

Development of Learning Modules Targeted for Information Technology Specialists at the University of Pennsylvania

Frank R. Fuller

Department of History and Political Science, The Lincoln University Lincoln University,
PA USA

Abstract

Informal surveys, educational needs assessments, and information technology-related discussions amongst university personnel and students verify a need for teaching tools in information technology specialist learning. The main goal here is to discover a practical way to enhance the overall learning process involved in the information technology specialist job-training program through training modules. To do this, the author develops a methodical approach to online learning based on instruction emphasizing the ADDIE model, a constructivist approach, technology-based learning, experiential learning, and instruction with an interdisciplinary structure. The study here involves three trainees, who utilize three training modules called Using (and Hyperlinking) Internet-Based and Library Resources for Education, Using and Recording in Powerpoint, and Cost-Effective Tricks to Editing, Converting (from PDF to MS Word and back), or Writing on PDF Documents. The results are positive. The feedback from the rubrics (the primary feedback tool) and other evaluation methods reveal practical solutions based on the ADDIE model, Kirkpatrick's levels of evaluation and sound instructional design principles, an increased understanding of the tasks required of trainees, better indication of how to approach projects requiring teamwork, and a sense of drive that motivates the trainees to perform to the best of their abilities.

KEYWORDS: Information Technology, Instructional Technology, Technology Specialist, Online Reference Tool, Cooperative Learning, Instructional Design, Technology Support

INTRODUCTION: Analysis: *Identified Problem and its Context:* **Problem Definition:** Universities, such as the University of Pennsylvania, must periodically update online learning content for information technology support specialists, particularly for those who work with software issues every day. Information technology specialists who have worked on a series of lab computers need a certain amount of knowledge, and set standards for information technology positions under the Association for Educational Communications and Technology (AECT), to do their jobs effectively. For example, the Office of Personnel Management cites specific IT job requirements that include general and technical competencies and jobs classified under the IT Family (Saldarini, 2000); the University of Delaware's School of Education has also developed a matrix in order to align its own standards with those of other national organizations setting information technology employee guidelines (EDTC, 2012). Additionally, they will need to have reached a certain level of proficiency suitable to resolving general technology issues that surface periodically (AECT, 2010). While technology specialists need to have a certain body of knowledge to do their jobs, not all university research divisions have the

resources to handle effective training programs without having someone devote time to developing them.

Technology Specialists are best defined as, borrowing from Microsoft Corporation, those who “successfully implement, build on, troubleshoot, and debug a particular Microsoft” or other, related Mac software and hardware issues (MCTS, 2008). They are generally part-time students or staff with specialized training with software issues. They need training in general issues with software, hardware, & troubleshooting for technical support to the university community in a particular department (via email or in person) & physical items such as an ID card & a key to certain classrooms. Computer lab maintenance experience & working independently are a plus. The education minimum requires some college classes in basic computer skills & familiarity with OSX and Microsoft operating software, such as entry-level skills from an introductory computer science course (AECT Standards, 2010). The technology specialists have access to tutorials & other MS Word-based training tools that define most job tasks through the trainee program learning modules.

The reason for a set of trainings in this study at the University of Pennsylvania is so that staff employees can more efficiently outline their duties and save time, money, and valuable resources for personnel to devote more energy to daily administrative duties. Several training modules are posted on a Share network and build from an AECT standard, where a position profile (as a guide) has been developed from job expectations through analyzing departmental data, staff data and university IT staff feedback from specific job requirements and departmental personnel. Recommendations help staffers synthesize this data into several training modules, with departmental personnel deciding on what areas to add to these Share files. Project execution involves building a UPenn information technology standard (from ADDIE) expected of information technology support specialists in the biomedical informatics department. The target audience is departmental information technology support specialist trainees. Once computer-based training is complete, staff are ready to work. A solid framework is useful for delivering quality instruction, especially for outlining clear goals for the training program and for refining educational materials, such as online training tools, available for specialists towards acquired skill sets and future advancement (Jasman et al, 1998).

In addition to reviewing departmental and university staff data, we have identified several areas in need of improvement pertaining to the trainee subject matters. These areas included instruction by qualified personnel, rubrics for feedback, meetings with administration, & follow-up discussions with trainees in similar positions alike. Deficiencies existed in these areas: a. Utilizing a systematic approach to IT support specialist training in the department; b. Narrowing the gap between reality and classroom learning; c. Integrating technology and trainee-specific learning material; d. Developing a trainee standard; e. Helping program trainees apply studies to on the job training; f. Building acceptable online Share-based training modules with plenty of learning materials; g. Helping trainees gain sufficient knowledge for adequate instruction.

In this study, we have just identified specific areas for improvement regarding the training requirements of information technology support specialists in UPenn’s

Biomedical Informatics department. These deficiencies in trainee subject areas have impacted the project's design and structure. It is essential to examine these less-developed areas for trainees, which lays the groundwork for where to go next in terms of enhancing the training program. The trainee deficiencies and areas lacking development establish a blueprint for upgrading the overall training program in its objectives. The objectives factor into the introduction of learning modules and the project's design phase.

MATERIALS AND METHODS: *Target Audience Analysis:* **Cognitive Characteristics:** All 3 trainees are at a Masters-student reading level and are MS students in health-related fields. They are all motivated to advance in the healthcare field and frequently work with software and technology issues related to healthcare. Prior knowledge includes some experience working with computers at a better-than-average level and working knowledge of healthcare-related software programs, with necessary hardware knowledge to assist them with their jobs. All have undergraduate degrees in healthcare-related fields.

Physiological Characteristics: One 45-year-old Hispanic woman, one 23-year old black male, & one 25-year-old black female are the trainees, all in good health.

