of the key Pearson Vue™ data differentiators is exam type. Since the learning content of the AHIMA VLab™ activities is specifically designed around the 2018 HIM academic curricula competencies at the certificate, associate, baccalaureate and graduate levels, there are five AHIMA certification exams of interest for this study:

- Certified Coding Associate (CCA)
- Certified Coding Specialist (CCS)
- Certified Coding Specialist-Physician-based (CCS-P)
- Registered Health Information Technician (RHIT)
- Registered Health Information Administrator (RHIA)
Although AHIMA also offers the Certified Document Improvement Practitioner (CDIP), Certified Health Data Analyst (CHDA) and Certified in Healthcare Privacy and Security (CHPS) specialty certification exams, they are considered out-of-scope for this study because the learning content on the AHIMA virtual lab is not aligned with those specific certification exams. Another key Pearson Vue™ data differentiator is exam attempt number. **Figure 1** shows that this study focuses on first-attempt CCA, CCS, CCS-P, RHIT and RHIA exam takers.

3. **Timeframe of the Study:**

The principal researcher determined the timeframe of the study would be four full years, from January 2017 - December 2020, based upon three factors. The first factor was sample size. A four-year timeframe should encompass enough data to provide a longitudinal examination of the research question. The second factor was industry relevance; capturing data from the past four calendar years and ending at year-end 2020 would provide longitudinal study data as close as possible to present day so that study results would be more relevant to AHIMA VLab™ stakeholders. The third factor was the date that AHIMA started using the Aptify AMS (December 20, 2016) so 2017 would be the first full year of data available on the Aptify AMS.

4. **Export, transform and load:**

Using structured query language (SQL) procedures, data from both datasets were extracted, transformed and loaded into one Excel file, with data arranged into columns. This study is limited to domestic U.S. certification exam-takers, meaning data from test-takers outside the United States was excluded from the data export and the study.
5. Data modeling and preparation:

To assure individual confidentiality, data from any column with direct (e.g., first name, last name, ID #, etc.) or indirect (e.g., campus, etc.) person-specific identifiers were deleted. In the Excel file, the resulting columns and data were saved as a second sheet, an “adjusted raw data file,” which was used for further data modeling. Thus, only non-confidential aggregated data are available under this study.

In the first pass through the Aptify AHIMA VLab™ student user enrollment data, the confirmed AHIMA VLab™ users were isolated from the AHIMA VLab™ non-users:

- Counted as an “AHIMA VLab™ hit” (users) were individuals who:
  - activated an AHIMA VLab™ enrollment code within the Data Timeframe

- Counted as an “AHIMA VLab™ miss” (non-users) were individuals who:
  - did not activate an AHIMA VLab™ enrollment code at all, or
  - activated an AHIMA VLab™ enrollment code outside the Data Timeframe

In the first pass through the Pearson Vue™ Certification exam results data, the confirmed first-attempt CCA, CCS, CCS-P, RHIT and RHIA exam takers were isolated from other certification exam takers:

- Counted as a “Certification hit” (first-time test-takers), individuals who:
  - took their first-attempt CCA, CCS, CCS-P, RHIT or RHIA exam within the Data Timeframe

- Counted as a “Certification miss” (not first-time test-takers), individuals who:
  - took their second or higher attempt CCA, CCS, CCS-P, RHIT or RHIA exam within the Data Timeframe
o took any other certification exam within the Data Timeframe

o took any certification exam outside the Data Timeframe

o took any certification exam as an outside the U.S. exam-taker

6. Study population

The second pass of the data compared the AHIMA VLab™ hit/miss (user/non-user) data against the Certification exam hit/miss (first-time test-takers/not first-time test-takers) data:

- For any “AHIMA VLab™ hits” paired with a “Certification hit”
  - Data were further “scrubbed”
    - Cases in which the AHIMA VLab™ enrollment date was before the date of the first-attempt certification exam – were confirmed as an AHIMA VLab™ hit/Certification hit and thus included in the study group
    - Cases in which the AHIMA VLab™ enrollment date was after the date of the first-attempt certification exam – were reclassified as an AHIMA VLab™ miss/Certification hit and were thus included in the control group

- Confirmed AHIMA VLab™ misses paired with confirmed Certification hits were included in the control group

- Confirmed AHIMA VLab™ hits paired with confirmed Certification misses were excluded from the study

- Confirmed AHIMA VLab™ misses paired with confirmed Certification misses were excluded from the study
**Figure 2** AHIMA VLab™/Certification Hit-Miss Grid excerpted from Appendix M displays this concept graphically, with the study group consisting of AHIMA VLab™ Hits + Certification Hits; the control group consisting of AHIMA VLab™ Misses + Certification Hits; and all others excluded from the study.

**Figure 2.** AHIMA VLab™/Certification Hit-Miss Grid

7. **Institutional Review Board:**

The local Institutional Review Board (IRB) for this work is Rutgers Biomedical & Health Sciences. This work makes secondary research use of identifiable private information which is not publicly available. The investigator records information in a manner such that identity of study subjects cannot be ascertained directly or indirectly; the investigator will not contact the subjects and the investigator will not re-identify subjects. Per Rutgers University policy, human subjects research federal regulations and **APPENDIX O** (Chart 1, Chart 2 and Chart 6) which displays the related
decision trees – this study falls under the federal “Minimal Risk” Exempt Category 4 – Secondary Research for Which Consent is Not Required [45 CFR 46.104(d)(4)(ii)].
Chapter IV.

RESULTS

1. Preliminary results - descriptive statistics

“In most research conducted on groups of people, both descriptive and inferential statistics are used to analyze results and draw conclusions. What are descriptive and inferential statistics? Descriptive statistics is the term given to the analysis of data that helps describe, show or summarize data in a meaningful way such that, for example, patterns might emerge from the data. Descriptive statistics are simply a way to describe the data. Descriptive statistics are very important because if the data were presented in raw data format, it would be difficult to visualize what the data was showing. Descriptive statistics therefore enable presentation of data in a more meaningful way, which facilitates data interpretation. An example case may be ‘results of 100 pieces of students' coursework.’ Perhaps the overall performance of those students would be of interest. Perhaps the distribution or spread of the grades would be of interest. The calculated mean and standard deviation of the exam grades for the 100 students could provide valuable information and insight about exam performance of this group of students. Descriptive statistics enable such analysis. Descriptive statistics summarize and display data using a combination of tabulated description (i.e., tables), graphical description (i.e., graphs and charts) and statistical commentary (i.e., a discussion of the results).

Inferential statistics are techniques in which samples are used to make generalizations about the populations from which the samples were drawn. It is, therefore, important that the sample accurately represent the population. The process of achieving this is sampling. Inferential statistics arise out of the fact that sampling
naturally incurs sampling error and thus a sample is not expected to perfectly represent the population. The methods of inferential statistics are (1) the estimation of parameter(s) and (2) testing of statistical hypotheses. 74

a) Excel pivot table

An Excel Pivot Table was derived from the adjusted raw data file to display preliminary results in table format, as shown in Figure 3. The table displays summarized raw data for the five certification exams within the scope of this study, with each exam’s row highlighted in light yellow. Each column displays (from L-R): the certification exam title; the four-year sum of certification exam fails, passes and totals for non-users of AHIMA VLab™; the four-year sum of certification exam fails, passes and totals for users of AHIMA VLab™; and grand totals on the far-right.

<table>
<thead>
<tr>
<th>Row Labels</th>
<th>No AHIMA VLab</th>
<th>Yes AHIMA VLab</th>
<th>(blank) Total</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certified Coding Associate Exam</td>
<td>1478</td>
<td>4183</td>
<td>5661</td>
<td>2023</td>
</tr>
<tr>
<td>Certified Coding Specialist - Physician-based Exam</td>
<td>320</td>
<td>677</td>
<td>997</td>
<td>1236</td>
</tr>
<tr>
<td>Certified Coding Specialist Exam</td>
<td>1721</td>
<td>5817</td>
<td>7538</td>
<td>1146</td>
</tr>
<tr>
<td>Certified Documentation Improvement Practitioner</td>
<td>179</td>
<td>252</td>
<td>431</td>
<td>582</td>
</tr>
<tr>
<td>Certified Healthcare Technology Specialist - Clinic</td>
<td>140</td>
<td>154</td>
<td>294</td>
<td>171</td>
</tr>
<tr>
<td>Certified Healthcare Technology Specialist - Clinician,</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Certified Healthcare Technology Specialist - Imple</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Certified Healthcare Technology Specialist - Practice Workflow &amp; Informatics</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Certified Healthcare Technology Specialist - Technical/Software Support Staffs</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Certified Healthcare Technology Specialist - Trainer</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Certified in Healthcare Privacy &amp; Security Exam</td>
<td>54</td>
<td>129</td>
<td>183</td>
<td>149</td>
</tr>
<tr>
<td>Certified Professional in Health Informatics Exam</td>
<td>8</td>
<td>10</td>
<td>18</td>
<td>13</td>
</tr>
<tr>
<td>Registered Health Information Administrator Exam</td>
<td>3122</td>
<td>3541</td>
<td>6663</td>
<td>4026</td>
</tr>
<tr>
<td>Registered Health Information Technician Exam</td>
<td>1980</td>
<td>4492</td>
<td>6472</td>
<td>3561</td>
</tr>
<tr>
<td>(blank)</td>
<td>(blank)</td>
<td>(blank)</td>
<td>(blank)</td>
<td>(blank)</td>
</tr>
<tr>
<td>Grand Total</td>
<td>6999</td>
<td>18030</td>
<td>25029</td>
<td>10033</td>
</tr>
</tbody>
</table>

Figure 3. Excel Pivot Table – preliminary results

b) Certification exam pass rates

Numbers highlighted in green above were used to calculate the certification exam

pass rates for the control group (non-AHIMA VLab™ users) and for the study group (AHIMA VLab™ users) and the certification exam pass rates are displayed in Figure 4.

| Exam                                      | Pass Rate of Control Group | Pass Rate of Study Group | 2017-2020 Delta |
|-------------------------------------------|----------------------------|--------------------------|----------------
| Certified Coding Associate Exam           | 73.9%                      | 80.4%                    | 6.5%           |
| Certified Coding Specialist - Physician-based Exam | 67.9%                      | 59.8%                    | -8.1%          |
| Certified Coding Specialist Exam          | 77.2%                      | 71.5%                    | -5.7%          |
| Registered Health Information Administrator Exam | 68.3%                      | 70.5%                    | 2.2%           |
| Registered Health Information Technician Exam | 69.4%                      | 76.4%                    | 7.0%           |

**Figure 4.** Certification exam pass rates; control group and study group; and delta

Pass rate differences between the two groups (delta) were calculated and are displayed under the Delta column (far-right). Preliminary favorable results (where the pass rates of AHIMA VLab™ users are higher than the control group) are displayed in green text and preliminary unfavorable results (where the pass rates of AHIMA VLab™ users are not higher than the control group) displayed in red. Inferential statistical tests will now be applied to determine statistical significance.

2. **Inferential statistical testing – binomial logistic regression**

Based upon the dichotomous nature of the variables associated with this research study “Does student use of AHIMA VLab™ in their academic programs (yes/no) (independent variable) (dichotomous) impact outcomes (pass/fail) (dependent variable) (dichotomous) on their first-attempt national certification exams?” the principal researcher selected binomial logistic regression to determine: a) statistical significance and b) the likelihood of student use of AHIMA VLab™ impacting pass/fail outcomes on first-attempt national certification exams.

**a) Assumptions**
“A binomial logistic regression is used to predict a dichotomous dependent variable based on one or more continuous or nominal independent variables. It is the most common type of logistic regression and is often simply referred to as logistic regression. There are six assumptions that underpin binomial logistic regression. If any of these six assumptions are not met, data may not be able to be analyzed using binomial logistic regression because results may not be valid. Researchers should decide whether Assumptions 1 and 2 are met before moving on.”74

- “Assumption #1: The dependent variable should consist of two categorical, unrelated groups (i.e., a dichotomous variable). Also, the two categories of the dependent variable need to be mutually exclusive and exhaustive. The dependent variable for this study – ‘first-attempt national certification exam outcomes (pass/fail = dichotomous)’ passes this assumption. The two possible outcomes for the dependent variable for this study – ‘pass/fail on first-attempt national certification exams’ are indeed mutually exclusive (possible outcomes can be one or the other - pass or fail, not both) and exhaustive (there are no other available exam outcome options) and thus pass this assumption.

- Assumption #2: The independent variables should be measured at the continuous (i.e., an interval or ratio variable = quantitative) or nominal level. The independent variable for this study – ‘student use of AHIMA VLab™ in their academic programs’ is indeed a nominal, categorical,

dichotomous variable with only two possible responses (yes or no) and thus passes this assumption.

- Assumption #3: There should be independence of observations, which means that there is no relationship between the observations. If independence of observations does not exist, there is likely to be repeated measures and a different type of statistical test would be required. For this study, observations of ‘whether one used or did not use AHIMA VLab™’ and ‘whether one passed or failed their first-attempt national certification exam’ are indeed completely independent of one another and thus pass this assumption.

- Assumption #4: Data must not show multi-collinearity, which occurs when two or more independent variables are highly correlated with each other. This research study examines one independent variable and thus, this assumption does not apply.

- Assumption #5: There needs to be a linear relationship between any continuous independent variables and the logit transformation of the dependent variable. The independent variable under this study is a nominal, categorical variable (not a continuous variable) and thus, this assumption does not apply.

- Assumption #6: There should be no significant outliers, high leverage points or highly influential points, which represent observations in your data set that are in some way unusual. These can have a very negative effect on the binomial logistic regression equation that is used to predict
the value of the dependent variable based on the independent variables.**74**

There were no significant outliers or otherwise unusual observations noted in this study.

3) **Results and analysis for the CCA exam**

Adjusted raw data relative to each of the five certification exams were exported from Excel into IBM SPSS Statistics Version 27, Release 27.0.0.0, 64-bit edition and a binomial logistic regression was run for each exam type. Results relative to the CCA exam are shown below.

**Logistic Regression**

**Case Processing Summary**

<table>
<thead>
<tr>
<th>Unweighted Cases&lt;sup&gt;a&lt;/sup&gt;</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Selected Cases</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Included in Analysis</td>
<td>7684</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Missing Cases</strong></td>
<td>0</td>
<td>.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>7684</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Unselected Cases</strong></td>
<td>0</td>
<td>.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>7684</td>
<td>100.0</td>
</tr>
</tbody>
</table>

<sup>a</sup> If weight is in effect, see classification table for the total number of cases.

“The Case Processing Summary section indicates:

- sample size (N)”**75**; in this analysis, there were 7,684 CCA exam-takers.

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• “any outliers (Unselected Cases)”\(^\text{75}\); in this analysis, there were none.

