Introduction

*Design and Development Research Project* is based on the concept that the practice of design and development is empirical by nature (Richey, Klein, 2007). It emphasizes that instructional design process is similar to scientific problem-solving processes. In such a project the researcher develops innovative interventions (also referred to as Intervention Design and Development) to provide possible solutions to practical problems (Thomas & Rothman, 1994). Throughout design and development process designers employ scientific methods to facilitate their understanding of the design and development process (Richey, Klein, 2007). There are at least three key areas of research and theory that are applied when conducting design and development research project: *learning theory and research; instructional and instructional design theory and research; and communication theory and research* (Richey, Klein, 2007; Smith & Regan, 2008). Thus, the Design and Development Research Project covers the wide range of competencies (knowledge, skills & dispositions) that are required of instructional designers and are emphasized in the Instructional Technology Program (MIT) at UNCW. It crosses over all phases of the design and development process and the various education and training settings in which designers work.

The primary purpose of the *Design and Development Research Project* is to provide a culminating opportunity for the MIT students to demonstrate a complete understanding of the field and ability to apply them in practice. In addition, *Design and Development Research Project* aims to promote students’ knowledge base and creativity in design and development by engaging them in all of the specific design and development project phases namely *analysis; design; development and evaluation*.

Richey and Klein (2007) identify three main categories of *Design and Development Research Project*:

I. **Research on Product and Tool;**

II. **Product Development Research; and**

III. **Validation of a Model Research.**

*Research on Product and tool* typically involves situations in which the design and development process used in a particular situation is described, analyzed and a final product is evaluated.

*Product development research* originates with the design and development of an instructional or non-instructional product or program. They demonstrate a range of design and development principles available to practitioners. The procedures employed follows instructional systems design (ISD) encompassing front-end analysis through evaluation (Richey & Klein, 2007).
Validation of a Model Research is the most generalizable form of design and development research. This type of research highlights either comprehensive models or particular design techniques or processes.

When deciding on the category of research project, the MIT students must consult with their advisors and should also review the various lines of inquiry within each of these two major types of design and development research explained more specifically in Richey and Klein’s book entitled “Designed and Development Research” (2007).

The outcomes or products of the Design and Development Research Project may include the following:

1. **The instructional design products** under the study
2. **The report of the study.** The report may be in form of: results of studying a specific product or tool; report of lessons learned from developing specific products and analyzing conditions which facilitate their use; results of the study of model development and validation or use; description of new design and development procedures or models and conditions which facilitate their use.

### Procedural Guideline for Conducting a Design and Development Research Project

Whether conducting a Research on Product and Tool or Product Development Research or Validation of a Model Research the following procedures must be followed.

**Step 1: Identifying design and development research problem and related questions**

- Start by identifying a few broad problem area of interest such as distance education, online learning, or performance analysis.
- Conduct a literature review to identify if there is a substantial body of literature in the area. As a result of the literature review, you should be able to decide: Is the problem important? Is the problem timely? Is the problem feasible (are there resources and expertise to study the problem)? Can it be solved in a time available? There are three areas that can be used as sources for identifying the problem for design and development research project:
  - **Actual workface settings** and projects (e.g., use of rapid prototyping methods for design and development of instructional products; evaluation of a comprehensive k-12 curriculum).
  - **Technology tools** particularly the newer and more innovative examples (e.g., examination of computer-based training program; the design and usability of a university website; examination of use of social networks for learning).
  - **Research-theoretical questions** that are based on current research and development literature (e.g., validation of applying Gagne’s Events of Instruction Model; validation of applying Keller’s ARCS (motivational design) model; validation of applying Hannafin’s open learning environment model for complex
cognitive task; use of cognitive scaffolding strategies in learning computer-based learning environment).

