Domain of Development

"Development is the process of translating the design specifications into physical form" (Seels & Richey, 1994, p. 35). In other words, development is the domain where, after the analysis and design phases have been completed, the actual instructional materials are produced.

Development is an all-encompassing domain and interrelates with the other four domains. Development involves learning and design theories and practices, and it also employs the many forms of technologies that are used for instructional purposes. Development performs in synch with utilization, management, and evaluation as well. It may be driven by theory and design, but it also must bend to the formative nature of the utilization, management, and evaluation domains (Seels & Richey, 1994).

Not only does the development domain engage all four of the other domains of Instructional Technology, it also encompasses the many different forms of instructional output. Hardware and software, visual and auditory materials, along with the programs and packages which fuse it all together are incorporated into the development of instructional materials.

After the instructional designer completes the design phase, he may use storyboards and/or flowcharts to present to his team what he envisions for the development of the product. The instructional designer and his team will then develop the instruction using any or all of the four technologies which encompass the development domain: print, audiovisual, computer-based, and integrated technologies. To help him or her in selecting the appropriate media for the instruction, the instructional designer might use the Reiser-Gange Media Selection model (1983). Despite the fact that the model is over twenty years old, it is still useful and in practice today. The types of media may have changed, but the model is based on media properties and learning task requirements, and those have not changed (Dick, Carey, & Carey, 2005). The model is basically a flow diagram that the designer follows after answering a series of questions regarding the skills that will be taught in the instruction. Several media are suggested and are referred to as "candidate media." The designer can take a look at the media that the model suggest for his or her particular case and decide from there which makes the most practical sense to utilize.

A formative evaluation is conducted as soon as development has been completed so as to assess what changes need to be made to the product. That way, any mistakes may be corrected before the product is put into full production.

Any number of instructional theories exists for instructional designers to draw upon when developing instructional products. Examples include Richard Mayer's SOI Model for Constructivist Learning, as well as Mayer's Cognitive Theory of Multimedia Learning. John Sweller's Cognitive Load Theory and David Jonassen's Constructivist Learning Environments might also be used.

Print Technologies

Print technologies are those which are presented in hard copy form. There are a number of ways to present print technologies such as manuals, textbooks, workbooks, handouts, diagrams, and photographs. Text displayed on a computer screen is not considered a print but rather is considered computer-based technology; however, when the computer screen is printed into a hard copy form for the purposes of instruction, it then is considered a print technology. (Seels & Richey, 1994).

The advantages of print technologies are that they are learner-centered, allowing the user to reorganize or restructure the information as necessary. The disadvantages of print technologies include learners reading text linearly but scanning visuals spatially. Likewise, communication is one-way and receptive while visuals are presented statically, and learners must rely heavily on language skills and visual perception (Seels & Richey, 1994).

Audiovisual Technologies

Audiovisual technologies are those which use mechanical and/or electronic means for presenting auditory and visual information. Audiovisual instruction makes use of machines such as DVD players, film projectors, TVs, VCRs, overhead projectors, and slide projectors to deliver instruction.

The advantages of audiovisual technologies include that they often contain a high degree of dynamic visual elements. They also tend to possess attributes which come from behavioral and cognitive psychology. The disadvantages of audiovisual technologies are that most deliver instruction in a linear manner. Additionally, audiovisual technologies tend to be teacher-centered and involve a low degree of learner interactivity (Seels & Richey, 1994).

Computer-based Technologies

Computer-based technologies are electronic in nature; however, they are different from audiovisual technologies in that they are presented in a digital format rather than as print or visual materials. The resources for computer-based technologies are microprocessor-based and are presented via a computer screen. The most common type of computer-based technology in use today is computer-based instruction (CBI). CBI is highly student-centered in that students can learn at their own pace and become more independent learners. Students also can receive immediate feedback while engaging in CBI. Another student benefit of CBI is that it utilizes a robust amount of learner interactivity (Multimedia Science, 2007).

Integrated Technologies

Integrated technologies produce and deliver materials under a wide umbrella of technologies, all of which are under the control of a computer. For instance, a high-

powered computer with a large amount of random access memory might be used along with peripheral devices such as a videodisc player and software such as a robust authoring system. Integrated technologies are versatile and allow developers the flexibility to include the most appropriate media and integrate them to best suit the instructional needs. Not only are integrated technologies attractive based on the high degree of learner interactivity, but also due to the nonsequential or linear ways the material may be presented. Additionally, words and images may be incorporated from any number of media sources (Seels & Richey, 1994).