“The most relevant tables can be found in the section ‘Block 1’ in the SPSS output of the binomial logistic regression analysis. The first table – Omnibus Tests of Model Coefficients - includes the Chi-Square goodness of fit test.”\(^\text{75}\) “Block 1 is where the predictor variables have been entered. The Model area displays the fit testing of the study model against the null model. The Sig (statistical significance) or p-value of < .05 is statistically significant and desired.”\(^\text{76}\) The observed Sig./p-value of .000 indicates that the study model is fitting the data statistically significantly better than the null model with no predictors. This is favorable.

**Block 1: Method = Enter**

<table>
<thead>
<tr>
<th>Omnibus Tests of Model Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-square</td>
</tr>
<tr>
<td>------------</td>
</tr>
<tr>
<td><strong>Step 1</strong></td>
</tr>
<tr>
<td><strong>Block</strong></td>
</tr>
<tr>
<td><strong>Model</strong></td>
</tr>
</tbody>
</table>

“The next table - Model Summary - includes the Pseudo R\(^2\), the -2 log likelihood is the minimization criteria used by SPSS.”\(^\text{76}\)


Model Summary

<table>
<thead>
<tr>
<th>Step</th>
<th>-2 Log likelihood</th>
<th>Cox &amp; Snell R Square</th>
<th>Nagelkerke R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8501.515*a</td>
<td>.005</td>
<td>.007</td>
</tr>
</tbody>
</table>

*a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

“The next table - Classification Table - contains the classification results,”75 with almost 76% correct classification, meaning that of the 7,684 observed CCA exam-takers, 5,810 were predicted to pass (Status 1) and 1,874 were predicted to fail (Status 0), therefore the model performed at 75.6% accuracy of classification.

**Classification Table**

<table>
<thead>
<tr>
<th></th>
<th>Predicted</th>
<th>Status</th>
<th>Percentage Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Observed</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Step 1</td>
<td>Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Status 0</td>
<td>0</td>
<td>1874</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>5810</td>
<td>100.0</td>
</tr>
<tr>
<td>Overall</td>
<td>Percentage</td>
<td></td>
<td>75.6</td>
</tr>
</tbody>
</table>

*a. The cut value is .500

“The last table – Variables in the Equation - is the most important one for this

logistic regression analysis. B is the ‘regression coefficient’ and is interpreted as the predicted change in log odds for every one-unit increase in the predictor. The value for the null hypothesis would be equal to 0 and the value for the alternative hypotheses would not be equal to 0. Generally speaking, B regression coefficients with a positive value would be an indicator that with every one-unit increase in the predictor variable, there is increasing likelihood to be a member of the target group. B regression coefficients with a negative value would be an indicator that with every one-unit increase in the predictor variable, there is decreasing likelihood to be a member of the target group.\(^{76}\) In this analysis, the positive value of .373 indicates that with every one-unit increase in the predictor variable (student use of AHIMA VLab\(^{TM}\) before sitting for their national certification exam) there is increasing likelihood to fall into the target group (passing the CCA national certification exam).

The predictor variable is also statistically significant as demonstrated by the Sig./p-value of .000. Therefore, there is a predicted positive relationship between student use of AHIMA VLab\(^{TM}\) and passing the CCA exam.

“Exp(B) is the ‘odds ratio’ where values < 1 indicate a negative relationship between the predictor/independent variable and the outcome/dependent variable. An Exp(B) value > 1 indicates a positive relationship between the predictor/independent variable and the outcome/dependent variable. Another way of stating it is ‘for every one-unit increase in the predictor variable, the odds of falling into the target group increase by a factor of the Exp(B) value.’”\(^{76}\) In this specific CCA exam analysis, for every one-unit

increase in the predictor/independent variable (student use of AHIMA VLab™ before testing), the odds of falling into the target group (passing the CCA exam) increase by a factor of 1.452 or 45.2%. Also, “for the 95% confidence interval for Exp(B), if 1 falls between the lower and upper bounds, that would be an indicator that the null hypothesis is supported. If 1 falls outside of those bounds, that would be an indicator that the null hypothesis is rejected.” In this case, 1 falls outside of the lower and upper bounds, therefore the null hypothesis (student use of AHIMA VLab™ has no impact on pass/fail outcomes) is rejected and the alternative hypothesis (student use of AHIMA VLab™ has an impact on pass/fail outcomes) is supported.

<table>
<thead>
<tr>
<th>Variables in the Equation</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>S.E.</td>
<td>Wald</td>
<td>df</td>
<td>Sig.</td>
<td>Exp(B)</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Step 1&lt;sup&gt;a&lt;/sup&gt; VLabBeforeTesting</td>
<td>.373</td>
<td>.064</td>
<td>34.258</td>
<td>1</td>
<td>.000</td>
</tr>
<tr>
<td>Constant</td>
<td>1.040</td>
<td>.030</td>
<td>1182.004</td>
<td>1</td>
<td>.000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variables in the Equation</th>
</tr>
</thead>
<tbody>
<tr>
<td>95% C.I. for EXP(B)</td>
</tr>
<tr>
<td>Lower</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>Step 1&lt;sup&gt;a&lt;/sup&gt; VLabBeforeTesting</td>
</tr>
<tr>
<td>Constant</td>
</tr>
</tbody>
</table>

<sup>a</sup> Variable(s) entered on step 1: VLabBeforeTesting.

**a) Analysis summary for the CCA exam**

The null hypothesis for this study is: “Student use of AHIMA VLab™ in their

---

academic programs has no impact on pass/fail outcomes of their first-attempt national certification exams.” The alternative hypothesis for this study is “Student use of AHIMA VLab™ in their academic programs has an impact on pass/fail outcomes of their first-attempt national certification exams.”

For the CCA national certification exam, the null hypothesis is rejected and the alternative hypothesis is accepted based upon the following:

- Omnibus Tests of Model Coefficients: the observed Sig./p-value of .000 indicates that the predictor model is fitting the data statistically significantly better than the null model with no predictors.
- B “regression coefficient:” a positive value of .373.
- Variable in the Equation: the predictor variable is statistically significant as demonstrated by the Sig./p-value of .000. Therefore, there is a predicted relationship between student use of AHIMA VLab™ and passing the CCA exam.
- Exp(B) “odds ratio:” the value of 1.452 (> 1) indicates a positive relationship between the predictor/independent variable and the outcome/dependent variable. For every one-unit increase in the predictor/independent variable (student use of AHIMA VLab™ before testing), the odds of falling into the target group (passing the CCA exam) increase by a factor of 1.452 or 45.2%.
- 95% confidence interval for Exp(B): 1 falls outside of the lower (1.281) and upper (1.645) 95% confidence bounds, indicating that the null hypothesis is rejected (student use of AHIMA VLab™ has no impact on
pass/fail outcomes) and the alternative hypothesis is supported (student use of AHIMA VLab™ has an impact on pass/fail outcomes).

4) Results and analysis for the RHIT exam

Adjusted raw data were exported from Excel into IBM SPSS Statistics Version 27, Release 27.0.0.0, 64-bit edition and a binomial logistic regression was run. Results relative to the RHIT exam are shown below.

Logistic Regression

“The Case Processing Summary section indicates:

- sample size (N);”75 in this analysis, there were 10,033 RHIT exam-takers.
- “any outliers (Unselected Cases);”75 in this analysis, there were none.

<table>
<thead>
<tr>
<th>Case Processing Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unweighted Cases</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td><strong>Selected Cases</strong></td>
</tr>
<tr>
<td>Included in Analysis</td>
</tr>
<tr>
<td>Missing Cases</td>
</tr>
<tr>
<td>Total</td>
</tr>
<tr>
<td>Unselected Cases</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

a. If weight is in effect, see classification table for the total number of cases.

“The most relevant tables can be found in the section ‘Block 1’ in the SPSS output of the binomial logistic regression analysis. The first table – Omnibus Tests of Model Coefficients - includes the Chi-Square goodness of fit test.”

“Block 1 is where the predictor variables have been entered. The Model area displays the fit testing of the study model against the null model. The Sig (statistical significance) or p-value of < .05 is statistically significant and desired.” The observed Sig./p-value of .000 indicates that the study model is fitting the data statistically significantly better than the null model with no predictors. This is favorable.

**Block 1: Method = Enter**

<table>
<thead>
<tr>
<th>Omnibus Tests of Model Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-square</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td><strong>Step 1</strong></td>
</tr>
<tr>
<td>Block</td>
</tr>
<tr>
<td><strong>Model</strong></td>
</tr>
</tbody>
</table>

“The next table - Model Summary - includes the Pseudo R², the -2 log likelihood is the minimization criteria used by SPSS.”

---


**Model Summary**

<table>
<thead>
<tr>
<th>Step</th>
<th>-2 Log likelihood</th>
<th>Cox &amp; Snell R Square</th>
<th>Nagelkerke R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11859.376&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.006</td>
<td>.008</td>
</tr>
</tbody>
</table>

<sup>a</sup> Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

“The next table - Classification Table - contains the classification results,” with almost 72% correct classification, meaning that of the 10,033 observed exam-takers, 7,214 were predicted to pass (Status 1) and 2,819 were predicted to fail (Status 0), therefore the model performed at 71.9% accuracy of classification.

**Classification Table<sup>a</sup>**

<table>
<thead>
<tr>
<th>Predicted</th>
<th>Status</th>
<th>Observed</th>
<th>0</th>
<th>1</th>
<th>Percentage Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step 1</td>
<td>Status</td>
<td>0</td>
<td>0</td>
<td>2819</td>
<td>.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>0</td>
<td>7214</td>
<td>100.0</td>
</tr>
<tr>
<td>Overall</td>
<td>Percentage</td>
<td></td>
<td></td>
<td></td>
<td>71.9</td>
</tr>
</tbody>
</table>

<sup>a</sup> The cut value is .500

“The last table – Variables in the Equation - is the most important one for this logistic regression analysis. B is the ‘regression coefficient’ and is interpreted as the

predicted change in log odds for every one-unit increase in the predictor. The value for
the null hypothesis would be equal to 0 and the value for the alternative hypotheses
would not be equal to 0. Generally speaking, B regression coefficients with a positive
value would be an indicator that with every one-unit increase in the predictor variable
there is increasing likelihood to be a member of the target group. B regression
coefficients with a negative value would be an indicator that with every one-unit increase
in the predictor variable, there is decreasing likelihood to be a member of the target
group.\(^76\) In this case, the positive value of .358 indicates that with every one-unit
increase in the predictor variable (student use of AHIMA VLab™ before sitting for their
national certification exam) there is increasing likelihood to fall into the target group
(passing the RHIT national certification exam).

The predictor variable is also statistically significant as demonstrated by the
Sig./p-value of .000. Therefore, there is a predicted relationship between student use of
AHIMA VLab™ and passing the RHIT exam.

“For Exp(B) is the ‘odds ratio’ where values < 1 indicate a negative relationship
between the predictor/independent variable and the outcome/dependent variable. An
Exp(B) value > 1 indicates a positive relationship between the predictor/independent
variable and the outcome/dependent variable. Another way of stating it is ‘for every one-
unit increase in the predictor variable, the odds of falling into the target group increase by
a factor of the Exp(B) value.’\(^76\) For this specific RHIT exam analysis, for every one-unit
increase in the predictor/independent variable (student use of AHIMA VLab™ before

testing), the odds of falling into the target group (passing the RHIT exam) increase by a factor of 1.430 or 43.0%. Also, “for the 95% confidence interval for Exp(B), if 1 falls between the lower and upper bounds, that would be an indicator that the null hypothesis is supported. If 1 falls outside of those bounds, that would be an indicator that the null hypothesis is rejected.” In this case, 1 falls outside of the lower and upper bounds, therefore the null hypothesis (student use of AHIMA VLab™ has no impact on pass/fail outcomes) is rejected and the alternative hypothesis (student use of AHIMA VLab™ has an impact on pass/fail outcomes) is supported.

<table>
<thead>
<tr>
<th>Variables in the Equation</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VLabBeforeTesting</td>
<td>.358</td>
<td>.048</td>
<td>55.951</td>
<td>1</td>
<td>.000</td>
<td>1.430</td>
</tr>
<tr>
<td>Constant</td>
<td>.819</td>
<td>.027</td>
<td>922.248</td>
<td>1</td>
<td>.000</td>
<td>2.269</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variables in the Equation</th>
<th>95% C.I. for EXP(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>VLabBeforeTesting</td>
<td>1.302</td>
</tr>
<tr>
<td>Constant</td>
<td>1.571</td>
</tr>
</tbody>
</table>

a. Variable(s) entered on step 1: VLabBeforeTesting.

---

a) **Analysis summary for the RHIT exam**

The null hypothesis for this study is: “Student use of AHIMA VLab™ in their academic programs has no impact on pass/fail outcomes of their first-attempt national certification exams.” The alternative hypothesis for this study is “Student use of AHIMA VLab™ in their academic programs has an impact on pass/fail outcomes of their first-attempt national certification exams.”

For the RHIT national certification exam, the null hypothesis is rejected and the alternative hypothesis is supported based upon the following:

- **Omnibus Tests of Model Coefficients:** the observed Sig./p-value of .000 indicates that the predictor model is fitting the data statistically significantly better than the null model with no predictors.

- **B “regression coefficient:”** a positive value of .358.

- **Variable in the Equation:** the predictor variable is statistically significant as demonstrated by the Sig./p-value of .000. Therefore, there is a predicted relationship between student use of AHIMA VLab™ and passing the RHIT exam.

- **Exp(B) “odds ratio:”** the value of 1.430 (> 1) indicates a positive relationship between the predictor/independent variable and the outcome/dependent variable. For every one-unit increase in the predictor/independent variable (student use of AHIMA VLab™ before testing), the odds of falling into the target group (passing the RHIT exam) increase by a factor of 1.430 or 43.0%.
95% confidence interval for Exp(B): 1 falls outside of the lower (1.302) and upper (1.571) 95% confidence bounds, indicating that the null hypothesis is rejected (student use of AHIMA VLab™ has no impact on pass/fail outcomes) and the alternative hypothesis is supported (student use of AHIMA VLab™ has an impact on pass/fail outcomes).

5) Results and analysis for the RHIA exam

Adjusted raw data were exported from Excel into IBM SPSS Statistics Version 27, Release 27.0.0.0, 64-bit edition and a binomial logistic regression was run. Results relative to the RHIA exam are shown below.

Logistic Regression

“The Case Processing Summary section indicates:

• sample size (N);”75 in this analysis, there were 4,564 RHIA exam-takers.
• “any outliers (Unselected Cases);”75 in this analysis, there were none.

75The logistic regression analysis in SPSS. Accessed 5/16/21.
### Case Processing Summary

<table>
<thead>
<tr>
<th>Case Type</th>
<th>Included in Analysis</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selected Cases</td>
<td></td>
<td>4564</td>
<td>100.0</td>
</tr>
<tr>
<td>Missing Cases</td>
<td></td>
<td>0</td>
<td>.0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>4564</td>
<td>100.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Case Type</th>
<th></th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unselected Cases</td>
<td></td>
<td>0</td>
<td>.0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>4564</td>
<td>100.0</td>
</tr>
</tbody>
</table>

a. If weight is in effect, see classification table for the total number of cases.