Affective Characteristics: The interests of all 3 persons relate to healthcare, working particularly with enhancing technology to assist with patient issues, and more interaction with faculty and support staff in the department for using software to organize patient data in reports. All are motivated to continue employment and advance in their positions. Their attitudes towards learning include being competent in the most recent advancements in working with patient data for their jobs.

Social Characteristics: They all work within a particular aspect of the department that handles collecting patient data for the faculty and other staff in the department. All are continuing their educations at the MS level to continue gaining some expertise in healthcare as it relates to technology. They are all aware of their duties and perform to the best of their abilities. Design implications include ensuring that all workers are can carry out the necessary tasks for their duties. They all have a better-than-average knowledge of working with computers (beyond introductory undergraduate courses in computer technology), have tutorials that relate directly to healthcare and technology that call for how-tos, with only the necessary information required in the tutorials, and the tutorials or learning modules must be accessible via a Share account that all of them access and recommend changes as needed. The training modules are simple and direct, with text, screenshots and video files used via Captivate to clarify a step-by-step process of necessary skills to be learned.

Needs assessment: For these IT support specialist trainees who have only a limited amount of time to learn specific topics most relevant to their position, these are considered the most important areas, as polled by these trainees. All of them are delivered an email asking them to indicate which areas they consider most relevant to their field (out of these 35 areas) that they pursue most frequently. The most critical areas are below. These also factor into the areas that they need to familiarize themselves

with in order to be competent at their jobs: 1. Capturing Screenshots using Capture-A-Screenshot Software; 2. Converting an Audacity File to a WAV File; 3. Converting a WAV File to an MP3 File Using Switch Sound File Converter; 4. Converting Files from MS Word to PDF; 5. Converting Files from PDF to MS Word; 6. Editing Audio with Audacity; 7. Linking a Powerpoint File with an MP3 Audio File Using Camtasia Studio 6; 8. Recording and Saving an Audacity File; 9. Recording Narration in Powerpoint; 10. Uploading Multimedia Files to the FTP Server for the Online Learning Library; 11. Uploading PDF Attachments to the CBMI Education Online Learning Library; 12. Categorizing and Documenting Website Media Files; 13. Cleaning Junk Out of the Computer; 14. Converting Files Using Freeware or Trialware; 15. Cost-Effective Tricks to Editing or Writing on PDF Documents; 16. Editing Wikis; 17. Exploring UPenn Library Research Partnerships; 18. Filling in the Gaps by Uploading Media Files to the Site; 19. Hyperlinking Referenced Articles to Topics; 20. Hyperlinking the Homepages of Session Speakers; 21. Internet-Based Educational Games for Children on Healthcare; 22. Manipulating and Converting Picture Files Across Various Formats; 23. Merging Picture Files Together; 24. Miscellaneous Use of Online Resources to Find Various Things; 25. Strategies for Getting Academic Research Published; 26. Using a Cellphone for Multimedia Files; 27. Using Audio Editing Freeware or Trialware Programs; 28. Using Cost-Effective Scanning Software; 29. Using Good Multimedia Programs (Free, Trial-Based) for Editing; 30. Using Internet-Based and Library Resources; 31. Using Photo-Editing Software; 32. Using Popular Multimedia Websites for Education; 33. Using Powerpoint; 34. Using Voice-Activated Software; 35. Virus-Scanning Software, Online and Free or Trial-Based Programs. The top 3 topics that have been developed include: 1. Using (& Hyperlinking) Internet-Based & Library Resources for Education; 2. Using & Recording in Powerpoint; 3. Cost-Effective Tricks to Editing, Converting (from PDF to MS Word and back), or Writing on PDF Documents. Based on trainee responses, some of the 35 original areas have been condensed & expanded upon for inclusion, which have been developed into three Share-based, interactive tutorials, Hyperlinking Library Sources, Using Powerpoint, and Converting PDF & Word Files.

Goals and Learning Objectives: Instructional goals and learning objectives apply trainee standards used for information technology support issues involving the three defined areas, with the IT standard based on the Association for Educational Communications and Technology (AECT). This project uses the AECT standard to define what IT specialists should know to effectively do their jobs. The project is designed to develop proficiency in these three specific subjects, to get departmental endorsement, and to build on these three areas for future training programs. Through formal development of this job-training program surrounding these particular subjects, success leads to future programs in a similar framework. The overall learning objectives in this program includes the following: 1. Through the IT support specialist training program, trainees should gain insightful knowledge on how to utilize hyperlinks for scholarly educational research; 2. Trainees should learn to maximize the use of Powerpoint, including audio recording, to increase customer satisfaction amongst departmental clients; 3. Trainees should learn to convert PDF and MS Word files between both formats, including the editing of such files, to more efficiently save the department time and resources; 4.

Trainees should be able to learn specific job tasks as related to these particular training modules.

Technical Analysis: This project helps in developing recommendations to narrow down resources for: a. academic reference material; b. appropriate trainee subject matter; c. IT curriculum-related study tools; & d. applicability to current information technology profession standards pertaining to departmental information technology support specialist positions. In addition, input is included from departmental personnel & current IT personnel in the department. The results determine what support is necessary for the training modules.

Supervision: The training modules are supervised by the Center for Biomedical Informatics in Translation (BIIT), who oversee all biomedical informatics divisions at Penn and whose primary purpose is to ensure that the technology and education standards for training IT staff are met within this particular training program. The two key BIIT personnel, the head of the Biomedical Informatics Department and the head of BIIT, both have technology backgrounds and are the ones who make key decisions with such IT training programs at the university level. They serve as the key decision-makers in monthly departmental meetings. The two administrators in the BIIT program use a protocol established by AECT standards called the “Principles for Performance-Based Assessment Systems in Professional Education Programs” (mentioned in the Design section) (AECT Principles, 2010).