Step 2: Using the literature to identify and refine the research problem

- Consult a variety of sources for literature in the field of study.
- Use the results of literature review to transform the research problem into specific research questions.
- Narrow the focus of the study by specifying parameters of research (e.g., what phases of the design and development will be addressed or will the study focus on one particular phase (will the study focus on a product, tool or model?). Will the research be conducted while the product is being designed and developed? Etc.)

Step 3: Defining methods and strategies

Design and Development Research Projects are often focused on a specific product, or program. This type of research often examines the entire design and development process from analyses to evaluation. However, given the resources, time and expertise you may narrow the scope of the research to only one or two phases of design and development. For example, when conducting products, programs, and tools you may combine the tasks of doing design and development and studying it. See Richey and Klein (2007) for examples and more information.

I. Methods and strategies used for Product Development Research Project: Several research methods can be used for Product Development Research Project.
   a. Descriptive research method using case study: This method provides a thorough description of the design and development process including technological details. When using this method the project is described from its initial step to try out and evaluation of the product.
   b. Mixed method using a systematic process of collecting data first during prototype and then throughout the study. This method allows for continued development and implementation of the product.
   c. Qualitative method using in-depth interview. This method blends providing details of how the product is developed and in depth-data collected.

II. Methods and strategies for research on products and tools:
   Some research projects in this category are focused on evaluation of products programs or products and some are focused on the development and use of technology tools. Both lines of studies, however, use many of the same methods and strategies.
   a) Case study method documenting the ISD process using various data collection strategies may such as survey, expert review, field observations and in-depth interviews: This method uses qualitative approaches with some quantitative analyses.
   b) Mixed methods using content analysis and in-depth interview: This method is mainly descriptive.

III. Methods and strategies for development or validation of an ID model research:
Some research projects in this category are focused on developing a model while others may focus on validating or using a theory-based model. Both lines of studies, however, use many of the same methods and strategies.

a. **Multiple qualitative methods**: This method is used for model development. The primary methods used are content analysis of extant data and in-depth interviews and narrative data such as journals and diaries.

b. **Mixed methods**: This method is also used for model development studies and uses strategies such as survey, field observations and a content analysis of logs.

c. **Expert review method**: This method is used for validation of an ID model projects. In-depth interviews or Delphi techniques strategies are often used to collect data to determine if different components of the proposed model are supported.

d. **Usability documentation method**: This method is also used for validation or use of a model. This method is usually descriptive and uses data collections strategies such as logs, self-check instruments, think aloud and in-depth interviews.

### Step 4: Selecting participants and settings

At this point in the design and development research process when the problem is identified, research questions are formulated and methods and strategies are determined, you need to select participants of the study and the context in which the study will be conducted. Design and development research is often context-bound. Thus, it is suggested that much emphasis be placed on the setting of the study as well as the people participating in the study. The range of setting in which education and training take place is broad. Examples of such setting are: schools (K–12, higher education); business and industry; healthcare organizations; community and government agencies. Factors that are considered in selecting setting are listed as follows (see Richey & Klein (2007) for more information).

1. **Physical materials** such as resources, equipment and facilities.
2. **Organizational climate** such as organizational goals and values; organization size; reward system; levels of supports; leadership style and group code.
3. **External influences** such as government influence; external image/reputation; market potential; competition level and economy.
4. **Member characteristics** such as leadership; middle management and employees.

The selected setting for the study must include the conditions and elements that are matched with research questions. In addition to the match between the questions of the study and the setting elements and conditions, feasibility should also be considered when selecting the participants and settings. Feasibility is defined as the extent to which the study can be done practically and successfully. Related to feasibility are resources available to the researcher; access to the setting or organization and the issue of the organization proprietary rights.

The participants are often selected because of their particular role in the design and development process. The participants may range from designers, developers, clients, subject matter experts, evaluators, learners, instructors, users and organizations. To identify participants one often selects a sample of participants from a population of interest followed by prescribed sampling techniques (Richey & Klein, 2007). However, the population size and the population’s characteristics must be considered when selecting participants and before applying any sampling techniques.
Step 5: Collecting data

As with other research projects, the data you collect depends on the nature and questions of the study. However, design and development research projects have unique variations that make certain types of data more relevant than in other types of research. The following are examples of such data (see Richey & Klein, 2007 for more information).

