

ASET Online Education

Development of learning modules:



Goals:

The primary goals in creating courses of study in various neurodiagnostic modalities are three-fold:

- To provide a method of systematic training and board exam preparation for those 67% of technologists who enter the field without formal training
- To provide continuing education courses for both credentialed and non-credentialed current practitioners in neurodiagnostic technology
- To provide a source of turn-key curriculum building blocks for existing and new schools, and training programs in neurodiagnostics, with the hope to both expand the number of schools in the U.S. and expand modalities included in existing schools

Design Methods and Learning Model:

The instructional design and development method was an ADDIE model (Analysis, Design, Development, Implementation, and Evaluation). Asynchronous mobile learning (mLearning) is a central focus in development because it suits the work schedule of the neurodiagnostic professional. Using Bloom's Taxonomy, the foundation is set by the establishment of basic skills knowledge such as terminology, head measurement, and neuroanatomy. These concepts are advanced in the comprehension and application phases of Bloom's Taxonomy when concepts such as polarity and instrumentation are introduced. Analysis comes into play with the introduction of skills in recognition of artifacts and patterns of normal responses. Synthesis of the information on neurological disorders or surgical procedures begins to form the critical thinking skills needed to make judgments about abnormal patterns, and, finally, evaluation is the skill that is ultimately needed to make decisions on next logical or appropriate steps to ensure the quality of testing and communication of important patient care information. The goal of the learning model is to incorporate the cognitive, perceptual, affective, psychomotor, and interpersonal learning domains into each of the courses of study.

Learning Management System (LMS):

Presentation components were recorded using PowerPoint or Keynote presentations and recorded with various presenters and authors using Adobe Connect Pro. Video presentation were then captured as QuickTime movies, edited and compressed for placement into Moodle, the LMS. Video presentations are available both as a download for mLearning and for video streaming on the Internet. Videos can be downloaded from the course and uploaded to an iPhone, iPod Video, iPad, laptop, or computer. With QuickTime Pro, learners can keep the video lectures and archive them on DVD or thumb drives for later use and study. The audio is also exported as a MP3 file for use with portable devices so learners can listen at times when they cannot give full visual attention but are not distracted by listening, such as while commuting, walking, or taking a break at work. Handout options include a high resolution color PDF with one slide per page for viewing as an electronic document and a black and white, printer suitable, six slides per page PDF download. Other learning resources are developed as text PDFs for download, and on occasion using Captivate. Internet resources are sometimes also used.

Learning modules are hosted in Moodle (Modular Object Oriented Dynamic Learning Environment), an open-source virtual learning environment. Moodle allows for flexible learning development and accommodates multiple modular content from various eLearning development tools. There are more than 83 thousand active Moodle sites worldwide, registered in 236 countries.

Moodle offers many options for assessments. Illustrations and even video may be inserted into questions, and several formats of questions are available. Quizzes are used to reinforce learning just after the presentation of new materials; practice exams are used as study tools in long courses; and final exams for each course are comprehensive. A comprehensive proctored exam is also in place to make a final assessment in each course of study.

Selection of Authors and Faculty:

ASET developed an EEG curriculum for California College of Health Sciences in the mid 1990's. California College was sold twice and the new owners no longer wished to continue the correspondence school in EEG. ASET retained copyright of the materials in the contract with CCHS. These materials had become outdated because of the introduction of digital EEG instruments to the field, but some of the material became the basis of the development of the current EEG course of study. Edits and updates were made by Maggie Marsh-Nation, MSIDT, R. EEG/EP T., CNIM. Additional lecture recordings were added to the content, and the learning portal is constantly revised, to keep up with new developments and trends within the practice of neurodiagnostics.

The next course of study to be developed was the IONM course of study. Efforts were made by Faye McNall, MEd., R. EEG T, and the Online Education Coördinator, Maggie Marsh-Nation, to recruit recognized subject matter experts who were outstanding in the field of IONM, held advanced degrees, and had at a minimum, extensive experience as conference and seminar faculty. University professors were sought when possible as well as those who were published in their area of expertise. With the help of the ASET IONM competencies, faculty collaborated on a list of courses and development began. The IONM course of study was several years in development.

The Nerve Conduction and LTM / ICU courses of study started with a task force of professionals practicing in the field, each with experience serving as faculty at ASET conferences and seminars. With the help of the ASET published competencies in each of these modalities, they developed a list of topics and course titles. The work was divided among the members of the task force, and they served as sounding boards for each other in development, as well as reviewers of the team's final courses.