“The most relevant tables can be found in the section ‘Block 1’ in the SPSS output of the binomial logistic regression analysis. The first table – Omnibus Tests of Model Coefficients - includes the Chi-Square goodness of fit test.”

“Block 1 is where the predictor variables have been entered. The Model area displays the fit testing of the study model against the null model. The Sig (statistical significance) or p-value of < .05 is statistically significant and desired.”

The observed Sig./p-value of .186 indicates that the study model is not fitting the data statistically significantly better than the null model with no predictors.

---


Block 1: Method = Enter

Omnibus Tests of Model Coefficients

<table>
<thead>
<tr>
<th></th>
<th>Chi-square</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>1.746</td>
<td>1</td>
<td>.186</td>
</tr>
<tr>
<td>Block</td>
<td>1.746</td>
<td>1</td>
<td>.186</td>
</tr>
<tr>
<td>Model</td>
<td>1.746</td>
<td>1</td>
<td>.186</td>
</tr>
</tbody>
</table>

“The next table - Model Summary - includes the Pseudo R², the -2 log likelihood is the minimization criteria used by SPSS.”

Model Summary

<table>
<thead>
<tr>
<th>Step</th>
<th>-2 Log likelihood</th>
<th>Cox &amp; Snell R Square</th>
<th>Nagelkerke R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5663.978&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.000</td>
<td>.001</td>
</tr>
</tbody>
</table>

a. Estimation terminated at iteration number 3 because parameter estimates changed by less than .001.

“The next table - Classification Table - contains the classification results,” with almost 69% correct classification, meaning that of the 4,564 observed exam-takers, 3,140 were predicted to pass (Status 1) and 1,424 were predicted to fail (Status 0), therefore the model performed at 68.8% accuracy of classification.

---


### Classification Table

<table>
<thead>
<tr>
<th>Observed Status</th>
<th>Predicted Status</th>
<th>Percentage Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>1424</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>3140</td>
</tr>
<tr>
<td>Overall Percentage</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. The cut value is .500

“The last table – Variables in the Equation - is the most important one for this logistic regression analysis. B is the ‘regression coefficient’ and is interpreted as the predicted change in log odds for every one-unit increase in the predictor. The value for the null hypothesis would be equal to 0 and the value for the alternative hypotheses would not be equal to 0. Generally speaking, a positive B regression coefficient value would be an indicator that with every one-unit increase in the predictor variable there is increasing likelihood to be a member of the target group. B regression coefficients with a negative value would be an indicator that with every one-unit increase in the predictor variable, there is decreasing likelihood to be a member of the target group.”

In this case, the positive value of .102 indicates that with every one-unit increase in the predictor variable (student use of AHIMA VLab™ before sitting for their national certification exam) there is increasing likelihood to fall into the target group (passing the RHIA)

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national certification exam).

The predictor variable is not statistically significant as demonstrated by the Sig./p-value of .188. Therefore, there is no predicted relationship between student use of AHIMA VLab™ and passing the exam.

“Exp(B) is the ‘odds ratio’ where values < 1 indicate a negative relationship between the predictor/independent variable and the outcome/dependent variable. An Exp(B) value > 1 indicates a positive relationship between the predictor/independent variable and the outcome/dependent variable. Another way of stating it is ‘for every one-unit increase in the predictor variable, the odds of falling into the target group increase by a factor of the Exp(B) value.’” In this specific RHIA exam analysis, for every one-unit increase in the predictor/independent variable (student use of AHIMA VLab™ before testing), the odds of falling into the target group (passing the RHIA exam) increase by a factor of 1.107 or 10.7%. Also, “for the 95% confidence interval for Exp(B), if 1 falls between the lower and upper bounds, that would be an indicator that the null hypothesis is supported. If 1 falls outside of those bounds, that would be an indicator that the null hypothesis is rejected.” In this case, 1 falls inside the lower and upper bounds, so the null hypothesis (student use of AHIMA VLab™ has no impact on pass/fail outcomes) is supported and the alternative hypothesis (student use of AHIMA VLab™ has an impact on pass/fail outcomes) is rejected.

---

Variables in the Equation

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>VLabBeforeTesting</td>
<td>.102</td>
<td>.077</td>
<td>1.732</td>
<td>1</td>
<td>.188</td>
</tr>
<tr>
<td></td>
<td>Constant</td>
<td>.768</td>
<td>.036</td>
<td>452.375</td>
<td>1</td>
<td>.000</td>
</tr>
</tbody>
</table>

95% C.I. for EXP(B)

<table>
<thead>
<tr>
<th></th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>.951</td>
<td>1.289</td>
</tr>
<tr>
<td></td>
<td>Constant</td>
<td></td>
</tr>
</tbody>
</table>

a. Variable(s) entered on step 1: VLabBeforeTesting.

a) Analysis summary for the RHIA exam

The null hypothesis for this study is: “Student use of AHIMA VLab™ in their academic programs has no impact on pass/fail outcomes of their first-attempt national certification exams.” The alternative hypothesis for this study is “Student use of AHIMA VLab™ in their academic programs has an impact on pass/fail outcomes of their first-attempt national certification exams.”

For the RHIA national certification exam, the null hypothesis is supported and the alternative hypothesis is rejected based upon the following:

- Omnibus Tests of Model Coefficients: the observed Sig./p-value of .186 indicates that the predictor model is not fitting the data statistically significantly better than the null model with no predictors.
- B “regression coefficient:” a positive value of .102.
• Variable in the Equation: the predictor variable is not statistically significant as demonstrated by the Sig./p-value of .188. Therefore, there is no predicted relationship between student use of AHIMA VLab™ and passing the RHIA exam.

• Exp(B) “odds ratio:” the value of 1.107 (> 1) indicates a weak positive relationship between the predictor/independent variable and the outcome/dependent variable. For every one-unit increase in the predictor/independent variable (student use of AHIMA VLab™ before testing), the odds of falling into the target group (passing the RHIA exam) increase by a factor of 1.107 or 10.7%.

• 95% confidence interval for Exp(B): 1 falls inside the lower (.951) and upper (1.289) 95% confidence bounds, indicating that the null hypothesis is supported (student use of AHIMA VLab™ has no impact on pass/fail outcomes) and the alternative hypothesis is rejected (student use of AHIMA VLab™ has an impact on pass/fail outcomes).

6) Results and analysis for the CCS exam

Adjusted raw data were exported from Excel into IBM SPSS Statistics Version 27, Release 27.0.0.0, 64-bit edition and a binomial logistic regression was run. Results relative to the CCS exam are shown below.
Logistic Regression

“The Case Processing Summary section indicates:

- sample size (N); in this analysis, there were 8,684 CCS exam-takers.
- “any outliers (Unselected Cases);” in this analysis, there were none.

**Case Processing Summary**

<table>
<thead>
<tr>
<th>Unweighted Cases&lt;sup&gt;a&lt;/sup&gt;</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selected Cases Included in Analysis</td>
<td>8684</td>
<td>100.0</td>
</tr>
<tr>
<td>Missing Cases</td>
<td>0</td>
<td>.0</td>
</tr>
<tr>
<td>Total</td>
<td>8684</td>
<td>100.0</td>
</tr>
<tr>
<td>Unselected Cases</td>
<td>0</td>
<td>.0</td>
</tr>
<tr>
<td>Total</td>
<td>8684</td>
<td>100.0</td>
</tr>
</tbody>
</table>

<sup>a</sup> If weight is in effect, see classification table for the total number of cases.

“The most relevant tables can be found in the section ‘Block 1’ in the SPSS output of this binomial logistic regression analysis. The first table – Omnibus Tests of Model Coefficients - includes the Chi-Square goodness of fit test.”

“Block 1 is where the predictor variables have been entered. The Model area displays the fit testing of the study model against the null model. The Sig (statistical significance) or p-value of < .05 is statistically significant and desired.”

---


that the study model is fitting the data statistically significantly better than the null model with no predictors.

**Block 1: Method = Enter**

**Omnibus Tests of Model Coefficients**

<table>
<thead>
<tr>
<th>Chi-square</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>17.297</td>
<td>1</td>
</tr>
<tr>
<td>Block</td>
<td>17.297</td>
<td>1</td>
</tr>
<tr>
<td><strong>Model</strong></td>
<td>17.297</td>
<td>1</td>
</tr>
</tbody>
</table>

“The next table - Model Summary - includes the Pseudo R², the -2 log likelihood is the minimization criteria used by SPSS.”

**Model Summary**

<table>
<thead>
<tr>
<th>Step</th>
<th>-2 Log likelihood</th>
<th>Cox &amp; Snell R Square</th>
<th>Nagelkerke R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>9469.668a</td>
<td>.002</td>
<td>.003</td>
</tr>
</tbody>
</table>

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

“The next table - Classification Table - contains the classification results,” with 76.4% correct classification, meaning that of the 8,684 observed exam-takers, 6,636 were predicted to pass (Status 1) and 2,048 were predicted to fail (Status 0), therefore, the

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model performed at 76.4% accuracy of classification.

**Classification Table**

<table>
<thead>
<tr>
<th>Predicted Status</th>
<th>Observed 0</th>
<th>Observed 1</th>
<th>Percentage Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1 Status</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>2048</td>
<td>.0</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>6636</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Overall Percentage</strong></td>
<td></td>
<td></td>
<td>76.4</td>
</tr>
</tbody>
</table>

a. The cut value is .500

“The last table – Variables in the Equation - is the most important one for this logistic regression analysis. B is the ‘regression coefficient’ and is interpreted as the predicted change in log odds for every one-unit increase in the predictor. The value for the null hypothesis would be equal to 0 and the value for the alternative hypotheses would not be equal to 0. Generally speaking, a positive B regression coefficient value would be an indicator that with every one-unit increase in the predictor variable there is increasing likelihood to be a member of the target group. B regression coefficients with a negative value would be an indicator that with every one-unit increase in the predictor variable, there is decreasing likelihood to be a member of the target group.”

76 In this case, the negative value of -.300 indicates that with every one-unit increase in the predictor variable (student use of AHIMA VLab™ before sitting for their national certification

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exam) there is decreasing likelihood to fall into the target group (passing the CCS national certification exam).

The predictor variable is statistically significant as demonstrated by the Sig./p-value of .000. Therefore, there is a predicted relationship between student use of AHIMA VLab™ and passing the CCS exam.

“Exp(B) is the ‘odds ratio’ where values < 1 indicate a negative relationship between the predictor/independent variable and the outcome/dependent variable. An Exp(B) value > 1 indicates a positive relationship between the predictor/independent variable and the outcome/dependent variable. Another way of stating it is ‘for every one-unit increase in the predictor variable, the odds of falling into the target group increase by a factor of the Exp(B) value.’”76 For this specific CCS exam analysis, for every one-unit increase in the predictor/independent variable (student use of AHIMA VLab™ before testing), the odds of falling into the target group (passing the CCS exam) increase by a factor of .741 or decrease by 25.9%. Also, “for the 95% confidence interval for Exp(B), if 1 falls between the lower and upper bounds, that would be an indicator that the null hypothesis is supported. If 1 falls outside of those bounds, that would be an indicator that the null hypothesis is rejected.”76 In this case, 1 falls outside the lower and upper bounds, therefore, the null hypothesis (student use of AHIMA VLab™ has no impact on pass/fail outcomes) is rejected and the alternative hypothesis (student use of AHIMA VLab™ has an impact on pass/fail outcomes) is supported.

---

Variables in the Equation

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1&lt;sup&gt;a&lt;/sup&gt; VLabBeforeTesting</td>
<td>-.300</td>
<td>.071</td>
<td>17.856</td>
<td>1</td>
<td>.000</td>
<td>.741</td>
</tr>
<tr>
<td>Constant</td>
<td>1.218</td>
<td>.027</td>
<td>1969.846</td>
<td>1</td>
<td>.000</td>
<td>3.380</td>
</tr>
</tbody>
</table>

Variables in the Equation

<table>
<thead>
<tr>
<th></th>
<th>95% C.I. for EXP(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lower</td>
</tr>
<tr>
<td>Step 1&lt;sup&gt;a&lt;/sup&gt; VLabBeforeTesting</td>
<td>.645</td>
</tr>
<tr>
<td>Constant</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> Variable(s) entered on step 1: VLabBeforeTesting.

a) Analysis summary for the CCS exam

The null hypothesis for this study is: “Student use of AHIMA VLab™ in their academic programs has no impact on pass/fail outcomes of their first-attempt national certification exams.” The alternative hypothesis for this study is “Student use of AHIMA VLab™ in their academic programs has an impact on pass/fail outcomes of their first-attempt national certification exams.”

For the CCS national certification exam, the null hypothesis is rejected and the alternative hypothesis is supported based upon the following:

- Omnibus Tests of Model Coefficients: the observed Sig./p-value of .000 indicates that the predictor model is fitting the data statistically significantly better than the null model with no predictors.
• B “regression coefficient:” a negative value of -.300.

• Variable in the Equation: the predictor variable is statistically significant as demonstrated by the Sig./p-value of .000. Therefore, there is a predicted relationship between student use of AHIMA VLab™ and passing the exam.

• Exp(B) “odds ratio:” the value of .741 (< 1) indicates a negative relationship between the predictor/independent variable and the outcome/dependent variable. For every one-unit increase in the predictor/independent variable (student use of AHIMA VLab™ before testing), the odds of falling into the target group (passing the CCS exam) increase by a factor of .741 or decrease by 25.9%.

• 95% confidence interval for Exp(B): 1 falls outside the lower (.645) and upper (.852) 95% confidence bounds, indicating that the null hypothesis is rejected (student use of AHIMA VLab™ has no impact on pass/fail outcomes) and the alternative hypothesis is supported (student use of AHIMA VLab™ has an impact on pass/fail outcomes).
7) Results and analysis for the CCS-P exam

Adjusted raw data were exported from Excel into IBM SPSS Statistics Version 27, Release 27.0.0.0, 64-bit edition and a binomial logistic regression was run. Results relative to the CCS-P exam are shown below.

**Logistic Regression**

“The Case Processing Summary section indicates:

- sample size (N); in this analysis, there were 1,236 CCS-P exam-takers.
- any outliers (Unselected Cases); in this analysis, there were none.

<table>
<thead>
<tr>
<th>Case Processing Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unweighted Cases⁹</td>
</tr>
<tr>
<td>Selected Cases</td>
</tr>
<tr>
<td>Included in Analysis</td>
</tr>
<tr>
<td>Missing Cases</td>
</tr>
<tr>
<td>Total</td>
</tr>
<tr>
<td>Unselected Cases</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

a. If weight is in effect, see classification table for the total number of cases.

“The most relevant tables can be found in the section ‘Block 1’ in the SPSS output of this binomial logistic regression analysis. The first table – Omnibus Tests of Model Coefficients - includes the Chi-Square goodness of fit test.”