For the training itself, products include three primary tutorials that greatly expand on the subject matter as a comprehensive trainee resource with Share-based training modules, which contain continually-related material for learning, helping the trainee understand specific objectives that are to be gained. This project can assist with producing similar, future models for other university-based job training programs. Below is the list of hardware and software requirements that are necessary to complete the program.

Senior IT Support Administrator	Instructor	Job Trainees
a. Access to User Share Accounts	Microsoft Off/Office Mac	Laptops or Computers
b. Share Account	Share Account	Share Account
c. Audacity	Powerpoint	Powerpoint
d. Internet Explorer	Adobe Reader	Adobe Reader
e. Switch Sound File Converter	Windows Media Player	Windows Media Player
f. Camtasia Studio	Camtasia Studio	Camtasia Studio
g. Adobe Captivate	Adobe Captivate	Adobe Captivate

Timeline: The analysis section of this ADDIE model has taken place over two months. The design, development, implementation, and evaluation stages have also been

completed over a two-month period. Table 1 shows a project timeline below. The ADDIE model is used continually throughout the earlier stages and convenes at the evaluation phase for the course of the project itself, with the ADDIE design process then moving through the analysis and design phases; the development, implementation, evaluation phase and written results are finalized after the completion of the proposal defense. The associated university technology department makes decisions on future programs based on how earlier phases are handled.

Table 2 Project Timeline: *Project Timeline:* The IT specialist job training program timeline, from the initial planning stages to the end stage, includes the following:

March 2012 – April 2012 Analysis	Departmental Planning	Research programs, lit review
April 2012 – May 2012 Design	Concept development	Construct timeline, map out project, & assess appropriate subject-related materials
May 2012-June 2012 Development	June 2012 Bring together resources	Create 3 learning modules (tutorials on various job-related aspects for building skills in specific areas) and course content plans, finalize multimedia software, begin Share-based curriculum-aid tool (learning modules)
June 2012 – July 2012 Implementation	Activate project	Officially launch, examine data
July 2012-August 2012 Evaluation	Conduct evaluation of materials aiding in instruction	Note rubric recommendations & overall improvements for future implementation & program development

Design: The target audience, the 3 trainees for IT support specialist issues, have been participants in a project involving training modules. These modules have been developed by the IT persons in the biomedical informatics department; the project is primarily concerned with computer-based training. This training process is overseen by the BIIT personnel, who are the head of the Biomedical Informatics Department & the head of BIIT, both with technology backgrounds, the ones who make critical decisions with such IT training programs at the university level. They are the key decision-makers in monthly departmental meetings.

The 2 administrators in the BIIT program use a protocol as established by AECT standards regarding the “Principles for Performance-Based Assessment Systems in Professional Education Programs” (AECT Principles, 2010). This is used to assess whether the training modules follow appropriate guidelines for training IT personnel. Following particular guidelines ensures that all critical areas are met for training, which is explained in more detail in the implementation & evaluation section. Regarding the training, each trainee has accessed the training modules through their work Share account, which has the 3 primary topics listed under each module for the topics they choose, which are: 1. Using (and Hyperlinking) Internet-Based & Library Resources for

Education; 2. Using & Recording in Powerpoint; and 3. Cost-Effective Tricks to Editing, Converting (from PDF to MS Word and back), or Writing on PDF Documents.

The Share accounts are accessed through a folder in the university's Intranet system & are available for viewing on Penn's internal website for those with an authorized account. These areas are accessible via each user's Share account & observable once clicked & opened in the corresponding subject area. They have the option of being added to & modified over time for those with specific privileges as desired or at a higher administrative level if necessary.

The most logical way to develop each tutorial is to first sketch it in MS Word & cut & paste it (with additional corrections for centering & ensuring that the text and photos, &/or video are legible once transposed into each step in Captivate) under each step for users to access via their Share accounts through the university network. The interactive modules are accessed via Share, with the images &/or video inserted in each step (each step is numbered in a sequence so that the trainee is not confused throughout the whole process, which includes visual aids & a clickable menu for the user to go to the next step). The tutorials themselves are interactive, developed in Adobe Captivate & display a step-by-step process (clickable depending on the user's interaction between steps) of how to guide the user through each skill set. Screenshots & video in each module the (often done through Capture-A-Screenshot) to show an exact visual representation of what each trainee needs to find on the computer screen to go to the next step. Each module has been developed in an interactive format through Captivate. This type of learning module integrates Technology-Based Learning, as the modules are delivered primarily via online instruction. In addition, Interdisciplinary Learning is utilized, since the interactive modules draw from technology & career-oriented training in a format that focuses on technology aspects in a work environment.

From my experience working with older computer users and younger workers in training workshops, Captivate seems to be the most practical method (drawing elements from both technology-based learning and interdisciplinary learning), as those with less computer experience need to know exactly which buttons to press during interactive training sessions, what to look for on the screen, and have writing that is large enough to easily identify where the trainee is throughout the entire process (which bodes well for those who do not have the time or energy to increase the font size on the screen during the training sessions).

During the actual training program, I am available online to answer questions and assist when the training is being conducted at the workspace, with each user at a computer. Later on, users are asked for feedback via the rubric and make changes as necessary which they feel can be justified for the next group of trainees. Concerns are then addressed and reviewed at the next departmental meeting.