1. **Profile data:** Design and development research projects typically have two types of participants: people who are involved in the project such as designers and developers; design team, clients, learners and instructors; the actual project itself (project scope, project resources, and the nature of the particular product to be produced). Thus data should be collected related to both groups.

2. **Context data:** Context is critical part of design and development studies, as it is also critical to ID projects. Three context areas are important for design and development projects: (1) the environment in which the design and development takes place, (2) the environment in which the intervention is implemented, and (3) the performance environment in which skills and knowledge are applied.

3. **Progress project data:** Collection of in-progress data is critical to understanding the nature of design and development. It is important to collect systematic data as the design and development is progressing. Some of the data collection strategies include daily logs; tasks completed; time-on-task; decision made; designers’ and developers’ difficulties and challenges; designers and developers opinion about the ID process; client attitudes; and subject matter experts views and recommendations.

4. **Try-out data:** Collection of product evaluation data from learners and instructors is a natural part of a design and development project. Various instruments such as test and performance data; work log, surveys and questionnaires, interview protocols and observation guides are often used to collect try-out data (Dick, Carey & Carey, 2009).

Step 5: Interpreting findings

The findings of the design and development research projects can be understood in terms of the following:

- How findings can be used to expand the knowledge base by providing rich source of information that can inform design and development theory and practice
- What lessons learned from the product or tool study?
- What are the implications of model developed or used?

**Specific Guidelines**

**Research on Product and Tool**

*Research on Product and tool* can be conducted by first selecting and describing an instructional product or tool that was developed for a specific situation. Description of the product includes:
• Describing the basic features of the product and principles used in its design and development
• Describing current research on the principles used to design and develop the product
• Describing the needs addressed in the product (customer needs and performance problem being addressed)
• Describing the goals and objectives of the product
• Describing the target learners and learning environment and equipment needed to implement the product

Once the program is described in detail, select an evaluation model that is appropriate for evaluating the effectiveness of product development (e.g., CIPP (Context, Input, Process & Product); Kilpatrick’s Evaluation Model).

Given the evaluation model identify a research methodology should be selected to collect appropriate evaluation data. Choose from the following methods taking into account the product or tool being evaluated.

a) Case study method documenting the ISD process using various data collection strategies may such as survey, expert review, field observations and in-depth interviews: This method uses qualitative approaches with some quantitative analyses.

b) Mixed methods using content analysis and in-depth interview: This method is mainly descriptive which the design and development process used in a particular situation is described, analyzed and a final product is evaluated.

Collect data as the program or product is being implemented. Analyze data and report findings.

Product Development Research Project

Design and Development Research can be conducted during the design of a product or tool. When conducting such a project the entire design and development process must be documented. The procedures employed during design and development should follow the tenets of instructional systems design (ISD) listed below (Dick, Carey & Carey, 2009).

• Front-end analysis: This phase encompasses performance analysis; needs analysis; goal analysis, instructional analysis (content analysis & task analysis) and learner and context analysis.

• Design: This phase encompasses writing performance objectives, identifying assessment strategies and developing assessment instruments, and determining and developing instructional strategies.

• Development: This phase encompasses creating story board and developing or adopting instructional materials (images, case studies, assessment items, presentations, video clips, podcasts, multimedia materials, web pages, etc.).
• **Formative evaluation**: This phase encompasses designing and conducting formative evaluation.

• **Revision**: This final phase includes using data from formative evaluation to make proper changes and reexamine the validity of the instructional analysis.

• **Impact/Summative Evaluation**: This phase determines the value of instruction and its effectiveness.