“Block 1 is where the predictor variables have been entered. The Model area displays the fit testing of the study model against the null model. The Sig (statistical significance) or p-value of < .05 is statistically significant and desired.” The observed Sig./p-value of .019 indicates that the study model is fitting the data statistically significantly better than the null model with no predictors.

**Block 1: Method = Enter**

<table>
<thead>
<tr>
<th>Chi-square</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>5.508</td>
<td>1</td>
</tr>
<tr>
<td>Block</td>
<td>5.508</td>
<td>1</td>
</tr>
<tr>
<td>Model</td>
<td>5.508</td>
<td>1</td>
</tr>
</tbody>
</table>

“The next table - Model Summary - includes the Pseudo R², the -2 log likelihood is the minimization criteria used by SPSS.”

**Model Summary**

<table>
<thead>
<tr>
<th>Step</th>
<th>-2 Log likelihood</th>
<th>Cox &amp; Snell R Square</th>
<th>Nagelkerke R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1573.442&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.004</td>
<td>.006</td>
</tr>
</tbody>
</table>

<sup>a</sup>Estimation terminated at iteration number 3 because parameter estimates changed by less than .001.

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“The next table - Classification Table - contains the classification results,”\textsuperscript{75} with 66.3\% correct classification, meaning that of the 1,236 observed exam-takers, 820 were predicted to pass (Status 1) and 416 were predicted to fail (Status 0), therefore the model performed at 66.3\% accuracy of classification.

\textbf{Classification Table}\textsuperscript{a}

<table>
<thead>
<tr>
<th>Observed Status</th>
<th>Predicted Status</th>
<th>Percentage Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Step 1</td>
<td>0</td>
<td>416</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>820</td>
</tr>
<tr>
<td>Overall Percentage</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\textsuperscript{a} The cut value is .500

“The last table – Variables in the Equation - is the most important one for this logistic regression analysis. B is the ‘regression coefficient’ and is interpreted as the predicted change in log odds for every one-unit increase in the predictor variable. The value for the null hypothesis would be equal to 0 and the value for the alternative hypotheses would not be equal to 0. Generally speaking, a positive B regression coefficient value would be an indicator that with every one-unit increase in the predictor variable there is increasing likelihood to be a member of the target group. B regression coefficients with a negative value would be an indicator that with every one-unit

increase in the predictor variable, there is decreasing likelihood to be a member of the target group." In this case, the negative value of -.351 indicates that with every one-unit increase in the predictor variable (student use of AHIMA VLab™ before sitting for their national certification exam) there is decreasing likelihood to fall into the target group (passing the CCS-P national certification exam).

The predictor variable is statistically significant as demonstrated by the Sig./p-value of .018. Therefore, there is a predicted relationship between student use of AHIMA VLab™ and passing the CCS-P exam.

“Exp(B) is the ‘odds ratio’ where values < 1 indicate a negative relationship between the predictor/independent variable and the outcome/dependent variable. An Exp(B) value > 1 indicates a positive relationship between the predictor/independent variable and the outcome/dependent variable. Another way of stating it is ‘for every one-unit increase in the predictor variable, the odds of falling into the target group increase by a factor of the Exp(B) value.’” In this specific CCS-P exam analysis, for every one-unit increase in the predictor/independent variable (student use of AHIMA VLab™ before testing), the odds of falling into the target group (passing the CCS-P exam) increase by a factor of .704 or decrease by 29.6%. Also, “for the 95% confidence interval for Exp(B), if 1 falls between the lower and upper bounds, that would be an indicator that the null hypothesis is supported. If 1 falls outside of those bounds, that would be an indicator that the null hypothesis is rejected.” In this case, 1 falls outside the lower and upper bounds, therefore, the null hypothesis (student use of AHIMA VLab™ has no impact on pass/fail

---

outcomes) is rejected and the alternative hypothesis (student use of AHIMA VLab™ has an impact on pass/fail outcomes) is supported.

<table>
<thead>
<tr>
<th>Variables in the Equation</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1a VLabBeforeTesting</td>
<td>-.351</td>
<td>.148</td>
<td>5.592</td>
<td>1</td>
<td>.018</td>
<td>.704</td>
</tr>
<tr>
<td>Constant</td>
<td>.749</td>
<td>.068</td>
<td>122.015</td>
<td>1</td>
<td>.000</td>
<td>2.116</td>
</tr>
</tbody>
</table>

95% C.I. for EXP(B)

<table>
<thead>
<tr>
<th>Variables in the Equation</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1a VLabBeforeTesting</td>
<td>.526</td>
<td>.942</td>
</tr>
<tr>
<td>Constant</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Variable(s) entered on step 1: VLabBeforeTesting.

a) Analysis summary for the CCS-P exam

The null hypothesis for this study is: “Student use of AHIMA VLab™ in their academic programs has no impact on pass/fail outcomes of their first-attempt national certification exams.” The alternative hypothesis for this study is “Student use of AHIMA VLab™ in their academic programs has an impact on pass/fail outcomes of their first-attempt national certification exams.” For the CCS-P national certification exam, the null

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hypothesis is rejected and the alternative hypothesis is supported based upon the following:

- Omnibus Tests of Model Coefficients: the observed Sig./p-value of .019 indicates that the predictor model is fitting the data statistically significantly better than the null model with no predictors.

- B “regression coefficient:” a negative value of -.351.

- Variable in the Equation: the predictor variable is statistically significant as demonstrated by the Sig./p-value of .018. Therefore, there is a predicted relationship between student use of AHIMA VLab™ and passing the exam.

- Exp(B) “odds ratio:” the value of .704 (< 1) indicates a negative relationship between the predictor/independent variable and the outcome/dependent variable. For every one-unit increase in the predictor/independent variable (student use of AHIMA VLab™ before testing), the odds of falling into the target group (passing the CCS-P exam) increase by a factor of .704 or decrease by 29.6%.

- 95% confidence interval for Exp(B): 1 falls outside the lower (.526) and upper (.942) 95% confidence bounds, indicating that the null hypothesis is rejected (student use of AHIMA VLab™ has no impact on pass/fail outcomes) and the alternative hypothesis is supported (student use of AHIMA VLab™ has an impact on pass/fail outcomes).
Chapter V.

DISCUSSION

1. Summary of important findings

The null hypothesis for this study is: “Student use of AHIMA VLab™ in their academic programs has no impact on pass/fail outcomes of their first-attempt national certification exams.” The alternative hypothesis for this study is “Student use of AHIMA VLab™ in their academic programs has an impact on pass/fail outcomes of their first-attempt national certification exams.” Figure 5 arranges important study findings into table format.

<table>
<thead>
<tr>
<th>Results by Certification Exam</th>
<th>Statistical Significance; Null/Alternative hypothesis Supported or Rejected?</th>
<th>Predicted relationship between Independent and Dependent Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCA</td>
<td>Statistically Significant; Null hypothesis is rejected; Alternative hypothesis is supported</td>
<td>Positive Relationship</td>
</tr>
<tr>
<td>RHIT</td>
<td>Statistically Significant; Null hypothesis is rejected; Alternative hypothesis is supported</td>
<td>Positive Relationship</td>
</tr>
<tr>
<td>RHIA</td>
<td>Not Statistically Significant; Null hypothesis is supported; Alternative hypothesis is rejected</td>
<td>No Relationship</td>
</tr>
<tr>
<td>CCS</td>
<td>Statistically Significant; Null hypothesis is rejected; Alternative hypothesis is supported</td>
<td>Negative Relationship</td>
</tr>
<tr>
<td>CCS-P</td>
<td>Statistically Significant; Null hypothesis is rejected; Alternative hypothesis is supported</td>
<td>Negative Relationship</td>
</tr>
</tbody>
</table>

Figure 5. Hypothesis testing results by certification exam

Figure 5 shows that for the four-year study time period, a statistically significant positive relationship is predicted for student use of AHIMA VLab™ and passing the CCA and RHIT national certification exams; there is no appreciable relationship
predicted for student use of AHIMA VLab™ and passing the RHIA national certification exam; and a statistically significant negative relationship is predicted for student use of AHIMA VLab™ and passing the CCS and CCS-P national certification exams.

The principal researcher for this study is quite familiar with the AHIMA VLab™ e-learning platform - having worked with it in several different capacities beginning in 2012; as an educator using it with students in the classroom; as a volunteer member serving several years on the AHIMA VLab™ strategic advisory committee and subsequently serving as Chair; and since 2016 as an AHIMA staff member with primary management responsibility over AHIMA VLab™. Along with all of the stakeholders mentioned in the Acknowledgements section of this work, the principal researcher has contributed directly or indirectly to the vision, strategy, content and functionality of the AHIMA VLab™ e-learning platform since 2012. One may ask, “So what? Why does that matter?”

In the context of the findings displayed in Figure 5, study results are mixed, with some statistically significant positive relationships, no relationship and some statistically significant negative relationships. Perhaps this may be a reflection of “the lens through which AHIMA VLab™ should be viewed as a health information e-learning platform.” That is to say AHIMA VLab™ is a lab – a practice environment – where learners gain hands-on practice applying the health information theories learned in the classroom using real-world health information software applications. That is why the tagline for AHIMA VLab™ is “Where Practice Meets Theory™.” Like all learning resources and platform options, there is no one, single panacea resource or platform that covers all required learning content.
The challenge for health information educators has always been “What learning resources can be selected to best prepare learners for their national certification exams and ultimately their roles in the healthcare workforce?” Educators oftentimes select from a myriad of textbooks, workbooks, software, videos, recordings, mentorship, industry guided learning experiences and e-learning options to put together the suite of learning resources which best-suits their learners. Where any of these approaches may fall short of meeting learners’ needs, supplemental learning resources are necessary. This is the lens through-which one must view AHIMA VLab™.

Some results of this research study should be celebrated, specifically results for the CCA and RHIT certification exams:

- For every one-unit increase in student use of AHIMA VLab™ before sitting for the CCA exam, the odds of passing the exam increase by a factor of 1.452 or 45.2%. This may serve as a proxy that demonstrates AHIMA VLab™ has a favorable impact on health information education at the coding certificate level.

- For every one-unit increase in student use of AHIMA VLab™ before sitting for the RHIT exam, the odds of passing the exam increase by a factor of 1.430 or 43.0%. This may serve as a proxy that demonstrates AHIMA VLab™ has a favorable impact on health information education at the associate degree level.

Having said that, the scope of this particular research study focused on one independent variable “student use of AHIMA VLab™.” Other factors may influence the positive relationship predicted for student use of AHIMA VLab™ and passing the CCA
and RHIT national certification exams. Anecdotally (and not statistically) several factors come to mind. First, as mentioned earlier, the learning content activities and assessments hosted on AHIMA VLab™ are designed around the prevailing academic curricula competencies at the degree-granting associate, baccalaureate and graduate levels. Coding education content for learners in non-degree coding certificate programs is also featured on the AHIMA VLab™ platform. “Generally, learning content is designed at higher Bloom’s Taxonomy levels (Remember, Understand, Apply, Analyze, Evaluate, Create) as one moves from certificate, to associate, to baccalaureate to graduate level.”

Please see Appendix Q for the AHIMA-Revised Blooms’ Taxonomy (2018). Historically, learning content on the AHIMA VLab™ platform has focused more on the certificate and associate levels, followed by baccalaureate and graduate-level content. In the health information education space, “there are far more certificate- and associate-level programs than others. As of June 12, 2021, there were 249 CAHIIM-accredited associate-level programs, 74 accredited baccalaureate programs and 30 accredited master’s degree programs.”

Higher demand has led to development of more AHIMA VLab™ content at the certificate and associate academic levels and Bloom’s Taxonomy levels. Second, regarding assessments on the platform, answer/response options include: true/false, multiple choice (pick one/pick many) and matching. “Those are fairly limited assessment response options and they also exist at the lower Bloom’s Taxonomy levels.” This may be a contributing factor why AHIMA VLab™ is used more at the certificate- and

associate-level as compared to the baccalaureate or graduate levels. Third, the coding certificate and the associate degree programs prepare learners for the CCA and RHIT exams, respectively – the exams of interest in this section. As mentioned, “there are far more certificate and associate degree programs in the health information education space than there are baccalaureate and graduate programs.”\(^{81}\) In part, this is evidenced by the N sample size of the AHIMA VLab\(^{\text{TM}}\) user/CCA exam-takers (7,684) and AHIMA VLab\(^{\text{TM}}\) user/RHIT exam-takers (10,033) in this study, totaling 17,717 AHIMA VLab\(^{\text{TM}}\) user/exam-takers compared to the N for the baccalaureate level exam-takers (4,564).

Lastly and generally speaking, the CCA certification exam is an “entry-level” coding exam (two-hour exam; no coding experience requirement) as compared to a “coding mastery exam” such as the CCS and CCS-P exams (3.5-hour exam; coding experience requirement). “The RHIT certification exam is taken following completion of a CAHIIM-accredited associate degree program and is AHIMA’s academic credential at the associate level.”\(^{82}\) In summary, at least four anecdotally noted factors may contribute to the positive relationship predicted for student use of AHIMA VLab\(^{\text{TM}}\) and passing the CCA and RHIT national certification exams: the nature of the learning content on the AHIMA VLab\(^{\text{TM}}\) platform, the nature of the assessment answer/response options on the AHIMA VLab\(^{\text{TM}}\) platform, the number of coding certificate and health information associate-level programs in the education space and the nature of the CCA and RHIT exams. Further statistical examination


of these factors may be fertile ground for future research.

Anecdotally (and not statistically) several factors may also influence the RHIA exam results for which there is no appreciable relationship predicted for student use of AHIMA VLab™ and passing the RHIA national certification exam. First, as mentioned earlier, the learning activity content and assessments on AHIMA VLab™ are designed primarily at the certificate and associate degree academic and Bloom’s Taxonomy levels and somewhat less at the baccalaureate level. Because there are more certificate- and associate-level programs than others⁸¹, along with that higher demand, the content on AHIMA VLab™ is targeted primarily (not entirely) at those levels. Second, regarding assessments on the platform, answer/response options include: true/false, multiple choice (pick one/pick many) and matching. Those are fairly limited assessment response options and their lower Bloom’s Taxonomy levels⁸⁰ may not fully meet the needs of educators/learners at the baccalaureate or graduate levels. Third, CAHIIM-accredited baccalaureate degree programs prepare learners for the RHIA exam – the exam of interest in this section. “There are fewer baccalaureate programs than certificate or associate level programs.”⁸¹ In part, this is evidenced by this study’s N sample size of the AHIMA VLab™ user/RHIA exam-takers (4,564) as compared to the AHIMA VLab™ user/CCA + RHIT exam-takers which total 17,717. And lastly, the RHIA certification exam is

AHIMA’s academic credential at the baccalaureate level.” In summary, at least four anecdotally noted factors may contribute to no appreciable relationship predicted for student use of AHIMA VLab™ and passing the RHIA national certification exam: the nature of the learning content on the AHIMA VLab™ platform, the nature of the assessment answer/response options on the AHIMA VLab™ platform, the lower number of baccalaureate degree health information education programs as compared to coding certificate and associate-level programs in the health information education space and the nature of the RHIA exam. Further statistical examination of these factors may be fertile ground for future research.