Technology-Based Learning: Often, technology-based learning (TBL) is focused on e-learning and online instruction, with an academic approach in terms of content and the level of teaching. TBL is meant to simulate a real-world environment as much as

possible to help accelerate student understanding of the material. This type of learning can reach a wide audience and enhance the learning process by being conducted within a scholarly atmosphere and one which audiences can relate to (Rice, 2009). In addition, technology-based learning bridges classroom-based and distance learning, providing alternatives that may be ideal for several of the students in the job-training program and is cost-efficient (Rice, 2009). TBL expands learning opportunities, bringing better customer care and success in the teaching profession. TBL also brings the feeling of home into the classroom and engages learners, displaying positive feedback from many work environments and from universities (Rice, 2009).

Interdisciplinary Learning: Instructors can help students appreciate a job-training program's value. Students are motivated by great teachers & engaging speakers who challenge pupils to find answers for themselves across disciplines (Davis, 1997), showing students the joys of interdisciplinary education. Interdisciplinary learning connects several fields & learning approaches, moving across several academic disciplines to portray its message. Interdisciplinary learning can have a greater impact when 2 or more subject areas are combined to enhance learning in both (Cone and Cone, 1998). Merging technology & experiential learning helps students benefit from the job-training programs & seek greater truths to draw practical solutions to problems. Interdisciplinary learning challenges students to examine alternative concepts, helping them look outside the box to draw from information in other disciplines. In addition to AECT, students may learn from the International Society for Technology in Education (ISTE, 2009). Students can be inspired when educators cross disciplines to bridge between fields (Cone and Cone, 1998). The scientific method & interdisciplinary learning help students gain specific skills. Cognitive abilities are developed in the process, such as perspective-taking techniques & drawing in ideas from multiple areas (Repko, 2008). Multi-tiered thinking helps students assess how practical a particular program is & advances critical thinking skills.

Recommended Instructional Strategy and Rationale: The proposed project borrows ideas from technology-based learning (TBL) & an interdisciplinary approach. These strategies prove practical for the program and students, helping students work together, engage in the learning process, develop solutions for themselves, and utilize available resources, such as technology, to enhance the learning process, which in turn helps the student discern which strategies need improvement and which prove more effective. The strategies target which deficiencies are identified through the needs assessment and contribute to an improved understanding of the required areas for training by the trainees themselves.

Table 3 Project Components include the following areas to develop the training modules and to take in feedback on how to improve the overall job-training program itself: Project & Multimedia Components (Methods):

Part 1 Development of Training Modules
Step 1: Explore which Sections need Changing
Step 2: Discussions Held to Examine Relevant Data

Step 3: Prioritize Changes for Training Modules using Share (Outline areas, then make changes)
Step 4: Develop training curriculum module template (Encourage interaction, alter and update training modules)
Step 5: Rubric for Feedback and Recommendations for Future Programs

The implementation strategy for the project has various parts. The first part has included introducing the training modules and making changes from March to April 2012. The training modules themselves contain various file types, with media files in multiple formats for multimedia, audio files, and PDF slides. The goal is to streamline everything to a single format in each area. Improvements are necessary and ongoing to emphasize efficiency from this point forward until the project's end. Instruction is provided for these trainees by experienced IT personnel, developing tutorials for specific areas, and online instructors available for live assistance have assisted the trainees in case of any particular issues.

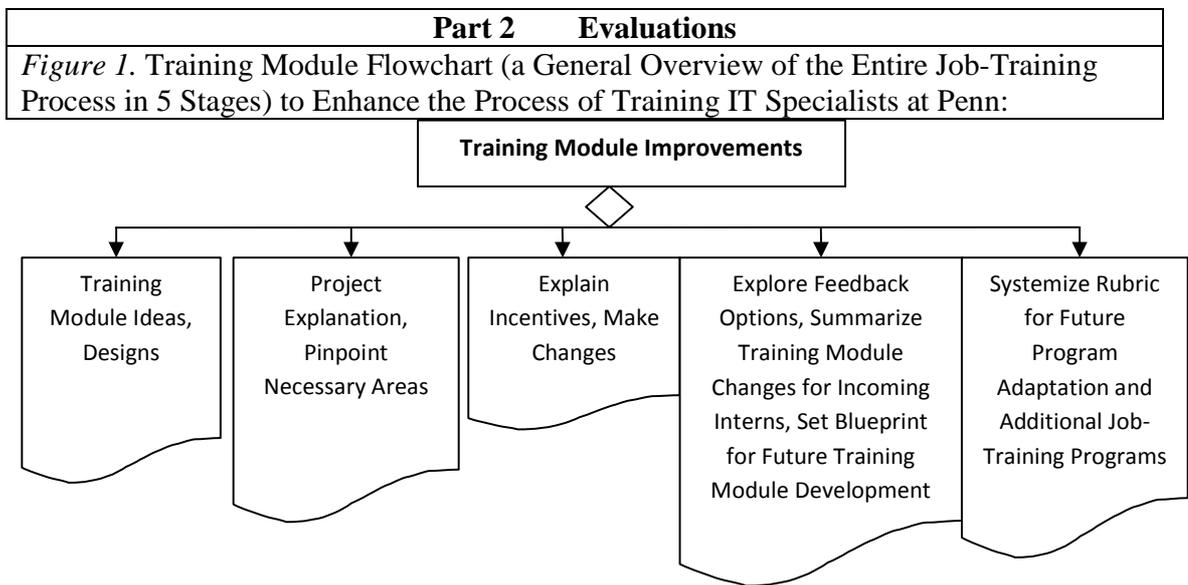
The first phase, from March to April 2012, has involved steps one and two under Part 1, Development of Training Modules from Table 3. This first period concerns examining which sections of the training modules need changing and which must be expanded. A Powerpoint presentation has been made with a discussion of the particular areas which need improvement and also outline specific circumstances where practical explanations are useful for developing a certain skill-set, identified during several meetings from March 2012 to April 2012 to examine relevant and important data for development. This data has been qualitatively assessed for significance as far as recommendations from administration and training instructors. Direct decisions have then been made by the department and instructors.

