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Instructional Design Based on

Student Centric Integrated Technology Model

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Abstract

The ADDIE model for instructional design developed by Gagne provides a systematic method for managing the process of designing instruction. A generalized model, such as the ADDIE model, provides the flexibility to be adapted to a wide range of applications but because the model is general in nature, will lack guidelines required to address specific conditions or unique applications. The integration of technology, in particular computer-based technology, into a student centric learning environment is one such situation. The Student Centric Integrated Technology (SCIT) model was developed to address the need for providing specific guidelines and considerations while continuing with a systematic approach to instructional design as found in the ADDIE model. This paper will explore the use of the SCIT model to address the technology integration requirements in comparison to the use of the ADDIE model.
Instructional Design Based on Student Centric Integrated Technology Model

The ADDIE model with a simple and systematic five-step approach is viewed as the foundation for instructional design. The five steps cover the aspects of Analyze, Design, Develop, Implement and Evaluate as the core components that are required to produce effective instruction. The model provides a clear and effective approach to identifying requirements, establishing goals and objectives, preparation of course materials and evaluation of the implementation of the instruction. Although a multitude of instruction models exist (Ryder, 2008), following the ADDIE model will produce a well designed and effectively implemented instruction.

The ADDIE model was developed in the mid 1970’s (Clark, 2004) at a time when computer technology was emerging but had not yet started to approach the level of capabilities that exist today. The technologies that existed at the time that the ADDIE model began consisted primarily of film and audio tapes. As a result, the ADDIE model does not include specific guidelines for integration of computer technology into the learning process. The general guidelines incorporated into the ADDIE model do, however, provide an overall structure that can be used for integrating technology into a design but fails to provide guidelines for specific technology related decisions. Without specific guidelines, the instructional designer must rely on personal knowledge of computer technology or have assistance from a technology expert to ensure consideration of technology requirements.

The growth and rapid development of computer technology, especially with the advent of the personal computer beginning in the 1990’s and the expectations of computer technology to bring dramatic change to education have led to a flurry of activities to include computer
technology without consideration for design or educational theory. Most notable in the rapid expansion of computer technology in education was the unilateral embracing of technology for the sake of technology. This attitude was driven primarily by technology experts who were the primary developers of educational software and educational delivery systems. The truth is that simply adding technology did not accomplish the goal of making education more effective. As noted by Finch and Montanbeau (2000) “if you bring technological innovations into your classroom in order to involve your students, you are not going to achieve learning any better than if you don't incorporate technology.”

The maturing of the integration of computer technology in education has brought about the need for a model to map the steps necessary to successfully merge the two. Where the ADDIE model provided the framework to designing and implementing effective instruction, the Student Centric Integrated Technology (SCIT) model provides the framework for successfully designing and implementing effective technology integrated instruction.

The SCIT model provides a framework for designing and developing student centered instruction using integrated technology as an interface between the student and the course content. In this model, see figure 1, course content is the foundation of the instruction with technology acting as an interface to the student providing an optimum delivery to meet the unique needs of the learner. The Analyze, Design, Deploy (ADD) process is a continuing series of events that focuses on exploiting the capability of the technology to deliver the course content based on the learning style of the learner.

The major component of this model begins with a core built on recognition of the student as the center for the education process especially within the bounds of online education. By focusing on the student, the model establishes technology as the vehicle for delivery of course
content to match the specific needs of each learner. This approach is supported by the Constructivist Learning theory in that course content is delivered to the student to create an environment where each individual learner will have the opportunity to explore and create learning as an active process (Constructivism (learning theory)). To meet these multiple requirements, technology must be viewed as a delivery tool providing the learner with the ability to modify the delivery of the information thus creating an individualized learning environment.

The SCIT model also recognizes course content as the foundation for instruction. The model is flexible in that course content existing from previous instruction or new content developed to meet a new focus on training and education can be used for the foundation. The content provides the information that is delivered in multiple formats exploiting the capabilities of the technology. The capability of providing the multiple deliveries or presentation of course content provides for the support of all eight multiple intelligences identified by Howard Gardner (Armstrong, 2000). The capability of the technology is limited only by the resourcefulness of the designer and instructor since the newer technology is capable of delivering content using a full range of formats from simple written text to virtual reality simulations.

With the SCIT model, the technology must always be viewed as a delivery vehicle that creates the opportunity for the designer and instructor to meet a need of the student. The essential ingredient to the model is an understanding of the requirements of the student that would include but not limited to: learning style, motivation, skills and learning environment. Since the model must address all and any student, focusing on satisfying the requirements of all eight multiple intelligences will provide a framework for exploiting the capabilities of the technology.
The core of the model is supported through a cyclic process of Analyze, Develop and Deploy (ADD) process where each layer of the core is processed. In the Analyze step, the requirements, options and needs are reviewed and appropriate specifications developed meet the findings. The Develop step is the process of producing an appropriate solution. The Deploy step implements the developed solution and provides measures of the effectiveness of the solution. The process is repeated to further refine the implemented solution. This cyclic sequence is applied to the learner, technology and course content of the core.

The ADD sequence provides a practical and systematic process for examining each layer of the SCIT core with an end product being the delivery of an effective learning environment. The application of the ADD cycle should be viewed as commencing at the course content level and moving upward toward the level of the Learner with overlapping iterations of the ADD process at each level.