Some results of this research study demonstrated a statistically significant negative relationship predicted between the independent/predictor variable and the dependent/outcome variable, specifically results for the CCS and CCS-P certification exams:

- For every one-unit increase in student use of AHIMA VLab™ before sitting for the CCS exam, the odds of passing the exam increase by a factor of .741 (i.e., they decrease by 25.9%).
- For every one-unit increase in student use of AHIMA VLab™ before sitting for the CCS-P exam, the odds of passing the exam increase by a factor of .704 (i.e., they decrease by 29.6%).

The scope of this particular research study focused on one independent variable

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“student use of AHIMA VLab™.” Other factors may influence the negative relationship predicted for student use of AHIMA VLab™ and passing the CCS and CCS-P national certification exams. Anecdotally (and not statistically) several items come to mind – some are similar to those discussed previously and some are new.

- First, as mentioned earlier, the learning content (a.k.a. activities) and assessments hosted on AHIMA VLab™ are designed around the prevailing academic curricula competencies at the degree-granting associate, baccalaureate and graduate levels. Coding education content for learners in non-degree-granting coding certificate programs is also featured on the platform. One more point to add regarding coding education content on the AHIMA VLab™ platform, the majority of the coding education content is at the “beginner coder” level vs. the “mastery coder” level. This is evidenced by the very favorable study results for the CCA exam “For every one-unit increase in student use of AHIMA VLab™ before sitting for the CCA exam, the odds of passing the CCA exam increase by a factor of 1.452 or 45.2%.”

- Second, regarding assessments on the platform, answer/response options include: true/false, multiple choice (pick one/pick many) and matching. Those are fairly limited assessment response options, especially for coding education in which free-text fields may be preferred to enter codes for grading vs. selecting codes from multiple choice options. This underlies what is important to know here - that AHIMA VLab™ was not ever and is not currently designed or intended for coding mastery education. In the
coding education space, there are many fine examples of coding education textbooks, workbooks, study guides, exercises and similar resources which are readily available to coding educators and learners. AHIMA Press features many such excellent resources and others are available elsewhere as well. There is simply no compelling business case to “reinvent the coding education wheel” on the AHIMA VLab™ e-learning platform.

- Third, the certification exam eligibility criteria are different for the AHIMA coding certification exams (CCA, CCS, CCS-P) and the academic-focused AHIMA certification exams (RHIT and RHIA). The primary difference is that, although all three AHIMA coding certification exams have specific eligibility criteria, none require graduation from a formal academic program (i.e., they are non-academic certification exams). Thus, many non-degree-granting coding certificate education programs prepare learners for these certification exams. Also, the CCS and CCS-P certification exam eligibility criteria include a coding experience requirement whereas the CCA certification exam does not. Further examination of the N sample sizes of the non-academic and academic certification exams may provide more context. For this study, the N sample size of the AHIMA VLab™ user/CCA exam-takers was 8,684. The N sample size of the AHIMA VLab™ user/CCS-P exam-takers was 1,236. Adding-in the 7,684 AHIMA VLab™ user/CCA exam-takers brings the non-degree-granting AHIMA VLab™ user/coding certificate exam-takers total to 17,604. Conversely, “the eligibility criteria for AHIMA’s
RHIT\textsuperscript{82} and RHIA\textsuperscript{83} certification exams do require graduation from a formal degree-granting CAHIIM-accredited associate or baccalaureate academic program (i.e., they are academic-focused certification exams).” The N sample size of the associate-level AHIMA VLab\textsuperscript{TM} user/RHIT exam-takers was 10,033. Adding-in the 4,564 baccalaureate-level AHIMA VLab\textsuperscript{TM} user/RHIA exam-takers brings the degree-granting academic credential AHIMA VLab\textsuperscript{TM} user/exam-takers total to 14,597. Over the four-year study timeframe, there were 3,007 more AHIMA VLab\textsuperscript{TM} user/coding certification exam-takers than the AHIMA VLab\textsuperscript{TM} user/academic-focused certification exam-takers. The points here are: a) this provides additional context and support of the previous discussion that AHIMA VLab\textsuperscript{TM} content is designed primarily (but not entirely) towards certificate and associate level programs and b) the differences in certification exam eligibility requirements (no academic requirement vs. academic requirement) may be a factor influencing the learner populations interested in or actively seeking those exams.

- Fourth, generally speaking, the CCS and CCS-P exams are considered as “coding mastery exams” whereas the CCA certification exam is


considered as an “entry-level” coding exam. Knowing now that the AHIMA VLab™ was not ever and is not currently designed or intended for coding mastery education, coding educators using AHIMA VLab™ are always encouraged to supplement their coding instruction with other widely-available coding education resources.

- Lastly, at this time, requirements for the coding certification exams mandate the use of only hardcopy coding books during the exam (no use of online encoder applications). For exam-takers who learned coding having primarily focused on using the encoder applications available on the AHIMA VLab™ e-learning platform with perhaps little focus on using the codebooks, this may have had an impact on their certification exam outcomes. However, this does not seem to have been a factor regarding the CCA exam results, which were statistically significant and favorable.

In summary, at least five anecdotaly noted factors *may* contribute to the negative relationship predicted for student use of AHIMA VLab™ and passing the CCS and CCS-P national certification exams: the nature of the learning content on the AHIMA VLab™ platform, the nature of the assessment answer/response options on the AHIMA VLab™ platform, the certification exam eligibility criteria, the nature of the CCS and CCS-P exams and the codebooks only requirement during the exams. Further statistical examination of these factors may be fertile ground for future research.

Health information education stakeholders will be hard-pressed to find elsewhere an e-learning platform that hosts the number of real-world health information applications to benefit learners as AHIMA VLab™. Perhaps the AHIMA VLab™
Applications Philosophy® captures it best – “AHIMA VLab™ strives to maintain a robust suite of software applications which are relevant in the marketplace, actually used in the health information professional practice workspace and ultimately equips students with the skills and competencies necessary to succeed in the healthcare industry and to compete in the global economy.”

2. Limitations

There were some notable limitations within the study datasets, on both the Aptify AMS dataset side and the certification exam dataset side. On the Aptify AMS dataset side, there are two different AHIMA VLab™ “packages” available – the Health Information Administrator package and the Medical Coder package. Please see Figure 6, excerpted from Appendix N. AHIMA VLab™ Packages and Bundles. The Health Information Administrator package features the entire suite of software applications hosted on the platform. The Medical Coder package is narrower and includes the three encoders plus the authentic de-identified patient cases and the patient case scenarios. Regardless of which “package” an academic program chooses, their students must still acquire and redeem an enrollment code for AHIMA VLab™ access. For purposes of this study, no differentiation was made between enrollment codes for one package or the other - all active enrollment codes were candidates for this study. This presents an opportunity for further research.
There is a wide range of variation in how educators actually use the AHIMA VLab™ platform at the application level and the activities level. For example, some educators ask their students to use all of the available software applications on the platform. Other educators use the platform more narrowly, asking their students to use only select software applications. Additionally, there are a number of pre-built lessons plus assessments in each software application. Some educators may assign their students to complete all of the activities under each application. Other educators may prefer their
students to complete only two or three of them. Thus, a limitation of this study is variability in how academic programs use/assign the applications and the activities hosted on the platform. Regardless of how many (or few) applications or activities educators assign to their students, each student must still acquire and redeem an enrollment code for access. For purposes of this study, no attempt was made to discern “the extent to which each student accessed/used/completed a given application, a set of applications, a given activity, or a set of activities.” All active enrollment codes were candidates for this study.

Perhaps the way educators use textbooks provides a good analogy here. Educators typically review many textbooks before they land on the one they want to “adopt” and ask their students to purchase and use. Once a given textbook is adopted, the educator will select the specific chapters which they want to assign to their students to read. Educators may or may not assign all of the chapters within the textbook to be read by students. Educators should rightfully have the “academic freedom” to make such choices to best-benefit their students and to design their academic programs according to their local academic program vision and strategic plan. The AHIMA VLab™ should be viewed similarly to textbooks as described. Educators indeed have the academic freedom to choose which AHIMA VLab™ software applications and activities to assign to their students to best-benefit students and align with their local academic program vision and strategic plan. Some educators use AHIMA VLab™ very sparingly, using just one application and assigning just a few activities/assessments to their students. Other educators use AHIMA VLab™ very robustly, requiring their students to use all of the available applications and to complete all of the available activities/assessments. Other educators use it somewhere in between. For purposes of this study, no attempt was made
to discern “the extent to which each student accessed/used/completed a given application, a set of applications, a given activity, or a set of activities on the platform.” All active enrollment codes were candidates for this study.

On the certification exam dataset side, the data extracted from the AHIMA certifications dataset used for this study were limited to “first-attempt exam-takers.” A similar study of “second-attempt exam takers” and beyond presents an opportunity for further research.

The certification exam data used for this particular study were based on aggregate certification exam data at the pass/fail level. “The passing score, or cut score, is established through a process known as standard setting. A panel of stakeholders who serve as subject matter experts (SMEs) provides judgments on how a minimally qualified candidate (MQC) would perform on the exam. The SMEs utilize the standard setting methodology to establish the passing scores. The results of this standard setting procedure along with the recommended cut score range are then compiled and presented to the Commission on Certification for Health Informatics and Information Management (CCHIIM).”77 “CCHIIM is a standing commission of AHIMA dedicated to assuring the competency of professionals practicing health informatics and information management (HIIM). CCHIIM provides strategic oversight of all AHIMA certification programs. CCHIIM holds the sole and independent authority in all matters pertaining to both the

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certification and ongoing recertification (certification maintenance) of HIIM professionals. By establishing and enforcing the standards and procedures for certification and recertification of HIIM professionals, CCHIIM serves these professionals as well as the public.\textsuperscript{78} “CCHIIM reviews the SME panel’s recommendations, as well as an estimated expectation of candidate performance and consequently votes to approve the passing score. All AHIMA exam scores are reported on a scale of 100 to 400. The passing score is based on the knowledge and skills needed to demonstrate competence in the skill domain and the difficulty of the questions that are delivered to a candidate. The approved passing score is then converted to a common or scaled score where all passing scores are set at 300, regardless of exam or version of an exam, also known as a form. Scaled scores are used to ensure consistency and fairness in reporting scores to all candidates. AHIMA converts all passing scores to 300 to establish consistency across all exams and forms. After a candidate completes their exam, the points earned on each question are summed and then compared with the cut score to determine whether the result is pass or fail. Any score of 300 or greater is a ‘pass.’ Any score below 300 is a ‘fail.’\textsuperscript{77} As mentioned previously, the certification exam data used for this particular study were based on aggregate data at the pass/fail level. If possible, a similar study at a more-granular level beyond pass/fail may present an opportunity for further research. For example, Figure 7 displays an excerpt from Appendix P the


AHIMA RHIT Exam Content Outline. “The content of each section of the RHIT exam (and others as well) is arranged first ‘by Domain’ and then ‘by Task.’ For example, under Domain 1 – Data Content, Structure and Information Governance, test questions are asked relative to various Tasks such as Task 3 - Define the legal health record or Task 4 – Maintain the integrity of the legal health record.”

Figure 7. AHIMA Registered Health Information Technician (RHIT) Exam Content Outline

If possible, a similar study at a more-granular level beyond pass/fail, such as Domain-level or Task-level, may present an opportunity for further research.

It is conceivable that “the amount of time elapsed from using AHIMA VLab™ to sitting for the certification exam” may have some impact on pass/fail outcomes. That is a limitation of this study – that variable was not explored in this study and provides an

opportunity for future research.

The data extracted from the AHIMA certifications dataset used for this study excluded exam-takers “outside the United States.” Results from this study will thus be “viewed in isolation” to domestic exam-takers within the U.S. This presents an opportunity for further research.

The literature search revealed only one previous formal study related to the AHIMA VLab™ e-learning platform. This study contributes to that body of knowledge. There is ample opportunity to continue researching other aspects of the AHIMA VLab™ e-learning platform.

3. Future research

This study will be published via the researcher’s dissertation and will also be advanced to one or more education-related or health information-related journals for publishing consideration. Comments, reaction and feedback will likely be received from stakeholders within the healthcare, education or health information communities, which is anticipated to be useful to inform future AHIMA VLab™ strategy and/or tactics.

As stated earlier, this work establishes some baseline measures of student use of AHIMA VLab™ and the resulting impact on pass/fail outcomes on national certification exams and by proxy, health information education. Building upon that foundation, there are a myriad of future research opportunities, including:

- The data extracted from the AHIMA Aptify system for this study made no distinction between the specific AHIMA VLab™ package (Health Information Administrator or Medical Coder) in which individual students were enrolled.”
Future studies could explore whether either or both packages impacted certification exam outcomes and/or to what extent?

- Educators at each campus ask their students to use AHIMA VLab™ at varying levels: with some educators using all of the available applications, while others only use one or two applications; and with some educators using all of the activities under each application, while others use only one or two activities under each application. This study made no attempt to differentiate “the extent to which educators (and their students) used the AHIMA VLab™ applications and/or activities.” Future studies could examine these factors.

- This study made no attempt to quantify “the amount of time elapsed between using AHIMA VLab™ and the time of taking the certification exam” – only that AHIMA VLab™ use was before taking the certification exam. Future studies could examine this factor.

- The data extracted from the AHIMA certifications dataset used for this study was purposefully limited to “first-attempt” exam-takers. Future studies could explore results for second-attempt exam-takers and beyond.

- The data extracted from the AHIMA certifications dataset used for this study excluded exam-takers “outside the United States.” Results from this study are thus “viewed in isolation” to domestic exam-takers within the U.S. Future studies could explore results for exam-takers outside the U.S.
Chapter VI.

CONCLUSIONS

This study was mindfully, purposefully and intentionally launched to accomplish the following research aims:

- **Research aim 1**: Contribute to the body of knowledge. Publishing the research study via this dissertation contributes to the body of knowledge and makes the study results available to stakeholders.

- **Research aim 2**: Establish baseline information and knowledge on the impacts of the AHIMA VLab™ on health information education. **Figure 8** arranges important findings into table format.