Feedback from peers who have attended the program and so forth has guided the researcher through the second phase, from April to May 2012. Input from trainees in the program explains what was changed over the next four months to the project's finale. The most frequent responses and suggestions, taken from trainee surveys, have been considered in follow-up sessions as to what direction staff should take for improvements. This phase of the project essentially involves illuminating relevant areas to develop while discarding other areas, based on final decisions by administrative personnel.

The third phase, from May to June 2012, has advanced to step three under Part 1, Table 3 and examines which changes take place first for immediate needs. The Biomedical Informatics information technology branch of that department has been assisted by the Ed.S. Candidate using the university's Share network to outline priorities for training tutorials, which has been done by thoroughly reviewing the training modules for needed changes. We identify specific areas anticipated by previous research in information technology issues and pinpoint which areas, according to AECT experts, are deemed important for the trainees and narrow them down in Share subject headings to a few important areas to focus on (with trainee feedback). These are modified for improvements and assessed for future study by incoming trainees.

During the fourth phase, from June to July 2012, the project focuses on rolling out the training modules, which include a template for trainees, instructors, and administrative personnel to review as part of step four, Part 1, Table 3. Program trainees have the option of recommending additions or alterations to the training modules for appropriate changes as needed. This is a valuable training resource for the program and a solid study guide for the learning modules. The content is monitored by program instructors and the department, with monthly meetings to determine future direction.

The last and final step, the fifth phase, from July to August 2012, under Part 1, Table 3, has focused on a rubric to enhance the development of future programs. The rubric expands further on the overall vision of the project and allows program trainees to make recommendations and give constructive feedback options for assessment. The overall program is designed to foster understanding in information technology areas relating to the biomedical informatics department. The model design is a blueprint for similar job-training programs, streamlining the overall process at the university. Other programs can be developed at the University of Pennsylvania for specialized areas, starting with other areas in biomedical informatics focusing on other IT issues. The training program is an ideal test-run for future certification programs developed by the University of Pennsylvania. The department can work with trainee program instructors to design particular areas to cater to each university training program. Other specialized training programs can be tailored for particular needs.



Development: The trainees need a desktop or laptop computer at a workstation and a Share account to access the university network and the training modules. The modules are filed, according to title, under specific headings in Share & accessible by each trainee. Each tutorial is a step-by-step guide on how to proceed through each particular skill learned. The lesson plan is laid out numerically in an interactive, step-by-step process. A questionnaire, in the form of a rubric, asks trainees to seek input about what

they learned, with columns for various categories rating trainee satisfaction levels and space available for additional comments.

In order to develop this proposal into a concrete project, an inclusive summary for employees is included on the introductory title page. This summary incorporates all the training modules displaying the majority of the project adjusted over time. The training modules are connected to training guides for biomedical informatics department information technology support specialist trainees. IT personnel develop tutorials to teach trainees primarily in biomedical informatics at the University of Pennsylvania. The information technology support specialists are assisted by myself, the researcher, to add specific materials to this job-training program. Suggestions for improvement include having the department adopt various multimedia applications at the project's end. Program instructors provide online assistance whenever help is needed, with evaluation focused at the end of the project. Recommendations for learning strategies are presented in later workshops for the program administrator. The goal for the program is to fit everything together in an appropriate framework for the employees. This process is in order to learn the majority of the tools used to assist in contributing to needed updates over the course of the project.

Strategies examining ways to improve the program factor into overall project development. IT support specialist staff and myself have suggested necessary changes and have helped design evaluation methods, which include exploring which sections need changing, designing a rubric for feedback and making recommendations for future programs. The project implementation & evaluations have been divided between the information technology support specialist trainees, the instructors, and the senior administrative personnel.

Technical Specifications: Audacity, PowerPoint and MS Word are primarily used to convert software files into audio & multimedia versions. These files are placed in the Share training modules as interactive modules with Captivate. Revising, cutting and pasting various sections are the steps (in order) used to edit existing modules within the Share subject areas. Both staff and learners only need to ensure that 256 MB of RAM, 2 GB of hard drive space, and a monitor with a videocard are needed for hardware on any laptop. A \$15 mic and headset combination from any department/ electronics store is also needed.

For operating systems, anything above Windows 2000, along with MS Office, is suggested, along with Internet Explorer 7. The plug-ins include Adobe Flash Player 9, Adobe Reader 7, Audacity 1.2.6, PowerPoint 2003; these are necessary for editing, but learners only need Flash Player, Adobe Reader, PowerPoint, and Adobe Captivate. For Mac users, Office Mac is provided (if necessary) for employees, along with appropriate plug-ins that allow Mac compatibility. The staff working on the training modules need Switch Sound File Converter 1.0 (which also ensures Mac compatibility) at a minimum, to convert files, and MS Word to cut, paste, or insert relevant files into the online training modules developed in Captivate. The TBL knowledge is useful for creating the video scenarios and the ITPBL activity components.

The training modules serve in a similar capacity as the University of Pennsylvania job training modules, which are connected to the associated Information Technology Support Specialist divisions. Making the necessary changes requires PowerPoint and Audacity to make adjustments and edits, but Switch Sound File Converter is also periodically used to convert necessary files (the modules contain mostly video files within Captivate), along with, optionally, related programs, to update the modules periodically. The primary equipment needed for all parties is a computer, Internet access, Microsoft Office applications and Adobe Reader. For using the training modules, a standard browser that is convenient and user-friendly is a must, along with Captivate to run the modules, and a tutorial developed utilizing PowerPoint has been (optionally) inserted into the Share files (if necessary) to assist staff and incoming trainees with explaining what changes have been made over the course of the project and for overall explanatory purposes of its goals. Microsoft applications, such as Excel, outline which files have been changed and need updating periodically, which serve as a useful categorization tool. The senior staff administering the program ensure that all components are available.

