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## Design-Based Research Toward a Professional Development Program

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DESIGN-BASED RESEARCH TOWARD A  
PROFESSIONAL DEVELOPMENT PROGRAM

by

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B.S. Southern Illinois University, 1996  
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A dissertation in practice submitted in partial fulfillment of the requirements  
for the degree of Doctor of Education  
in the Department of Learning Sciences and Educational Research  
in the College of Community Innovation and Education  
at the University of Central Florida  
Orlando, Florida

Fall Term  
2021

Major Professor: David N. Boote

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## ABSTRACT

The purpose of this dissertation in practice was twofold; The first purpose was to design a Professional Development (PD) program for a specialized group of civilian employees working in a large military organization, and the second purpose was to evaluate and refine that PD program using mixed-methods empirical research. The study focused on a group of approximately 100 Instructional System Specialists and Research Psychologists. These employees are highly educated, with the majority holding advanced degrees in their respective fields, yet they lacked a clear path to career development within their organization. Following the tenets of design-based research, a PD program was developed for these employees based on design principles drawn from a review of extant literature. The program artifacts included a set of assessment rubrics to assess the employees' knowledge and skills, a curriculum design plan to inform curriculum development efforts, and a policy manual to guide program implementation. Once these artifacts were drafted, they were refined through several cycles of formative evaluation. Throughout each phase of the research, quantitative and qualitative data showed strong, positive stakeholder support for the program. Qualitative findings contributed substantially to formative evaluation and revision of the program, although quantitative data did not show a statistically significant improvement from initial draft to final revision. These findings are interpreted to indicate that the program was well-design, even at initial draft, and there was little need for measurable improvement. The methods described in this study resulted in a sound, research-based PD program, and these design-based research methods can be generalized to be used in similar situations. As such, this study adds to our body of knowledge in the areas of curriculum and instructional design, and it serves as an applied example of design-based research in an authentic setting.



To my beautiful family, Annalita, Allison, and Olivia,  
for your unending love, support, and encouragement.

## ACKNOWLEDGMENTS

I would like to acknowledge Dr. David Boote, my doctoral advisor and dissertation committee chair. Dr. Boote, your teaching, advice, and guidance have been invaluable, and your patience is admirable. I have learned so much from you, not only in the classroom but throughout the dissertation process. Thank you for supporting my growth as a scholar-practitioner.

I would also like to thank Dr. Michelle Gill, Curriculum and Instruction EdD program coordinator at the University of Central Florida. Dr Gill, your direction and encouragement have ensured the success of countless students, including myself, and for that I thank you.

To my esteemed committee members, Dr. Richard Hartshorne and Dr. Thomas Vitale, thank you for your continuous support from proposal through defense. And to my esteemed colleague and committee member, Dr. Amy Scheick, thank you not only for your support as a committee member, but for your friendly advice and insight throughout my doctoral studies.

To my friend and long-time mentor, ETCS(SS) (Ret.) John Lomax, thank you for the “gentle nudge” to further my education. I recall sitting at your round table, pondering my own professional development, and musing, “Well, I’ve been thinking about going for a doctorate...” And the rest, as they say, is history.

Finally, I would like to acknowledge my friends and colleagues in the GT53 Division of NAWCTSD, and our Division Head Dr. Kelsey Henderson. Kelsey, thank you for endorsing this program and believing in my efforts. And to those that took the time to answer the survey, review my documents, and participate in workshops, I thank you all for your time and effort you devoted to this program. Your feedback will help ensure we have a sound, rigorous, and effective Professional Development program for years to come. BZ shipmates!

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## LIST OF ABBREVIATIONS

ADDIE	Analysis, Design, Development, Implementation, and Evaluation
ADL	Actual Development Level
AERA	American Educational Research Association
APA	American Psychological Association
BMT	Behavior Modeling Training
CAI	Computer-Aided Instruction
CDP	Curriculum Design Plan
CLP	Continuous Learning Point
DoD	Department of Defense
FL	Florida
GS	General Schedule
ICW	Interactive Courseware
ID	Instructional Designer
IDT	Instructional Design and Technology
IRB	Institutional Review Board
ISD	Instructional System Design
ISD/SAT	Instructional System Development/Systems Approach to Training
ISPI	International Society for Performance Improvement
JTA	Job/Task Analysis
KSA	Knowledge, Skills, and Attitudes
LO	Learning Objective
MCD	Military Characteristics Document