<table>
<thead>
<tr>
<th>Results by Certification Exam</th>
<th>Statistical Significance; Null/Alternative hypothesis Supported or Rejected?</th>
<th>Predicted relationship between Independent and Dependent Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCA</td>
<td>Statistically Significant; Null hypothesis is rejected; Alternative hypothesis is supported</td>
<td>Positive Relationship</td>
</tr>
<tr>
<td>RHIT</td>
<td>Statistically Significant; Null hypothesis is rejected; Alternative hypothesis is supported</td>
<td>Positive Relationship</td>
</tr>
<tr>
<td>RHIA</td>
<td>Not Statistically Significant; Null hypothesis is supported; Alternative hypothesis is rejected</td>
<td>No Relationship</td>
</tr>
<tr>
<td>CCS</td>
<td>Statistically Significant; Null hypothesis is rejected; Alternative hypothesis is supported</td>
<td>Negative Relationship</td>
</tr>
<tr>
<td>CCS-P</td>
<td>Statistically Significant; Null hypothesis is rejected; Alternative hypothesis is supported</td>
<td>Negative Relationship</td>
</tr>
</tbody>
</table>

**Figure 8.** Hypothesis testing results by certification exam

Study results show that for the four-year study time period, a statistically significant positive relationship is predicted for student use of AHIMA VLab™
and passing the CCA and RHIT national certification exams; there is no appreciable relationship predicted for student use of AHIMA VLab™ and passing the RHIA national certification exam; and a statistically significant negative relationship is predicted for student use of AHIMA VLab™ and passing the CCS and CCS-P national certification exams. Conclusions to be drawn from these results are:

- As with all learning resources and e-learning platform options, there is no one, single panacea resource or platform which covers all required learning content at all Bloom’s Taxonomy levels required.
- The challenge for health information educators has always been “What learning resources can be selected to best prepare learners for their national certification exams and ultimately their roles in the healthcare workforce?” Educators oftentimes select from a myriad of textbooks, workbooks, software, videos, recordings, mentorship, industry guided learning experiences and e-learning options to put together the suite of learning resources which best-suits their learners’ needs. Where that resource meets learners’ needs, such as the positive relationship predicted between use of AHIMA VLab™ and the pass/fail outcomes on the CCA and RHIT national certification exams, mission accomplished. Where any of these approaches may fall short of fully meeting learners’ needs, such as the negative relationship predicted between use of AHIMA VLab™ and the pass/fail outcomes on the CCS and CCS-P exams, supplemental
learning resources are necessary. This is the lens through-which one must view AHIMA VLab™.

- Health information educators are cautioned to not regard AHIMA VLab™ as “a certificate, associate, baccalaureate or graduate health information program in a box.” Educators must consider AHIMA VLab™ as but one of many learning resources available for use in health information education and if educators adopt AHIMA VLab™ for student use, they must actively guide their students through its proper use.

- AHIMA VLab™ brings together onto one platform a very robust suite of real-world, commercially available EHRs, encoders and other health information software applications – upon which students can build and hone their hands-on health information skills. Perhaps the AHIMA VLab™ Mission Statement© captures it best - “AHIMA VLab™ is the platform of choice by HIM educators for world-class HIM experiential education.”

**Research aim 3**: Support continued expansion of the AHIMA VLab™ e-learning platform. Opportunities include:

- existing market segments – such as additional CAHIIM-accredited degree-granting health information programs. Additional content could be developed on AHIMA VLab™ to support educator and learner needs at the baccalaureate and graduate levels.
o new market segments – such as non-CAHIIM-accredited degree-granting academic programs and non-degree-granting entry-level coding certificate programs.

o interprofessional education – such as integrating health information education alongside education in other healthcare disciplines such as medical programs, pharmacy programs, nursing programs and other clinical disciplines. Perhaps the AHIMA VLab™ Vision Statement© captures it best - “AHIMA VLab™ is the platform of choice by health educators around the globe and across all clinical disciplines for world-class interprofessional and experiential health intelligence education.”

o “upskilling pathways” via professional development content and continuing education units (CEUs) offered under certain domains or impact areas.

- **Research aim 4**: Benefit AHIMA. Now that quantifiable research evidence exists that student use of AHIMA VLab™ does indeed favorably impact health information education at the CCA and RHIT level, this presents a business growth opportunity for AHIMA to continue developing AHIMA VLab™ content to benefit learners and educators at all academic levels.

- **Research aim 5**: Benefit the health information profession. Continuing and increasing educator and student use of AHIMA VLab™ can yield more well-trained students, national certification exam candidates and ultimately professionals entering the healthcare workforce.
• **Research aim 6**: Benefit the healthcare industry. Continuing and increasing educator and student use of AHIMA VLab™ can yield more well-trained students, national certification exam candidates and ultimately professionals entering the healthcare workforce.

• **Research aim 7**: Inspire future researchers. Now that quantifiable research evidence exists that student use of AHIMA VLab™ does indeed favorably impact health information education at the CCA and RHIT level, this presents opportunities for others to research additional factors and independent variables of interest to benefit stakeholders.

The literature review for this research study began with a 2002 article in which AHIMA started to view e-learning as of strategic importance; that strategic view culminated with the 2006 launch of the AHIMA e-HIM™ Virtual Lab and that strategic view continues to the present day with AHIMA VLab™. **Appendix J**, the AHIMA 2020-2023 Strategic Plan displays the AHIMA Mission and Vision Statements, three Strategic Outcomes and several multi-year strategies. AHIMA VLab™ is an integral component of Strategic Outcome 2. Shape the health information profession by growing the influence and competitiveness of health information skillsets. AHIMA VLab™ is also an integral component of the two related multi-year strategies:

- Align professional development and educational programs with shifting market needs to advance hard and soft skillsets and support rebranding of the profession and
- Deepen audience engagement, elevate member expertise and develop the next generation of change leaders.
Findings and results from this research study serve to inform AHIMA education and enterprise strategy. Future researchers are encouraged to examine other related factors and variables of interest to health information education stakeholders.
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Appendix A

Closing the Knowledge Gap with E-learning
by Lana Vukovljak

Are high costs and potential downtime preventing your staff from receiving much-needed training? E-learning offers more than a solution to these concerns: it’s a better way to learn.

In this article, find out how e-learning works and how to implement an e-learning program in your organization.

The advent of the Internet as a means of delivering and facilitating learning has changed the way organizations can provide training. Instead of sending employees to training facilities, organizations can use the Internet to deliver training and connect employees with knowledge they need to meet business goals. According to the American Society for Training and Development (ASTD), a workplace learning association, employers are making the transition to Internet-based learning solutions because technology offers the opportunity to integrate learning with work and enhance performance in a dynamic, interactive and measurable way.

For HIM professionals, this means that much-needed education and training for employees can be customized, offered on site and tackled in pieces, rather than in week-long or day-long courses.

What Is E-learning?

E-learning is a broad term that encompasses instructional content or learning delivered by electronic technology (Internet, PC, TV, telephone, etc.). One delivery medium that has become very popular in recent years is the Web. Web-based training delivers educational content through a Web browser via the Internet, intranet, or an extranet.

In contrast to traditional forms of classroom-based learning that require a student’s physical presence in specific courses at certain times and locations, e-learning can take place at any time and in any location. This enables learners and organizations to customize the education to meet their needs and create opportunities for sharing information and peer-to-peer learning.

E-learning can be synchronous or asynchronous or instructor-facilitated or self-directed and self-paced. Synchronous learning is a real-time, instructor-facilitated e-learning event in which all participants are logged on at the same time and communicate directly with each other. The most common tools used in this type of learning are virtual classrooms, chat rooms and audio or video conferencing. Asynchronous learning, conversely, is e-learning in which interaction between learners occurs intermittently and with a time delay. Asynchronous learning mediums include self-paced or self-directed courses taken via the Web with threaded discussions and e-mail interaction.
Unlike traditional classroom-based learning, e-learning is always learner-centered, regardless of whether learning takes place in real time or is asynchronous. E-learning is designed to allow students to take charge of their own learning. The students are able to find, analyze, store and retrieve information in a new and more self-directed way. According to Facilitating Online Learning: Effective Strategies for Moderators by George Collison, learners react to content, share challenges and learn tangibly by putting into words (often via discussion postings) their own understanding and clarifications of assumptions. By experimenting with new skills and ideas, the students eventually take ownership of them.

**What Are the Benefits?**

High-quality e-learning creates an economic advantage for both individuals and organizations by shortening the amount of time it takes to train on new products and processes. Once the up-front infrastructure and development costs are met, the cost of educating additional students becomes marginal. Compared to traditional classroom-based training, organizations can significantly cut their employee training costs by implementing e-learning. When calculating costs for traditional training, in addition to training hours, number of students and instructor hours, consider the cost of a training facility, the travel costs for each learner and their hours out of the office. For an e-learning program, organizations need to consider product and implementation costs, which tend to be significantly lower than the costs of traditional training.

Because e-learning can take place at the organization, employees do not spend time traveling to a training facility. Further, training can be scheduled at convenient times for both the employer and the employees. As a result, businesses don’t need to lose several employees for days at a time, because the training can take place in shifts or one student at a time.

E-learning has the potential to help close the critical competency gaps that stand in the way of individual and organizational success and can help workers keep pace with today’s rapidly changing business and work environment.

**Are You Ready for E-learning?**

When implementing e-learning, there are three basic types of readiness an organization will need to consider: financial, structural and cultural.

Financial: Daryl Capuano, a consultant for e-learning consulting firm Brandon-hall.com, says the first practical step in any e-learning program has to do with numbers, specifically the number of employees and the number of miles between them and the training facility. Organizations need to consider the expenses incurred if employees are sent to off-site training and compare those with the cost of purchasing online training.

Structural: Does your company have the right technological infrastructure in place? If your organization selects the Web as the delivery medium, you need to make sure that you
have necessary equipment: plenty of PCs for employees and Internet access with sufficient bandwidth. Frustration with inadequate technology can be a barrier to successful learning.

Cultural: Readiness revolves around more than technology; the employees also need to be ready for e-learning. Employers should determine how employees prefer to learn, whether they have basic computer skills and whether they are familiar with online learning. If face-to-face meetings and phone conversations are the primary means of communication in an organization, then potential learners might need to become familiar with how to use discussion boards, virtual classrooms, or e-mail before starting training.

Once an organization determines its readiness for e-learning, the organizers need to secure the support from upper management. Also, have a clear implementation plan and consider the following questions:

- How will the courses be rolled out to users?
- Who will track learners’ progress?
- What are the timelines?

The best way to approach selecting and implementing an e-learning module is to form a project management team. The team would include members from information systems, human resources, education and training and finance. Make sure that you involve your learners in the process. They will be the primary users so their feedback is very important.

Making It Work—at Work

Once you have selected the e-learning program and courses, the next step is making the process a success. A positive call for participation to employees is a prerequisite to successful e-learning. Below are a few ways to make e-learning appealing to your employees:

Do not force your employees to learn on their own time unless they choose to do so. If the training is important enough to ask your employees to participate, then make sure to provide work time (not including lunch hours) or offer compensation.

Set realistic expectations. Make sure that the selected courses are at the appropriate level for your employees and are as applicable to your employees’ needs as possible. Allocate enough time for training so the students are not expected to complete a two-hour course in one sitting. Remember that one of the major advantages of e-learning is that it can be done over multiple sittings and can be customized according to students’ needs and schedules.

Provide an inviting setting for learning. In addition to the necessary hardware and software, consider the environment in which employees will be learning. If your employees are learning at their desktop, provide headsets to reduce distractions. Consider setting up a training room to prevent disruptions that your employees might experience at their
workstations. Even though adult learners are self-motivated, they have their own challenges and conflicts. An atmosphere of support will make your e-learning more successful.

E-learning offers organizations an affordable and convenient way to educate employees. It enables employers to provide needed training without dramatically reducing productivity. The interactive aspect of e-learning increases knowledge retention while giving employers a way to track progress. For HIM professionals looking to keep employees up to speed or increase their skills, e-learning is a vehicle to explore.

References


A Checklist for E-learning Success

A well-designed e-learning program should incorporate the following features: multiple activities, quality content, collaborative learning environment, feedback, different learning styles and aligned goals. Below is a closer look at these features:

Multiple activities: Today’s learners expect more comprehensive learning experiences. Research has shown that retention increases as learners apply information through a variety of vehicles. E-learning is an active medium and learners expect increased interaction because they operate under different learning behaviors. For example, human-computer interaction requires multitasking, which must be considered when designing online courses.

Quality content: Because of the proliferation of courses and programs offered via the Web, the selected content should come from a trusted, authoritative content provider like a well-known organization or training company.

Collaborative learning environment: A well-designed e-learning program establishes mechanisms to engage learners directly and collaboratively with the materials and with others in the course. Effective communication and collaboration are essential to becoming a successful learner and the success of one student helps other students to be successful. Collaboration and peer learning is done primarily through discussion threads, bulletin boards, e-mail and virtual classrooms.
Feedback: Every student response must be followed by a consequence, which means that an answer to a question is either confirmed or corrected. All interactions in e-learning should be designed so that they provide immediate feedback.

Different learning styles: Not everyone learns in the same way, so it is important to provide multiple opportunities for different learning styles. Successful e-learning must be designed to accommodate:

- visual learners (learn using graphical ways of presenting information)
- tactile learners (learn by writing down information they want to remember, creating study sheets)
- collaborative learners (like working in small groups toward achieving a common goal)
- self-directed learners (the learning is initiated by the learner. The learner makes decisions about what training and development experiences will occur and how)
- sequential learners (learn using a linear, organized and rational learning style. Sequential learners gain understanding by following logical, linear steps)
- global learners (global learners absorb materials randomly and in “big jumps”)

Aligned goals: Providing students with clear goals and objectives at the beginning of the course is critical because they help students set their expectations and aid them in determining whether the course is suitable. E-learners are not a captive audience, so it is critical that instructional objectives are in relation to the application that makes sense for them. In other words, the medium should match the topic.
Appendix B - Available Tools and Technologies

Available Tools and Technologies

Learning technology - any hardware or software that facilitates individual or organizational learning.

Learner management systems (LMS) – a software platform that typically performs the tasks of managing learning, keeping track of student progress and recording course completion.

Telecommunication devices:
- mobile/wireless/cell phones
- PCs
- Tablets
- Notebooks

Collaboration tools and technologies:
- teleconferencing options (audio and video)
- virtual collaboration platforms
- groupware
- video and audio streaming
- voice-over internet protocol (VOIP)
- discussion threads
- chats
- messaging
- application sharing
Appendix C

Richey dissertation interview question set

Research Question:
Does student use of AHIMA VLab™ in their academic programs impact pass/fail outcomes on their first-attempt national certification exams?

Interview questions:

1. Other than the ones listed in reverse chronological order below, are you aware of any other published articles related to AHIMA’s VLab? Please cite the source/timeframe, if known.


2. What was the original business case/intention of establishing AHIMA’s VLab?

3. It appears that the Foundation for Research and Education (FORE) supported the VLab project. Did AHIMA/FORE have a particular “strategy” in mind at the time?

4. What were the key steps in preparing for and launching AHIMA’s VLab?

5. Who were the key individuals/groups involved in launching and supporting AHIMA’s VLab?

6. Do you have/Can you share their current contact information?
7. Who were the original vendors supplying software for the platform?
8. What would your future vision be for AHIMA’s VLab?
9. Do you have any questions for me?

Thank You!!
Appendix D – Interview Responses – Desla Mancilla, DHA, RHIA

“In early 2005, the AHIMA Board of Directors committed to provide funding and leadership support over a number of years to develop and deploy a new e-learning platform – a virtual lab – upon which health information management (HIM) students can build and hone the necessary skills and abilities for success in the healthcare workforce. The AHIMA Board of Directors recognized this project as an important step in the continuing development and advancement of the HIM profession.