Quality Assurance (QA) - Review of Courses and Assignment of Continuing Education Credits:

Courses are peer reviewed before release by at least five professionals. Two credentialed individuals are enlisted to review the course, looking specifically at content, and three learners, for whom the material is new, are enlisted to review for content clarity, instructions, and time for completion. These three individuals track their time, and the amount of time assigned as continuing education units is the average of these three individuals' time spent taking the course from start to finish.

Limits on CEU Credits:

The ASET Department of Education determined the number of credits for any one module would be capped 20 continuing education units. Understanding the CEU requirements by ABRET, it was felt that ABRET's intent in requiring 60 units, during the ten years between re-certification, the re-certifying technologist should complete no fewer than three online courses. EEG 106A Instrumentation and LTM / ICU 107, ICU Monitoring module require more than twenty hours to complete, and both are popular modules.

Course Development Process:

Our course development process has differed slightly in that the EEG course material was expanded and updated by the Online Education Coördinator, Maggie Marsh-Nation in accordance with the competencies established by ASET. ASET had recruited credentialed leaders in the field as authors for the original correspondence course, and ASET held the copyright. The expansion and updates have greatly altered the content from the original analog EEG materials. Course development began in IONM with an invitation to selected faculty to serve as authors, discussions with the authors began by outlining module topics and content. NCS and LTM / ICU, a task-force / team of professionals began by developing a course list and selecting authors. Members of the task force / team were selected by the ASET Department of Education. At all seated ASET conferences and seminars, evaluations are completed by participants, and this data is kept confidential by the Department of Education and is used to select authors, presenters, task force members, and instructors.

“Once course authors were selected for each course, a meeting was set up to provide an orientation for authors regarding options for delivery of content. Authors were encouraged to use delivery mechanisms that worked best for them and the material they were presenting.” Options included text documents, PowerPoint presentations using Adobe Connect Pro for making recorded video presentations, and textbooks. There were also discussions between the online coördinator and faculty about the realistic availability of the faculty to interact with students. Many of the course authors are busy and not always able to interact as faculty on a daily basis, so the course was either designed to be interactive on a level that matched the time the author has available, or a mutually agreed upon faculty person would take over the course and serve as the interactive faculty after course development by the author. The assessment techniques were also matched to the availability of faculty to provide essay exam grading. Four of the IONM courses have lengthy essay exams. The rest of the courses make use of the automatically graded exams and discussion questions are emailed directly out to the faculty and other students who subscribe to the discussion. This allows the faculty to respond to the posts directly from a smart phone or portable device without the requirement of logging into the system.