MIL-HDBK	Military Handbook
MKO	More Knowledgeable Other
MS	Microsoft (e.g., MS Teams)
NAVAIR	Naval Air Systems Command
NAWCTSD	Naval Air Warfare Center Training Systems Division
NCME	National Council on Measurement in Education
NETC	Naval Education and Training Command
OPM	Office of Personnel Management
PD	Professional Development
PD	Position Description
PLR	Proficiency Level Rubrics
PQS	Personnel Qualification Standards
RQ	Research Questions
RRL	Ready Relevant Learning
SCT	Social Cognitive Theory
TDDCP	Training Device Decision Coordinating Paper
TSD	Training Situation Document
TSFD	Training System Functional Description
TSRA	Training System Requirements Analysis
U.S.	United States
UCF	University of Central Florida
US	United States
ZPD	Zone of Proximal Development

# CHAPTER ONE: INTRODUCTION

## Organizational Context

The Naval Air Warfare Center Training Systems Division (NAWCTSD) in Orlando, FL is the US Navy's principal center for research, design, development, acquisition, testing, and evaluation of training systems to support the Navy and other military services (U.S. Navy, 2020). NAWCTSD employs a diverse workforce of military personnel and civilians, including scientists, engineers, and business professionals, to support the fleet through four product lines:

**Training systems**—which include hardware and software systems such as simulators, part-task trainers, and virtual or augmented reality environments.

**Training services**—which can include management, engineering, logistics, and life-cycle support of training courses and devices.

**Training content**—including traditional instructor-led courses as well as software-based curricula such as Interactive Courseware (ICW) and Computer-Aided Instruction (CAI).

**Intellectual services**—including research and development, front-end analysis, and manpower and personnel studies.

(U.S. Navy, 2020).

Within the organizational structure of NAWCTSD, the Training Systems Analysis, Design and Evaluation division (which is referred to internally by its numerical designator GT53) is responsible for improving human performance through the analysis, design, evaluation, and acquisition of cost-effective training solutions (Naval Air Systems Command (NAVAIR), 2018). Seen from the perspective of the ubiquitous ADDIE model (Analysis, Design, Development, Implementation, and Evaluation), GT53 conducts the left and right “bookends” of the process—the analysis, design, and evaluation phases. GT53 employees conduct front-end

analyses to determine training requirements, and their analyses result in design requirements. Once these requirements are determined, the development and implementation tasks are typically performed by private industry, with GT53 employees providing technical and contractual oversight. GT53 employees conduct formative evaluation throughout the development process, and summative evaluation at the completion of the implementation phase, to ensure that the requirements have been met.

The GT53 division is comprised of approximately 100 employees, six managers (known as branch heads) and a division head. The division is sub-divided into six branches, with each branch consisting of approximately 15-20 employees. Each branch has a branch head who serves as the manager and first-line supervisor of the employees in that branch, and the division head is the manager and first-line supervisor of the six branch heads. Each branch conducts a specialized segment of the division's mission. The six branches are as follows:

GT531: Aviation training requirements analysis and design branch

GT532: Sea- and ground-based requirements analysis and design branch

GT533: Training systems evaluation branch

GT534: Ready Relevant Learning (RRL) branch

GT535: Manpower and personnel studies branch

GT536: RRL content conversion branch

The employees of GT53 are highly educated, with over 85% of the employees holding a master's degree or higher, including 11 employees who hold a doctorate (K. Henderson, personal communication, September 9, 2019). Most employees occupy one of two job series: instructional system specialists or research psychologists. Approximately 60% of the employees are instructional system specialists and approximately 30% are research psychologists. The

remaining 10% occupy unique or specialized job series that help support the division's mission. Employees are classified according to the U. S. Office of Personnel Management (OPM) General Schedule (GS) pay scale from GS-11 through GS-14 (or equivalent) (U.S. Office of Personnel Management, 2020). Employees at the GS-11 level are considered entry level employees, while GS-12 is considered the full-performance level or working-level for employees. GS-13 employees are typically team leads, and GS-14 employees are considered technical experts in the division. The majority of employees fall into the GS-12 and GS-13 levels. There are currently only two GS-11 employees and six GS-14 employees in the division.

The GT53 division holds, as its core competencies, four professional domains: analysis, design, evaluation, and acquisition. Of these, *analysis*, *design*, and *evaluation*—expressed in the division's title—are fundamental to the field of instructional design. The fourth domain, *acquisition*, is not typically associated with the field of instructional design. Rather, it is inherent in all of the work performed by GT53. The Federal Acquisition Regulations define acquisition as purchasing or leasing supplies or services by the federal government, for the use of the federal government, using appropriated funds and a mutually binding legal contract (Federal Acquisition Regulations, 2019). In the context of NAWCTSD, GT53 staff oversee the acquisition of training materials, training devices, and training technologies for use by the U.S. Navy. Thus, the technical domain of *acquisition* is intrinsic to the rest of the division's core competencies.