At the time, I was an educator teaching at Texas State University in San Marcos, TX. I came to know about the new virtual lab plans through an invitation from AHIMA to serve on the Academic Advisory Council to spearhead the project. The Academic Advisory Council was started in early 2005, with members coming from the community of HIM educators, several technology vendors and AHIMA staff. Laurie McBrierty served as the Council’s first Chair. Other charter members included me, Karen Bakuzonis, Gretchen Murphy, Beth Climer, Charlotte McKesson, Vicki Wheatly from QuadraMed and Mohit Saigal. Early meetings focused on establishing the vision for the virtual lab.

Initial participating industry vendors and their software applications included QuadraMed MPI Smart ID and Smart Merge, Nuance Quantim™ encoder, HealthPort (now Ciox Health) eSmartlog, McKesson Horizon Patient Folder, EDCO Solcom electronic document management system (EDMS) and the VistA electronic health record (EHR) simulations.

Subsequent meetings of the AHIMA Academic Advisory Council members and participating vendors in 2005 focused on creating learning content in the form of lessons which could be assigned to students. Me and and Laurie McBrierty wrote the very first lesson, QuadraMed Introduction to SmartID. Additional lessons followed shortly thereafter, eventually evolving into a library of lessons from which educators could choose to assign to their students.

AHIMA also contracted with Hatsize Learning Corporation (Hatsize) to host the lessons on their ‘virtual desktop’ – with the lessons and virtual desktop ultimately becoming collectively known as AHIMA Virtual Lab. Hatsize had a local office located in Austin, TX in close proximity to the Texas State University San Marcos campus where our students worked in their in-person computer lab and Hatsize staff often visited with the goal of making the user interface as real-world realistic and user-friendly as possible. Educators would schedule blocks of time and a certain number of seats on the AHIMA Virtual Lab (via the Hatsize virtual desktop) in which students could access and complete their assigned lessons.”
“This program was designed to enable education institutions nationwide to instruct students – future health information management (HIM) professionals - using the latest technology the industry has to offer. HIM academic programs have had limited access to the technology tools encountered in the electronic workplace. That need will be addressed by the virtual lab project. We have created a single learning portal in partnership with six healthcare IT companies. Using their technology, we are reaching out to educators and students in HIM academic programs nationwide.

Early-on, the AHIMA Board of Directors did not intend for the virtual lab to be financially self-supporting. It was originally sponsored and financially supported by the AHIMA Board of Directors which committed to provide a certain amount of funding over a number of years to help develop the skills and abilities of HIM students soon to enter the healthcare workforce. The AHIMA Board of Directors envisioned this project as an important step in the advancement of the profession.

Since the time the virtual lab was launched, AHIMA has commenced with specific targeted marketing and communication campaigns to expand the virtual lab to campuses across the U.S. A significant venue for getting the word out was at the annual AHIMA Assembly on Education (AOE) Symposium - AHIMA’s premier meeting for HIM educators. AHIMA has purposefully hosted regular virtual lab faculty training sessions at each annual AOE Symposium and that continues to the present day.”
Appendix F

Available Tutorials for AHIMA VLab™ Applications

SIMULATIONS

Simulations for the following AHIMA VLab™ applications can be accessed through the “Help & Support” page at academy.ahima.org under Virtual Lab Simulations. You can also follow this direct link: http://campus.ahima.org/vlab/Simulations/.

- **HealthPort eSmartlog** – Intro to eSmartLog
- **McKesson** – Introduction to Horizon Patient Folder
- **QuadraMed MPI** – Introduction to SmartID
- **QuadraMed MPI** – Introduction to Smart Merge
- **Solcom EDMS** – EDMS Web Client
- **Nuance Quantim Encoder** – Introduction to Quantim
- **VistA EHR** – 14 simulations which include the following (note: these simulations are currently the only VLab Academy Vista offerings, we do not have the actual application available for use at this time):
  - Data Retrieval
  - Scheduling an Appointment
  - Checking In a Patient
  - Coding an Office Visit
  - Creating an Office Note
  - Creating a Problem List
  - Clinical and Health Reporting
  - Creating a Consultation
  - Ordering an Outpatient Lab
  - Alerts and Triggers
  - Ordering a Medication
  - Creating a Discharge Summary
  - Checking Out a Patient
  - Restricted Records
Appendix G - HIM Laboratory: Delivering e-HIM Technology to Colleges and Universities – Virtually

by Sandra Kersten, MPH, RHIA, Mohit Saigal and Kathie Owens, MA

The e-HIM® Virtual Lab offers students important exposure to core HIM technologies, with minimal IT support required.

HIM students can expect to work with health IT upon graduation. In most organizations, managing or supporting clinical documentation, reimbursement, risk assessment, quality measures, research and education requires understanding one or more electronic health information systems. This expectation is reflected in educational standards from the Commission on Accreditation for Health Informatics and Information Management Education, the accrediting body for HIM academic programs. Technology requirements now form one component against which school curricula are evaluated.

For academic programs, however, the challenges of providing exposure to technology are significant. Purchasing multiple applications is often beyond the reach of technology budgets and integrating and updating software requires more IT support than may be available. Distance programs must support online environments that students can access remotely. Planning technology coursework also offers unique challenges. Students must receive enough training to use the application, but the skills they learn must extend beyond any single product or single setting.

One answer to these challenges is to think virtually, shifting the burden away from schools and students by creating online virtual laboratories where students can get hands-on training directly from their desktops, without attending a special classroom or lab and without costly tech set-up. Virtual labs are created for more than technology applications; other uses include patient care simulation and physical science.

The e-HIM® Virtual Lab collects core HIM technology in one cyberspace lab. The lab turns student computers into HIM laboratories with just a high-speed Internet connection, offering an environment where students can apply theory and concepts in practice settings without getting bogged down by the complexity of individual software procedures. Enrollment for the 2006–07 school year is currently under way, with a target of 100 schools, or about 4,000 students. It is anticipated that eventually up to 10,000 students from 250 schools could access the lab each year.

The lab will provide colleges and universities with access to a full array of core HIM technologies, an integrated electronic health record and the supporting tools and resources that will allow them to successfully and effectively integrate these technologies into the learning environment. The lessons, collected into one learning repository, are intended to enhance the HIM education system by integrating with curriculum for approved or accredited certificate, associate, baccalaureate and master’s programs.
AHIMA created the virtual lab with input from HIM educators, industry leaders and HIM professionals. The lab was developed initially in partnership with 13 academic institutions and six software industry partners.

**How It Works**

Two important criteria keep the lab easy to access and focused on providing widely applicable technical experience:

- Minimal IT requirements, so that school labs and students can access applications easily
- Lessons that blend software application experience with HIM core concepts, so that students obtain knowledge that applies to more than a single application or a single work environment

Keeping IT requirements simple is key. Applications must require minimal set-up, build, or maintenance at the local training sites. This spares academic programs the struggle of keeping current with frequent software updates and upgrades. It also circumvents incompatibilities with other academic center software that could limit the options schools have to add new software to their computing center PCs.

Selection of the hosting environment for each application in the Virtual Lab is determined on a case-by-case basis in order to maximize the lab’s investment in software and hardware, minimize the impact on academic programs and provide environments that will best support the needs of the academic programs and HIM curriculum. If the software is a Web-native application, it will likely be hosted at AHIMA’s data center. For client-server applications, whenever possible, the applications are provided through the lab’s virtual training management system, which supplies virtual machines that students access via the Internet. (For more on virtual technology and the lab’s setup, see below.)

For both of these environments, all that’s required of students is a high-speed Internet connection. When it’s determined that the client-server application is not suitable for the virtual environment (usually a joint decision between the software partner and AHIMA), it may require the installation of downloadable applets on the client local machines (i.e., the student’s or the school’s). AHIMA will make the applets available to schools via the Web or CD. A Web-based portal will provide access to the lab’s learning management system that manages scheduling and access, the lab applications and a repository of lessons.

Some of the first applications selected for the lab address core HIM functions— an encoder and abstracting application and electronic document management and deficiency management tools. More specialized technologies include master patient index software for patient identity management and a suite of applications based on provider dictation-transcription, speech recognition and natural language processing.
Another critical lab component is an electronic health record, including a clinical data repository. AHIMA has partnered with the College of St. Scholastica and the Virtual Lab will access an EHR built and maintained as part of St. Scholastica’s ATHENS project. From this partnership, students will be able to learn and explore in a fully integrated EHR environment.

The lab’s virtual training management system offers a scheduling system, allowing instructors to grant their students access to the applications at specific times. Students have a single access point to all the virtual applications, with access ultimately determined by their classroom assignments (as scheduled by their instructors). The management system will allow the lab to deliver technical and end-user training for both classroom and self-paced online training. The approach also allows training data to be reset for students simply, making it much easier to manage the lab environment in support of a large number of users.
Combining the application environments with an e-learning platform gives the lab a well-structured solution to centrally manage learner training needs. The lab’s infrastructure includes online registration to provision users in all the systems and manage the user data on a daily basis. By design of its infrastructure and scalability, the lab seeks to offer an essential, widely adaptable resource in preparing both HIM students and the current work force.

More Than Software Training

The design of lab lessons will be a critical factor in the lab’s success, because teaching theoretical concepts through software applications can be challenging. Lessons must provide enough detail in the software procedures to ensure the students successfully navigate the application, yet create a conceptual framework that will be applicable to a variety of practice settings.

Careful lesson design makes the lab more than a software training system and different from work-based training systems. Most of the applications in the marketplace have their own specific programs to train end users on the product; healthcare organizations typically customize training programs further to include their own specific workflow requirements. Therefore work-based training usually integrates organization-specific workflows into application training.

The Virtual Lab seeks to offer more widely applicable learning. Volunteer educators and subject matter experts serve as content contributors and reviewers for the lesson repository, offering input on both the practical application of the software and the educational design of the lessons. The Virtual Lab’s instructional designer provides expertise in formatting the content for online learning, for both instructor-led and self-paced learning experiences and in categorizing and organizing the lesson resources to ensure they’re available for instructor selection.

The lab lesson repository will be managed through a Web-based learning management system similar to those typically used to manage online educational programs. Clinical data and other supplemental information (such as sample policies and procedures, case studies, or scenarios) will be built into the lab applications and exercises in order to simulate the current healthcare environment. Students will apply problem-solving and analytical skills in the context of healthcare software applications and will gain experience and familiarity with a range of healthcare applications. The creation of this national database of current, accurate and comprehensive educational modules will significantly support and enhance the quality of HIM programs.

Up Next

A volunteer council comprised of HIM professionals, educators and other industry experts is currently planning the lab’s next phase—determining what applications are critical and relevant for HIM education; what interfaces, if any, need to be created between existing applications to better replicate the healthcare environment; and what data can be added to enhance the learning environment.
As the course repository builds, the lab envisions developing a series of custom course modules that will be available to academic programs, particularly for distance education. As the course modules are developed, lab staff will also seek employer and work force partners to develop custom modules for the work force environment, eventually providing a rich resource for training resources outside of the academic classroom as well, with products developed specifically for employer training, professional development and lifelong learning.

This type of course module will be available for work force training, helping the current HIM work force improve or gain new skills as well as launch new careers in HIM. AHIMA will continue to seek new sources of funding for the lab and advocate for the allocation of public dollars to support technology funding for education, both for academic programs and the current work force.

More information on the Virtual Lab—including enrollment forms—is available at http://campus.ahima.org/vlab.

Appendix H – Giving Health Information Students Real-world Experience

by Wylecia Wiggs-Harris, PhD

“The COVID-19 pandemic has impacted nearly every facet of American life, including higher education. My organization, AHIMA, is the leading voice of health information and meeting students where they are has been a priority for us more than ever during the pandemic. We have worked to increase our robust online education offerings to health information students preparing for an exciting science, technology, engineering and math (STEM) career in our complex, challenging and fun field.

The AHIMA VLab™ is at the center of our online education strategy. The AHIMA VLab™ is a virtual practice environment where health information students can explore healthcare technology and build their knowledge through interactive activities. ‘Practice meets Theory’ in the AHIMA VLab™, as health information students are able to learn firsthand how the accuracy, protection and accessibility of health information impacts each step of a patient’s health journey.

Expanding the platform - I’m excited about many of the new features in the AHIMA VLab™. In 2020, we announced that MEDITECH Expanse is now available on the platform. MEDITECH Expanse is a real-world electronic health record (EHR) system, a safe place where health information students can get comfortable working in a digital EHR. Using software like Expanse prepares students to hit the ground running after graduation. More than 150 realistic patient case scenarios were recently added to AHIMA VLab™, reflecting our continuing commitment to enhance the learning experience for health information students. Each patient case has been coded, with up-to-date coding answer keys that are also available to educators. The Ciox HealthSource Gym was another important 2020 addition to AHIMA VLab™. This experiential coding training and assessment solution is a web-based application powered by clinical content, making it more efficient than ever to train and assess medical coders and even clinical documentation integrity (CDI) professionals already working in the field. Ciox HealthSource Gym is designed to improve medical coding skills by providing data-rich training and practice exercises with immediate feedback. It enhances the coding acumen of CDI professionals and allows users to learn by doing — a proven methodology for increasing retention.

Hands-on experience - I’m also pleased to have collaborated with Wolters Kluwer in 2020 to add the MediRegs Coding Center Student resource to AHIMA VLab™. MediRegs Coding Center Student is designed to be an easy-to-use tool in which students can learn the basics of coding, billing and reimbursement compliance. Students who use it gain valuable experience applying the many resources available to a wide range of complex coding and billing situations they will later encounter in their careers. And educators are able to pair MediRegs Coding Center Student with their own interactive lesson plans, teaching students how to stay up to date on the latest regulatory issues health information professionals need to know.

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It’s probably becoming apparent that AHIMA and those we collaborate with value health information students learning in a realistic environment that offers the same types of challenges health information professionals tackle each day. By working with actual, commercially available applications used in healthcare, students develop an understanding of the uniquely human characteristics of health information and discover why its proper management requires a diverse range of expertise. They also learn to adapt in a space that is in constant evolution and become familiar with the latest technology.

**Better for all** - so many groups of people benefit from AHIMA VLab™, including the students who obtain valuable experience they can’t get elsewhere, educators who are able to offer increasingly diverse educational opportunities, employers who are able to fill critical job vacancies with talented candidates and providers and patients who benefit from health information professionals being well prepared when they enter the field. And ultimately, that is who we are at AHIMA. We empower people to impact health, because health information is truly human information.