The Analyze step of the ADD process corresponds to the analysis step of the ADDIE model. The difference being that within the SCIT model, the questioning is directed toward the specific level of the core in relationship to the learner, whereas, in the ADDIE model, a gathering of needs and problem definitions are course specific as explained by Gagne et al (2005). In the case where the ADD process is being applied toward development of new course content, then the assessment of learner’s needs would be the first step but if the ADD process is applied to existing course content, then the process would validate the established learner’s needs and discover additional needs. The primary difference between the SCIT model and the ADDIE model is the focus of the discovery process; the ADDIE model focuses on the course and the SCIT model focuses on the learner.
The Develop step of the ADD process encompasses both the design and development steps of the ADDIE model. The major difference that exists between the models in that within the ADDIE model, the design step is used to develop goal and objectives whereas in the SCIT model, the definition of goals and objectives would be the outcome of the Analyze step. Thus in the SCIT model, the steps are simplified. Within the SCIT model, the Develop step provides the opportunity to explore options, consider alternatives and arrive at a proposed solution to meet the goals and objectives that were defined in the Analyze step but goes beyond simply considering alternatives.

The Develop step also includes the construction of a prototype using the alternative solutions that were examined. This represents a major break from the ADDIE model in that within the SCIT model both exploration and initial testing through trial and error are directly linked. In the ADDIE model, since design and development are separate processes, it is possible for the knowledge gained in the research from exploring options to be lost in transition to the development since no continuity is established. With the ADDIE model, the development is accomplished based on the defined goals and objectives that are output from the design phase (Gagne, Wager, Golas, & Keller, 2005). A collaborative effort between designers and developers would be ensured with the SCIT model since the exploration of options is directly incorporated into the testing and development of a proposed solution.

The Deploy step of the ADD cycle corresponds to the Implementation step of the ADDIE model and does not differ in application. This is the step during which the proposed and developed solution is implemented and used in a trial. In either model, the trial of the proposed solution is conducted in a controlled environment that provides support for the learner, a plan for
managing change and a plan for terminating the trial. With either model, the results of the
deployment provide input to the subsequent analysis.

The ADDIE model provides for a fifth step for Evaluation whereas, in the SCIT model,
the evaluation is considered to be Analyze, i.e. the beginning of the next cycle. The SCIT model
provides for the same level of questioning, evaluation and measurement in the Analyze step as is
outline in the evaluation step of ADDIE ( (Gagne, Wager, Golas, & Keller, 2005). As such, the
SCIT model provides for a cyclic process that continually evaluates the results of a deployment
that was developed based on an analysis. Another significant difference between the SCIT
model and the ADDIE model is in the expectation of change during the cycle. In the ADDIE
model, an analysis or review is conducted during each stage of the cycle which can, depending
on results, redirect the cycle to any other step ( (Gagne, Wager, Golas, & Keller, 2005). While
the SCIT model does not exclude return to a previous step if problems are discovered, the model
does not imply an analysis or review at each step. This reduces the possibility of modification of
during the Develop and Deploy steps prior to the return to the Analyze step thus ensures that the
specification as produced during the analysis will be developed and deployed without unrelated
modification.

The effectiveness of the ADD process is found in the multiple applications of the cycle to
each level of the core of the SCIT model. The SCIT model allows for application of the ADD
process at each level concurrently. For example, if an existing course is being revised using the
SCIT model, the ADD process at the course content level would provide an analysis of strengths
and weaknesses of educational goals, lesson materials, existing presentation and student
evaluations that would then feed to a Develop phase that would address the identified areas. In
conjunction, the Analyze phase at the technology level would be addressing and identifying
appropriate technology to support the deployment of the course content that would meet the learner’s needs as identified in the Analysis phase conducted at the learner level. Develop phase at the course content level could be directly tied to Develop phase at the technology level where the best technology was integrated into the presentation of course content to meet a unique needs identified during the Analyze phase at the learner level.

From this discussion it can be seen that the SCIT model provides a number of advantages over the ADDIE model. First, the SCIT model focuses directly on the learner and the needs of the learner whereas the ADDIE model focuses on the needs for the instruction or course. This difference of focus has the potential with the ADDIE model to produce a course that meets all the goals and objectives for teaching the subject but completely misses the ability of the learner to understand the instruction. The SCIT model ensures that the course content is presented in a manner that meets the learning style of the student.

Next, the ADDIE model does not provide clear guidelines for the deployment of technology in the process of designing instruction. The SCIT model addresses technology as a core component and establishes technology as the delivery tool between course content and the learner. Since technology is a level within the core of the SCIT model, the ADD process is applied equally as with the other level. The SCIT model ensures that the technology options be considered for presentation of the course content in a manner that meets the student’s needs.

The ADD process of the SCIT model provides an advantage over the ADDIE model in that the ADD process provides less complexity and fewer opportunities to initiate undesirable modifications. The ADDIE model with an analysis or review procedure incorporated at each phase provides and support the avenue to modify the outcome of the analysis that began the cycle. As such, with the ADDIE model, the end result, implementation, may be an entirely
different instructional component than originally determined during analysis. In contrast, by combining the steps in the ADD process and establishing only a single point of analysis, this ensures that the deployed product from the Develop step will match the specification of analysis. This allows the cycle to be repeated in a predictable manner that builds upon previous work in a consistent and reliable method.

While ADDIE model continues as a foundation for instructional design, the SCIT model provides enhancement especially in the area of integration of technology. While the ADDIE model does provide a systematic methodology for design of instruction that would be difficult to replicate, the model also lacks in specific provisions for addressing technology and learner’s needs. The SCIT model takes both the learner’s needs and technology into consideration while also providing a systematic methodology for analysis, development and deployment of instruction.
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Figure Caption

*Figure 1.* Graphic representation of the Student Centric Integrated Technology (SCIT) model.
Figure 1. SCIT Model