Trainee Needs: The trainees need either laptops or desktops to chart their progress through the job-training program and each TBL activity, as well as for feedback in future programs. All work laptops, IBM ThinkPads equipped with Windows XP, issued to staff or trainees contain necessary tools, such as Office programs, employee intranet access, & wireless access throughout the Penn campus. Additionally, Mac computers are equipped with Office Mac 2008 programs to ensure that trainees can utilize the same programs as IBM-compatible computers, in addition to Mac versions of the software programs (which are all available).

To view the training modules, only having most Microsoft Office 2003 or Office Mac programs (such as Windows Media Player) and an Internet browser, such as Internet Explorer 7 or a comparable Safari program, are needed, along with Adobe Reader 7 and Adobe Flash Player 7. Trainees are able to log into their Share accounts and suggest changes as needed for the modules themselves. To make suggestions to assess any aspect of the program, they simply use the rubrics and write in comments in the available space provided for them immediately after completing all learning modules. Any needed changes on the learning modules are addressed after training in the rubrics, and evaluations towards the program's end are brought up by the BIIT administrators in monthly meetings, reflected in the results of the rubrics and final departmental decisions.

Implementation & Evaluation: The Implementation and Evaluation Section begins with the following components. The target audience of three persons sits through the training and goes through the training modules. During the training itself, they follow the step-by-step instructions carefully so as to comprehend the lesson plans after logging in with their accounts. Their responses to various aspects of the training program in the rubric (listed under sections Design, Development, etc.) track how they feel as they progress through the training process and follow the instructions. This feedback is for the administrative personnel examining the program to evaluate whether several aspects of

the training process have proven effective. The feedback serves as the data by the target audience itself to record what they learn and how they feel about the training process. They also have the opportunity to give some suggestions along the way and record any possible complaints. The program itself serves as a test model for how similar training programs in instructional technology can be approached in the future. There is space on the rubric that serves to suggest alternative methods for instructions, if necessary, to simplify or outline the training process even further.

In terms of evaluations, a formative evaluation involves administrators in the BIIT program using a protocol established by AECT standards regarding the “Principles for Performance-Based Assessment Systems in Professional Education Programs” (AECT Principles, 2010) to assess whether the training modules follow appropriate guidelines for training IT personnel. It is outlined in a set of guidelines called the “Principles for Performance-Based Assessment Systems in Professional Education Programs” to assess what professional educators should know to develop standards based on performance through those established by the National Council for Accreditation of Teacher Education (NCATE) and the organizations under that umbrella. The project essentially develops several measures to evaluate specific areas and highlights principles by that organization’s Specialty Area Studies Board. These include a) ...knowledge, skills, and dispositions...by...educator candidates...in program goals; b)...standards of...national and state accrediting...bodies; c)...means for measuring...performance and impact; and d)...information...for decision-making” (AECT Principles, 2010). A summative evaluation involves the target audience using a rubric as adopted by AECT, which is excellent for persons initially entering IT training programs. This is the rubric used by the trainees to assess the appropriateness of the program itself (AECT Standards, 2010). For final evaluation, we use Kirkpatrick’s first 2 evaluation levels (Kirkpatrick 2006). The 3 trainees employ a rubric for feedback following completion of the training modules. This is submitted to them to provide comments & respond to appropriate categories. Kirkpatrick’s 1st level, Reaction, records trainees’ thoughts & overall satisfaction level through particular categories. The left column contains a description of each aspect being measured, with the right column measuring 3 levels of satisfaction from unacceptable to Target, with Unacceptable being the lowest level and Target the highest satisfaction level. The categories contain a wide range of areas, from asking if the presentation design is sufficient to questioning whether the visual design is aesthetically pleasing enough.

Kirkpatrick’s 2nd evaluation level, Learning, is reached by measuring if participants have gained any particular knowledge, skills, or have changed their perspective on the subject matter in the modules following the training itself. This is provided for by adding additional space near the end of the rubric that serves as an outlet to further address any concerns not already contained in the rubric, to explain the knowledge or skills gained, or to allow trainees to reflect on these areas after having gone through the learning modules.

Table No: 04 Presentations format rubric

Name of Program IT Support Specialist Training Program ____ **Name critiquer** L.E. _

INITIAL PROGRAM RUBRIC STANDARD	UNACCEPTABLE	ACCEPTABLE	TARGET
1. Design	Program lacks sufficient knowledge, skills, and dispositions in basic principles of instructional systems design, message design, instructional strategies, and learner characteristics at macro- and micro-levels.	Program knowledge, skills, and dispositions are well-grounded in basic principles of instructional systems design, message design, instructional strategies, and learner characteristics in most applications.	Program knowledge, skills, and dispositions are fully grounded in basic principles of instructional systems design, message design, instructional strategies, and learner characteristics at both a macro- and micro-level.
Reviewer's Comments Target: The program demonstrated knowledge and skill in the 3 presentation provided. The information provide the learner with basic instructions in a systematic layout in addition to conveying to the learner the simplicity with visual animation.			
2. Development	Program demonstrates limited or simplistic knowledge, skills, and dispositions in the development of instructional materials and experiences using print, audiovisual, computer-based, and integrated technologies.	Program demonstrates essential knowledge, skills, and dispositions in the development of instructional materials and experiences using print, audiovisual, computer-based, and integrated technologies.	Program demonstrates complex, integrated knowledge, skills, and dispositions in the development of instructional materials and experiences using print, audiovisual, computer-based, and integrated technologies.
Reviewer's Comments Target: Provided a step by step process in development of a instructional tutorial lessons on the specific topics presented, including powerpoint, adding hyperlink to powerpoint, and creating a PDF file.			
3. Utilization	Program shows little evidence that it uses processes and resources for learning. It lacks basic knowledge of principles and theories of media utilization, diffusion,	Program shows evidence that it can use processes and resources for learning that are grounded in principles and theories of media utilization, diffusion,	Program routinely and skillfully uses processes and resources for learning that are grounded in principles and theories of media utilization, diffusion,