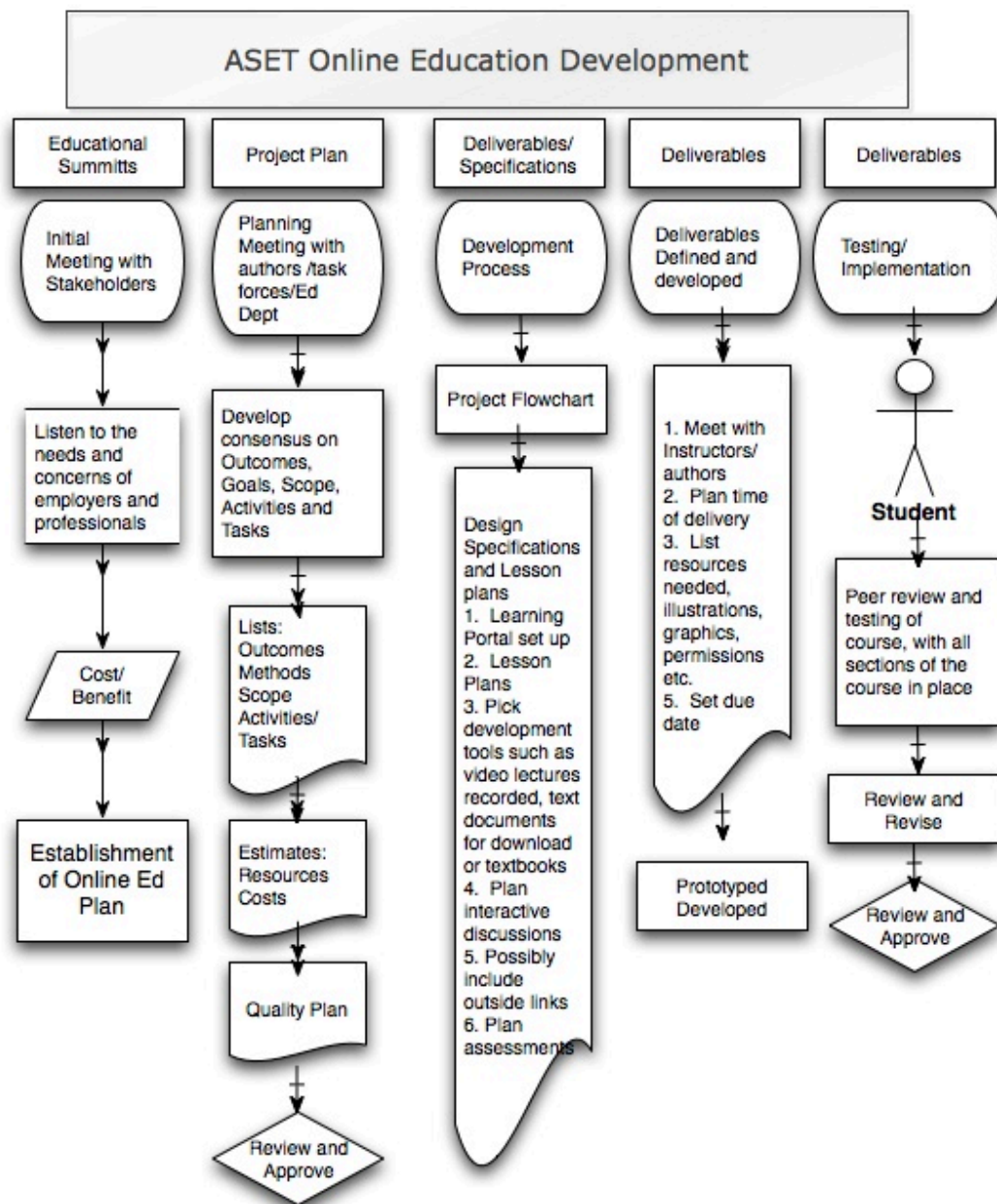
Quality Assurance Evaluation Data from Learners:

All learners complete an evaluation that is submitted anonymously to the online education coördinator. Feedback from learners about content appropriateness, portal functionality, quality of content presentation, clarity of questions, or any other matter is valued and acted upon when changes are needed. The courses are edited on an ongoing, as needed, basis to keep them compatible with current practice. Communication with faculty about the need for updates is ongoing. When new procedures or research data comes into play, it is integrated into the courses of study. Program directors or teachers at schools who use the courses as part of their curriculum are enlisted to provide information how the courses could better serve their students.

Long Term Goals

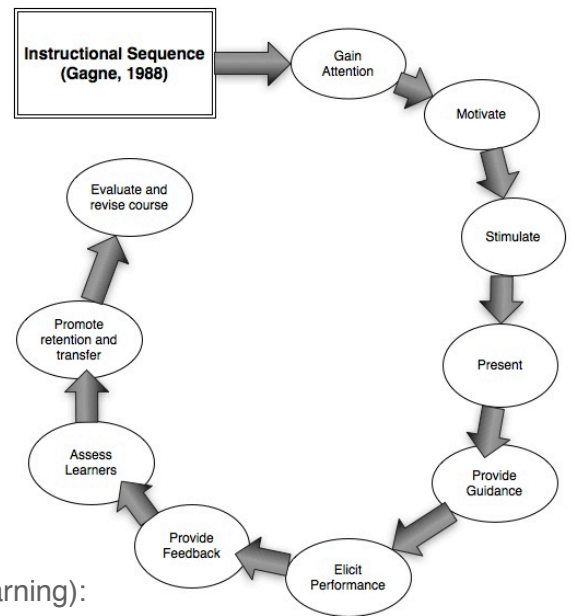
The hope is that ASET online education will help those technologists preparing for board exams in NDT, those in need of basic skills who were hired without formal training, and also help to expedite the formation of schools of neurodiagnostics, which are greatly needed and in short supply. For the professional who aspires to create a school of neurodiagnostics, the task of creating a curriculum is daunting and can be an obstacle to moving forward. In the future, ASET makes the commitment to monitor the quality of the courses, keep the content current, and make use of technology to keep the modules engaging and effective. In an effort to provide support to schools, as well as all professionals in the field, ASET has established the long-term goal of providing online education opportunities that are developed using sound instructional design techniques and creative implementation using state of the art technology.