References:


Roles & Responsibilities of Faculty Supervising Design & Development Research Project

The faculty member supervising the Design and Development Research Project has the ultimate responsibility for ensuring that the student has produced a high quality work and that the student has fulfilled the procedure and deadlines. The faculty supervisor is specifically responsible for:

• **Consulting with the student in the selection of the Design & Development Research Project Committee**: In consultation with the student and the MIT program coordinator the faculty supervisor is responsible for selecting the review committee. Faculty/staff members who are selected to serve in the review committee must be asked and agree to serve in the committee and must be informed of the project development process.

• **Approving the Student's proposal for Design and Development Project**: The faculty member is integral to the selection of an appropriate idea and putting together a short proposal for the committee review. Often a series of discussions are necessary during writing a short proposal.

• **Approving the Proposal**: Upon the approval of student's development plan or short proposal by the committee members, the faculty supervisor must ask the student to submit a tentative plan with a brief explanation of activities. The faculty supervisor must then monitor this plan in order to assure that the student’s work is completed in a timely manner and with proper time for review and revisions. The supervisor may call the committee for meetings or periodic review throughout the completion of the project and when he/she finds it necessary.

• **Reviewing Student Work**: It is the responsibility of the faculty supervisor to monitor the process and to review the product as it is being developed and provide constructive feedback as many times as needed. If necessary the faculty supervisor may ask the review committee to read portions of student work while it is being developed. However, the faculty supervisor is responsible for keeping the review committee informed about the
progress of student work and consulting them if needed. Three weeks before the deadline for the Project defense the faculty supervisor must ask the student to submit the final draft of the final products to her/her review committee and ask for their feedback. Upon approval of the first draft and approximately two weeks before the Project defense the faculty supervisor must ask student to submit the final draft of the review committee.

- **Scheduling & Conducting Project Defense:** The faculty supervisor is responsible for informing the student of the project defense deadline and procedure. She/he is also responsible for making sure that all members of the review committee are consulted and agreed to attend the project defense. The faculty supervisor is also responsible for reserving a room and conducting the defense session. Upon the successful completion of the defense the faculty supervisor may seek formal approval of the review committee's until final revisions are completed and the signature page is ready to be signed.

**Project Review Process**

Review of the project by the review committee and presentation (defense) of the project by the student are both required for the completion of the MS capstone experience. **The student must submit the final draft version of the paper and the product to his/her project committee for review** at least three weeks before the scheduled defense. During the review process the chair of the review committee or faculty supervisor and the two faculty/staff members on the review team will evaluate the product according to Design and Development Research Project Guidelines and give feedback to the student. The student then should revise the materials if needed and resubmit the final version to the review committee a minimum of 10 days before the scheduled defense.

In order to merit a positive evaluation, the final paper and product must meet or exceed minimum standards defined in the guidelines. Minimum standards are met if the paper and the product conform to the guidelines in consensus judgment of the review committee.

During the review each faculty evaluator (committee member) will examine the paper independently, and make individual judgments. Each faculty evaluator is to make a judgment indicating whether the paper and the product meet or exceed minimum standards. The chair of the project committee / faculty supervisor must ask the committee members to write positive or negative comments on a separate sheet of paper and make recommendations for changes and revisions required to bring the paper and/or the product up to the minimum standards.

If standards are met the chair and members of the review committee will initial the Project Signature pages to indicate fulfillment of the requirements and a positive judgment on the quality of the student’s work. Disagreements in judgment between/among faculty evaluators must be discussed and consensus judgment must be reached before the approval of the project products. If there are strong disagreements between/among the committee members the consultation of an addition review member must be sought.
If the final project product and paper does not meet minimum requirements, the *Project Signature pages* will not be signed. A list of required additional changes will be complied by the chair of project review committee and due date for completion will be inserted into the project. The review committee may decide to allow the student to defend (present) his/her incomplete project at the scheduled defense session. However, the completion of the MS degree will be pending until the required changes and revisions are completely satisfied.