	implementation, and policy-making.	implementation, and policy-making.	implementation, and policy-making.
<p>Reviewer's Comments Target: Program utilizes various methods and guidelines by including the principles of how to utilized the topics presented. It was an instrumental presentation that educated the viewer.</p>			
4. Management	Program is unable to plan, organize, coordinate, and supervise instructional technology. It lacks essential knowledge of basic principles of project, resource, delivery system, and information management.	Program demonstrates baseline abilities to plan, organize, coordinate, and supervise instructional technology through the application of basic principles of project, resource, delivery system, and information management.	Program demonstrates extensive abilities to plan, organize, coordinate, and supervise instructional technology through the application of principles of project, resource, delivery system, and information management.
<p>Reviewer's Comments Target: The presentations were clear, concise, educational, informational, utilized visual aids and was executed in a organized presentation.</p>			
5. Evaluation	Program is unable to effectively present instruction and learning. It lacks basic knowledge of principles of problem analysis, criterion-referenced measurement, formative and summative evaluation, and long-range planning.	Program demonstrates essential knowledge and skill in the evaluation of instruction and learning by applying principles of problem analysis, criterion-referenced measurement, formative and summative evaluation, and long-range planning.	Program demonstrates extensive knowledge and skill in the evaluation of instruction and learning by applying principles of problem analysis, criterion-referenced measurement, formative and summative evaluation, and long-range planning.
<p>Reviewer's Comments Target: The presentations demonstrated how to troubleshoot and explained window pop up and how to utilize various techniques to proceed to the next screening process. Overall evaluation, it was helpful to the viewer but the timing needed to be delay. Good instructional visual presentation. (AECT, 2010).</p>			

Taking all of this into account, on a grander scale, for overall departmental evaluation of the program, monthly meetings determine future direction and overall vision of the department for the trainee program.

Types of Learning Gained by Employees: The trainees have taken the rubric that I developed & report some general comments as well (optional). Feedback can be given in the space provided for each section in the rubric. Overall, the program is recorded as unacceptable, acceptable, or target, according to the rubric results on the quality of the program in five different sections. Comments are expected to range widely--some consider the tutorials comprehensive, while others request several changes the next time around. I have received alternative suggestions that are unanticipated as well. Overall, I expect the trainees to improve their overall knowledge base & benefit greatly from the training sessions. I predict that they learn quite a bit about the elements of a good presentation & what they can do if they take part in the training process a 2nd time, in addition to increasing their overall knowledge of necessary information for the job. Follow-up by trainee-program staff in monthly meetings determines the best way to implement lessons from the rubric feedback to address the next round of training sessions.

There is both integrative & cumulative learning for employees in the job-training program. Integrative learning is a cooperative effort through peer review & constructive feedback between employees who have successfully gone through the training process & commentary, with recommendations made. This type of learning integrates several learning concepts together throughout the learning process. Cumulative learning here refers to learning over time to build a knowledge base from various sources, including classroom learning, online learning, and on-the-job training. In addition, TBL and Interdisciplinary learning are integrated into the training, as mentioned in the above sections covering these particular areas.

RESULTS: *Proposed Revisions and Major Data Trends:* After project implementation, some revisions are suggested to improve the project itself. The major data trends are the following:

Table No: 05 Evaluation Rubrics and Comments (Combined Feedback of Job Trainees Who Went Through the Training Program & Suggested Improvements)	
Content Section	Combined Job Trainee Observations
Combined Section: Section 1 Design 1 & Section 2 Development	The design need be slightly more engaging, with brighter visual elements (“a more engaging display would have been beneficial” (trainee E.A.) to attract the reader.
Section 3: Utilization	A bit more content for each step is also mentioned (“more content could have been added to the presentations” (trainee E.A.) to help the trainee achieve maximum results.
Section 4: Management	To enhance the level of instruction, it is recommended that there be more time in between each step to fully understand the material (“it was helpful to the viewer but

	the timing needed to be delayed” trainee L.E.). Doing so gives the trainee a chance to absorb the information more effectively.
Section 5: Evaluation	The trainees seem to enjoy the visual aids and the method of delivery, gaining a clear understanding of the goals of each learning module.

DISCUSSION: *Implication of Findings:* The findings indicate trainees can learn the most essential job skills demonstrated through the learning modules in a step-by-step way. Further review reveals that the modules do their jobs quite well, & that investigating certain skills for job application helps students with job expectations. Based on results from the ADDIE model (among several learning types) & Kirkpatrick’s first 2evaluation levels, as shown in the rubric, the findings reveal that IT support specialist trainees working within the Biomedical Informatics Department are inspired to employ technology by using learning modules to engage in the demands of their occupations. According to overall rubric results, students prefer the interactive environment & visual aids, particularly in the development & utilization of these learning modules, as well as the crossing of disciplines and learn something new in a simple and direct format. This gives support to the theories being used incorporating online instructional learning. The Principles for Performance-Based Assessment Systems in Professional Education Programs (helping to narrow down the content of 3 learning modules) & the Rubrics reveal that learning results from students working with online training modules in a setting incorporating specific instructional technology job-training goals.