Instructional Design Methods



Robert Gagne developed an instructional sequence that outlines the conditions of learning. They are:

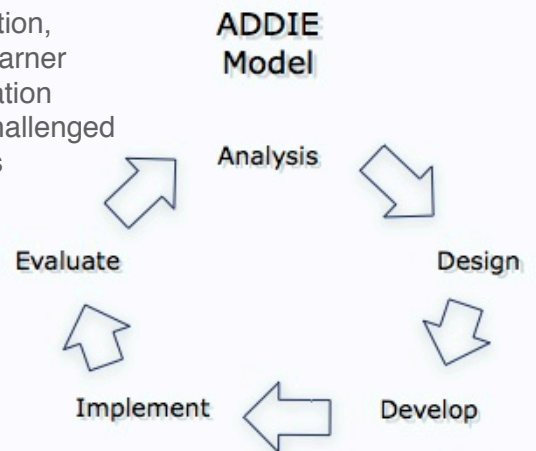
1. Gain attention (reception)
2. Informing learners of the objective (expectancy)
3. Stimulating recall of prior learning (retrieval)
4. Presenting the stimulus (selective perception)
5. Providing learning guidance (semantic encoding)
6. Eliciting performance (responding)
7. Providing feedback (reinforcement)
8. Enhancing retention and transfer (generalization)



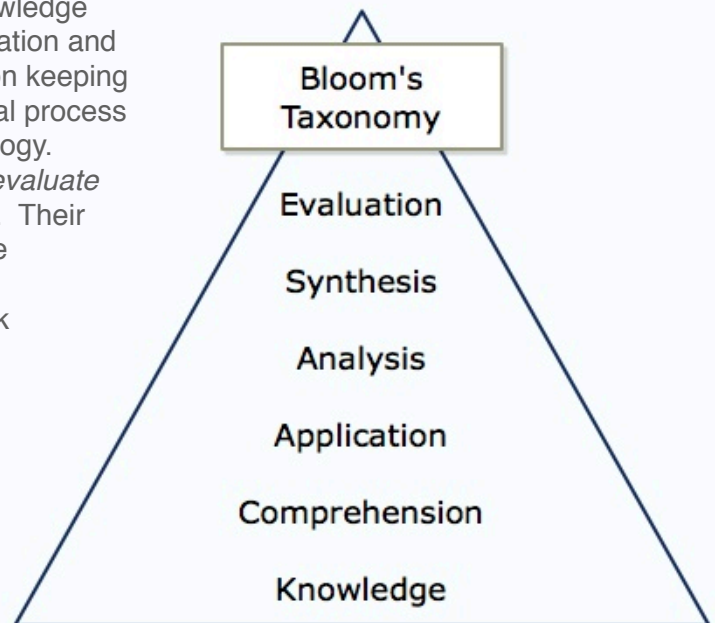
To this we add the ADDIE model and Bloom's Taxonomy.

Bloom's Taxonomy of Learning Domains (the phases of learning):

The courses of study are structured so that terminology and basic concepts (knowledge) are addressed at the onset to give the learner the tools needed for comprehension and application, then more advanced concepts are introduced to allow the learner to analyze information through understanding of instrumentation and factors influencing data. After analysis, the learner is challenged to form theories and ideas through synthesis of case studies or data concerning outcomes of testing. In this phase the application of concepts learned, analysis skills through understanding of instrumentation is combined with exposure to information about outcomes to form the critical thinking skills needed to perform an evaluation of data, and proceed with appropriate steps to relay needed patient care information.



The ADDIE model is used as the life cycle of online education. Development begins with *analysis* of the need of knowledge and skills. The *design* phase incorporates the information and the plan for how the module will deliver the information keeping it engaging and interesting. *Development* is the actual process creating the learning modules using available technology. Initial *implementation* is for reviewers only, and they *evaluate* the content, delivery method, ease of use and quality. Their input is integrated and after revisions, the courses are implemented to the learners, but the *evaluation* and updating process is ongoing through learner feedback on evaluation forms and through direct dialogue with students and program directors using the modules. Periodically as the profession evolves, the ADDIE process will go back to Analysis, followed by re-design, re-development, and re-implementation.



References

Gagne, R. (1985). *The Conditions of Learning* (4th.). New York: Holt, Rinehart & Winston.

Ormrod, J., et al. (2008). *Learning Theories and Instruction: Custom Edition*. New York, Laureate Education.