Appendix I – Annual # of Campuses Subscribed to AHIMA VLab™

The # of campuses subscribed to the AHIMA VLab™ has reached recent all-time year-end records in 2017, 2018 and 2019. In 2020, the COVID-19 virus has impacted campus enrollments, which has also impacted AHIMA VLab™ subscriptions as shown.
Appendix J – AHIMA 2020-2023 Strategic Plan

<table>
<thead>
<tr>
<th>Mission</th>
<th>Vision for Transformation</th>
<th>Transformation Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Empowering People to Impact Health</td>
<td>Short-Term: Focus on current strengths while exploring growth opportunities to lead AHIMA toward renewal in 2019</td>
<td>Outcomes-Focused</td>
</tr>
<tr>
<td>A world where trusted information transforms health and healthcare by connecting people, systems, and ideas</td>
<td>Long-Term: Lay the foundation for innovation and greater impact within the healthcare ecosystem by 2022</td>
<td>Agility</td>
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<tr>
<td></td>
<td></td>
<td>Audience-Driven</td>
</tr>
</tbody>
</table>

**Vision for Transformation**

**Strategic Outcomes**

1. Advance and advocate for the creation and use of trusted information across the evolving health continuum

**AHIMA’s Future Role:** AHIMA is a thought leader, legislative and regulatory authority, and industry convener around cutting-edge topics across the health information lifecycle. This includes advancing the way accurate, quality information is created, stored, protected, accessed, and used to improve care at all touchpoints across the health continuum and in all settings and methods of delivery.

**Four Year Outcome Metrics**

- Achievement of target revenue (specific targets to be set for new and existing revenue streams)
- Increase in number and annual spend of customers and members (specific targets to be set for strategic audiences)
- Thought leadership metric TBO: policy/advocacy

2. Shape the health information profession by growing the influence and competitiveness of health information skill sets

**AHIMA’s Future Role:** The healthcare industry looks to AHIMA as the knowledge provider, certifier, trusted advisor, and preferred partner for organizations and professionals in the use of health information. AHIMA’s professional audiences are viewed by healthcare and other industries as leading experts in the use of trusted information.

**Four Year Outcome Metrics**

- Increased revenue from professional development and educational programs
- Increased audience engagement (specific targets to be set for strategic audience segments and engagement beyond certification and CEUs)

**Multi-Year Strategies**

- Define and implement an organization-wide thought leadership strategy to advance AHIMA’s brand in market-driven focus areas
- Adapt, develop, and deliver content to meet needs of strategic audiences using a content-first, product-second approach

3. Drive strategic transformation and renewed growth as a great partner and place to work

**AHIMA’s Future Role:** AHIMA is a customer-centric, innovative growth organization that delivers an unparalleled experience for its audiences, and partners with industry leaders to achieve its vision. AHIMA thrives in a safe, inclusive, and high-performing culture that enables teams and individuals to grow and drive strategic impact.

**Four Year Outcome Metrics**

- Achievement of target revenue (will require short-term investment for long-term margin gains)
- Increased net promoter score (specific targets to be set for strategic audience segments)
- Staff engagement and effectiveness (specific metric TBD)

**Multi-Year Strategies**

- Align professional development and educational programs with shifting market needs to advance hard and soft skillsets and support rebranding of the profession
- Deepen audience engagement, elevate member expertise, and develop the next generation of change leaders
- AHIMA Foundation: Deploy workforce strategy, including efforts to increase awareness and understanding of the value of health information professionals as vital members of the care team
- Grow long-term profitability through operational, process, and infrastructure improvements, and strategic alignment of organizational and governance structure
- Build organizational culture and capabilities needed (including innovation and communication) to support strategic priorities and drive transformation through a cohesive change management effort
- Unify the customer experience across all channels to increase AHIMA’s value
Appendix K - AHIMA VLab™ Timeline

- 2006
  - AHIMA e-HIM™ Virtual Lab officially launched
  - Sandra Koston hired as Director
  - Growth to 69 subscribed campuses

- 2007
  - Growth to 121 subscribed campuses

- 2008
  - Growth to 167 subscribed campuses

- 2009
  - Growth to 221 subscribed campuses

- 2010
  - Growth to 281 subscribed campuses

- 2011
  - Growth to 257 subscribed campuses

- 2012
  - John Richay hired as Manager HIM eLearning Curriculum and Training, Virtual Lab
  - Thomas McKay hired as Sr. Manager, Instructional Design
  - Danielle Holmes hired as AHIMA VLab™ Marketing Manager
  - Sales efforts were re-engaged
  - Competency Maps posted
  - Former EHR unseated; drchrono onboarded
  - Recovery to 264 subscribed campuses

- 2013
  - 2014
  - 2015
  - Decline to 212 subscribed campuses
  - Pricing model updated
  - Migrated to Knowledge Connection platform
  - Greg Walton hired as Corporate Technical Support Specialist
  - J.T. Wood hired as Director
  - Growth to 279 subscribed campuses
  - Sandra Koston departure

- 2016
  - MEDITECH EHR onboarded
  - New all-time record of 281 subscribed campuses

- 2017
  - 2018
  - 2019
  - 2020
  - 2021
  - Brightspace platform launched; Knowledge Connection platform launched
  - Realistic Patient Case Scenarios launched
  - Upgraded to MEDITECH Expanse
  - MediRez launched
  - Cicare HealthSource Gym launched; Cicare Smartlog sunset
  - ARSO eMRI sunset
  - AHIMA VLab™ trademarked
  - COVID-19 pandemic
  - Slight decline to 301 subscribed campuses
Appendix L - Study Datasets, Timeframe and Includes/Excludes

**HIM Student Aptify**
**AHIMA VLab™ Enrollment Code Status**

- No active AHIMA VLab™ enrollment codes; 2017-2020

**PearsonVue™ AHIMA Exam Takers**

- Study set includes active AHIMA VLab™ enrollment codes *and*
  - 1st-attempt CCA, CCS, CCS-P, RHIT or RHIA exam takers in 2017-2020

- 2nd-attempt or higher exam takers; CDIP, CHDA or CHPS specialty exam takers; exams taken outside of 2017-2020
Appendix M - AHIMA VLab™/Certification Hit-Miss Grid

AHIMA VLab™/Certification Hit-Miss Grid

<table>
<thead>
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<th>Control Group</th>
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<tr>
<td>AHIMA VLab™ Misses +</td>
<td>AHIMA VLab™ Misses +</td>
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<tr>
<td>Certification Hits</td>
<td>Certification Misses</td>
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<table>
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<td>AHIMA VLab™ Hits +</td>
</tr>
<tr>
<td>Certification Hits</td>
<td>Certification Misses</td>
</tr>
</tbody>
</table>

Certification Exams

Hit

Miss
Appendix N - AHIMA VLab™ Packages and Bundles

Customize your virtual practice experience

One platform, hundreds of patient cases, and unlimited opportunities to strengthen your career prospects.

Select a package and bundle a solution that works best for your needs.

<table>
<thead>
<tr>
<th>AHIMA VLab™ Package</th>
<th>Medical Coder</th>
<th>Health Information Administrator</th>
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<tr>
<td>Modules Included:</td>
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<td>Authentic Patient Cases (Redacted)</td>
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<td>Realistic Patient Case Scenarios</td>
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<td>Clion HealthSource Gym</td>
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<td>Optional</td>
</tr>
<tr>
<td>MediRegis Coding Center for Students</td>
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<td>Clion HealthSource Gym and MediRegis Coding Center for Students</td>
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</tr>
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</table>

Make virtual practice part of your course plan.

Connect with a representative
Appendix O - Rutgers University IRB Decision Tree

Chart 01: Is an Activity Human Subjects Research Covered by 45 CFR Part 46?

1. Is the activity a systematic investigation designed to develop or contribute to generalizable knowledge? [45 CFR 46.102(i)]
   - Yes
   - No

2. Does the activity fit the criteria for excluded research at 45 CFR 46.102(i)(1)-(4)?
   - Yes
   - No

   If No:
   - Activity is not research, so 45 CFR part 46 does not apply.

If Yes:
   - Activity is research.

3. Does the research involve a living individual about whom an investigator conducting research obtains information or biospecimens through intervention or interaction with the individual and uses, studies, analyzes, or generates identifiable private information or identifiable biospecimens? [45 CFR 46.102(e)(1)(i) and 45 CFR 46.102(e)(2)-(3)]
   - Yes
   - No

   If No:
   - The activity is not research involving human subjects and 45 CFR part 46 does not apply.

If Yes:
   - Activity is research involving human subjects.

4. Is the research involving human subjects conducted or supported by HHS?
   - Yes
   - No

   If No:
   - The research involving human subjects is covered by the regulations.

If Yes:
   - 45 CFR part 46, subpart A applies to the research, and as appropriate, subparts B, C, D, and E also apply.

5. The research involving human subjects is NOT covered by the HHS regulations. Institutions may choose to follow regulatory procedures even when not required to do so.*

   Go to Chart 02
Chart 06: Does Exemption 45 CFR 46.104(d)(4) for Secondary Research that Does Not Require Consent Apply?

1. **Start Here**
   - Does the research involve secondary uses of identifiable private information or identifiable biospecimens? *

2. **No**
   - The research is not exempt under 45 CFR 46.104(d)(4).
   - Go to the other exemption decision charts to see if any other exemptions apply.

3. **Yes**
   - Is the identifiable private information or are the identifiable biospecimens publicly available? [45 CFR 46.104(d)(4)(i)]

4. **No**
   - Is the information, which may include information about biospecimens, recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained directly or through identifiers linked to the subjects, the investigator does not contact the subjects, and the investigator will not re-identify subjects? [45 CFR 46.104(d)(4)(ii)]

5. **Yes**
   - Does the research involve only information collection and analysis involving the investigator’s use of identifiable health information when that use is regulated under 45 CFR parts 160 and 164, subparts A and E, for purposes of “healthcare operations” or “research” as defined at 45 CFR 164.501 or for “public health activities and purposes” as described under 45 CFR 164.512(b)? [45 CFR 46.104(d)(4)(iii)]

6. **No**
   - Is the research conducted or supported by, or on behalf of, a Federal department or agency using government-generated or government-collected information obtained for nonresearch activities, and the research generates identifiable private information that is or will be maintained on information technology subject to and in compliance with section 208(b) of the E-Government Act of 2002, and all of the identifiable private information collected, used, or generated as part of the activity will be maintained in systems of records subject to the Privacy Act of 1974, and, if applicable, the information used in the research was collected subject to the Paperwork Reduction Act of 1995? [45 CFR 46.104(d)(4)(iv)]

7. **Yes**
   - Research may be exempt under 45 CFR 46.104(d)(4).
Appendix P

Registered Health Information Technician (RHIT) Exam Content Outline

**Domain 1 – Data Content, Structure and Information Governance (24-28%)**

**Tasks:**

1. Apply health information guidelines (e.g. coding guidelines, CMS, facility or regional best practices, federal and state regulations)
2. Apply healthcare standards (e.g. Joint Commission, Meaningful Use)
3. Define the legal health record
4. Maintain the integrity of the legal health record
5. Audit content and completion of the legal health record (e.g. validate document content)
6. Maintain secondary health information (e.g. patient registration, financial records)
7. Educate clinicians on documentation and content
8. Coordinate document control (e.g. create, revise, standardize forms)
9. Maintain the MPI

**Domain 2 – Access, Disclosure, Privacy and Security (12-16%)**

**Tasks:**

1. Manage disclosure of PHI using laws, regulations and guidelines (e.g. release of information, accounting of disclosures)
2. Determine right of access to the legal health record
3. Educate internal customers (e.g. clinicians, staff, volunteers, students) on privacy, access and disclosure
4. Educate external customers (e.g. patients, insurance companies, attorneys) on privacy, access and disclosure
5. Assess health record disposition (retain, archive, or destroy)
6. Conduct privacy audits
7. Conduct security audits

**Domain 3 – Data Analytics and Use (14-18%)**

**Tasks:**

1. Abstract data
2. Analyze data
3. Analyze privacy audits
4. Analyze security audits
5. Report data (e.g. registries, core measures)
6. Compile healthcare statistics and reports
7. Analyze healthcare statistics (e.g. census productivity, delinquency rates, resource allocation)
Domain 4 – Revenue Cycle Management (14-18%)

Tasks:
1. Code medical/health record documentation
2. Query clinicians
3. Conduct utilization review
4. Manage denials (e.g. coding or insurance)
5. Conduct coding audits
6. Provide coding education
7. Monitor Discharged Not Final Billed (DNFB)
8. Analyze the case mix

Domain 5 – Compliance (13-17%)

Tasks:
1. Refine departmental procedures
2. Perform quality assessments
3. Assess risks (e.g. patient care, legal)
4. Report health information noncompliance
5. Ensure HIM compliance (e.g. coding, ROI, CDI)
6. Maintain standards for HIM functions (e.g. chart completion, coding accuracy, ROI, turnaround time, departmental workflow)
7. Monitor regulatory changes for timely and accurate implementation

Domain 6 – Leadership (11-15%)

Tasks:
1. Provide education regarding HIM laws and regulations
2. Review HIM processes
3. Create or modify HIM policies
4. Create or modify HIM procedures
5. Establish standards for HIM functions (e.g. chart completion, coding accuracy, ROI, turnaround time, departmental workflow)
6. Collaborate with other departments for HIM interoperability
7. Provide HIM technical expertise
### Appendix Q

#### AHIMA-Revised Bloom’s Taxonomy

<table>
<thead>
<tr>
<th>Taxonomy Level</th>
<th>Category</th>
<th>Definition</th>
<th>Verbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Remember</td>
<td>Exhibit memory of previously learned material by recalling facts, terms, basic concepts, and answers</td>
<td>Choose, Define, Find</td>
</tr>
<tr>
<td>2</td>
<td>Understand</td>
<td>Demonstrate understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating main ideas</td>
<td>Collect, Depict, Describe, Explain, Illustrate, Recognize, Summarize</td>
</tr>
<tr>
<td>3</td>
<td>Apply</td>
<td>Solve problems to new situations by applying acquired knowledge, facts, techniques and rules in a different way</td>
<td>Adhere to, Apply, Calculate, Demonstrate, Discover, Educate, Identify, Implement, Interview, Model, Organize, Plan, Promote, Protect, Report, Utilize, Validate, Articulate</td>
</tr>
<tr>
<td>4</td>
<td>Analyze</td>
<td>Examine and break information into parts by identifying motives or causes, Make Inferences and find evidence to support generalizations</td>
<td>Analyze, Benchmark, Collaborate, Examine, Facilitate, Format, Max, Perform, Take part in, Verify</td>
</tr>
<tr>
<td>5</td>
<td>Evaluate</td>
<td>Present and defend opinions by making judgments about information, validity of ideas, or quality of work based on a set of criteria</td>
<td>Advocate, Appraise, Assess, Compare, Comply, Contrast, Determine, Differentiate, Engage, Ensure, Evaluate, Interpret, Justify, Leverage, Manage, Mitigate, Oversee, Recommend, Solve</td>
</tr>
<tr>
<td>6</td>
<td>Create</td>
<td>Compile information together in a different way by combining elements in a new pattern or proposing alternative solutions</td>
<td>Build, Compile, Conduct, Construct, Create, Design, Develop, Forecast, Formulate, Govern, Integrate, Lead, Master, Propose, Present</td>
</tr>
</tbody>
</table>