REFERENCES

- Anderson, L. W., Krathwohl, D. R., Airasian, P.W., Cruikshank, K. A., Mayer, R. E., Pintrich, P. R., et al. (2000). *Taxonomy for Learning, Teaching, & Assessing: A Revision of Bloom’s Taxonomy of Educational Objectives* (2nd Rev. ed.). Boston: Allyn&Bacon.
- Association for Educational Communications and Technology.(2010). What are the Initial Standards? Retrieved May 7 from the World Wide Web: <http://www.aect.org/standards/initstand.html>
- Association for Educational Communications and Technology.(2010). What is AECT? Retrieved Sep. 7 from the World Wide Web: <http://www.aect.org/About/default.asp>
- Association for Educational Communications and Technology.(2010). Principles for Performance-Based Assessment Systems in Professional Education Programs. Retrieved May 7 from the World Wide Web: <http://www.aect.org/standards/assessplan.html>
- Baloche, L., Hynes, J. L., & Berger, H. A. (1996). Moving Toward the Integration of Professional and General Education. *Action in Teacher Education*, 18, 1-9.
- Boix Mansilla, V. (2005). Assessing Student Work at Disciplinary Crossroads. *Change*, 37 January/February, 14-21.

Center for Biomedical Informatics Education.(2009). Certificate Program. Retrieved Nov. 2009 from the World Wide Web. <http://www.research.chop.edu/cbmi/ed/educertificate.php>

Cone, Theresa Purcell, & Cone, Stephen L. (1998). *Interdisciplinary Teaching through Physical Education*. Champaign, IL: Human Kinetics.

Dangel, Julie Rainer, Guyton, Edi, and McIntyre, Christie Bowen. (2004). Constructivist Pedagogy in Primary Classrooms: Learning from Teachers and Their Classrooms. *Journal of Early Childhood Teacher Education* 4 (24), 237-45.

Davis, James R. (1997). *Interdisciplinary Courses and Teach Teaching*. Phoenix: Oryx Press.

Hein, George E. (1991). Constructivist Learning Theory: The Museum and the Needs of the People. Prepared for the *International Committee of Museum Educators Conference*. Retrieved Nov. 2009 from the World Wide Web: <http://www.exploratorium.edu/IFI/resources/constructivistlearning.html>

International Society for Technology in Education. (2009). About ISTE. Retrieved Nov. 2009 from the World Wide Web: http://www.iste.org/AM/Template.cfm?Section=About_ISTE

Jasman, Anne, Payne, Lesley, Grundy, Shirley, and Del Borrello, Adrianna. (1998). Uncovering the Knowledge Construction of University Based Teacher Educators: What We Learn from/with School Based Practitioners. Prepared for the *Annual Conference of the Australian Association for Research in Education*. Retrieved Nov. 2009 from the World Wide Web: <http://www.aare.edu.au/98pap/jas98305.htm>

Kirkpatrick, D. L. & Kirkpatrick, J. D. (2006). *Evaluating Training Programs*. San Francisco, CA: Berrett-Koehler Publishers.

Malachowski, Michael. (2002). ADDIE Based Five-Step Method Towards Instructional Design. Retrieved Nov. 2009 from the World Wide Web: <http://fog.ccsf.cc.ca.us/~mmalacho/OnLine/ADDIE.html>

Microsoft Corporation. (2010). Microsoft Certified Technology Specialist (MCTS). Retrieved Aug. 2010 from the World Wide Web: <http://www.microsoft.com/learning/en/us/certification/mcts.aspx#tab1>

Nanjappa, Aloka and Grant, Michael M. (2008). Constructing on Constructivism: the Role of Technology. *Electronic Journal for the Integration of Technology in Education* 2 (1), 38-55.

Repko, Allen F. (2008). Assessing Interdisciplinary Learning Outcomes. *Rapid Intellect* 12 (3), 171-178.

Rice, John. (2009). Technology Based Learning Initiative. Retrieved Nov. 2009 from the World Wide Web: http://www.ehow.com/about_5612107_technology-based-learning-initiative.html?ref=fuel&utm_source=yahoo&utm_medium=ssp&utm_campaign=yssp_art

Saldarini, Katy. (2000). Details of New IT Job Standards Released. Retrieved Nov. 2012 from the World Wide Web: <http://www.govexec.com/federal-news/2000/07/details-of-new-it-job-standards-released/6868/>

University of Delaware. (2012). EDTC Alignment with AETC-SMETS. Retrieved Nov. 2012 from the World Wide Web: <http://www.udel.edu/education/edtc/AECT-SMETS.html>

University of Pennsylvania School of Medicine. (2009). Penn Medicine. Retrieved Nov. 2009 from the World Wide Web: <http://www.med.upenn.edu/>

Utsumi, Takeshi. (2005). Globally Collaborative Experiential Learning. *Turkish Online Journal of Distance Education* 6 (3), 40-47. Retrieved Nov. 2009 from the World Wide Web: <http://tojde.anadolu.edu.tr/tojde19/>

Vars, G. (2002). Educational Connoisseurship, Criticism, & the Assessment of Integrative Studies. *Issues in Integrative Studies*, 20, 65-76.

Wyl, C. F. (1993). Empathy, Perspective Taking, and Role Taking. A Review of The Constructs & an Attempt at Redefinition. *Dissertation Abstracts International*, 54(2-B).

Wyman, B. G., & Randel, J. M. (1998). The Relation of Knowledge Organization to Performance of a Complex Cognitive Task. *Applied Cognitive Psychology*, 12, 251-264.