### Author's Positionality

Creswell and Poth, in their 2018 text on qualitative inquiry and research design, explain that it is important for a researcher to identify his or her positionality in a study. This allows the researcher to make his or her values known to the reader, and it helps explain the source and basis of the researcher's first-hand knowledge (Creswell & Poth, 2018). This positionality

includes such characteristics as the researcher's personal and professional position (Berger, 2015; as cited in Creswell & Poth, 2018).

I believe my professional positionality is most pertinent to this study. I am a U.S. Navy veteran, having served 9 years active duty enlisted in the submarine force, and I have been an employee of NAWCTSD GT53 for 14 years. I began my career at NAWCTSD at the GS-12 level, having progressed through GS-13 and GS-14 levels to my current position. In 2019 I was assigned as the branch head for GT536, where I manage 14 direct-report employees.

I recognize that each of these positional characteristics had the potential to introduce bias into the study. I believe that my experience as a submarine veteran has instilled in me a penchant for compliance with published policies, procedures, and directives. This trait is reflected in my reliance, at least in part, on some Navy-specific references in my program design. However, I believe the use of these references was justified and appropriate, as NAWCTSD is a military organization under the cognizance of the U.S. Navy. I also recognize that my supervisory position may have been of influence, as many of my personal and professional relationships in the organization were formed when I occupied a non-supervisory position. Colleagues may have felt pressured to participate in my study because of our familiar relationship. Similarly, my supervisory relationship with my direct-report employees—all of whom had the potential to serve as program participants—could have exerted undue influence on their willingness to participate. However, trustworthiness measures taken in sampling and data collection were intended to minimize any bias that my professional positionality might have introduced. These trustworthiness measures are further described in the Trustworthiness section of Chapter 4.

### Problem Context

My fourteen-year tenure with NAWCTSD and my professional positionality have afforded me insight into a complex problem of practice in the GT53 division of NAWCTSD. The employees of GT53 are expected to progress, throughout their careers, from working-level GS-12 positions, through GS-13 team lead positions, and ultimately to technical experts and/or first-line supervisors at the GS-14 level. However, employees are not provided any structure to guide this progression, at least not consistently across the division. For example, an employee may spend years assigned to conduct formative evaluation of instructional media, having never been exposed to front end analysis or design processes. While this will tend to develop expertise in formative evaluation, the employee would have little knowledge or skill in other relevant domains. Conversely, whether by choice or circumstance, an employee may be frequently reassigned to a variety of projects. In this case, the employee would develop a wide breadth of experience, but would not have the opportunity to develop expertise in any particular domain. As a result, some employees may develop a depth of experience in a single domain with little breadth, while others may develop a wide breadth of experience with little depth. The progression can be somewhat haphazard and circumstantial, to the benefit of some employees and the detriment of others.

A related problem occurs when employees are reassigned between branches, which is sometimes necessary due to the dynamic nature of the division's tasking and workload. For example, as the division experienced growth in the Ready Relevant Learning (RRL) initiative employees were reassigned to GT534 and GT536 from other branches. In these situations, employees would ideally be selected for re-assignment based on the needs of the project and the skills of the employees. In that regard, division leadership would benefit from an accounting of each employee's skills and experience, in order to best align the employees' skills with the

demand. Yet such an accounting did not previously exist, apart from each branch head's personal (but typically undocumented) assessment. However, such an accounting of the skills of each employee in the division was the goal of a pilot study, described in the following section.

### Pilot Study

The pilot study preceding this dissertation in practice was a gap analysis, conducted between June and August of 2019, fulfilling a milestone requirement pursuant to an EdD in Curriculum and Instruction at the University of Central Florida in Orlando, FL (Miehl, 2019). The goals of that study were to measure the proficiency of GT53 employees in their core competency skills, and to compare those results with the division's proficiency goals.

The instrument for the study, which was labeled the skills inventory, was an Excel spreadsheet in which employees rated their proficiency in a broad collection of skills. The instrument listed 120 skill statements, such as "Develop assessment items to match learning objectives" or "Evaluate instructional design products (deliverables) for overall quality and instructional validity." For each of the 120 skills statements, employees were asked three data points. They were asked to note how often and how recently they had performed each task (each measured on an ordinal scale). Employees were also asked to assess their proficiency in each skill using this six-point scale:

- 1) **Novice:** I have no formal training, education, or experience in performing this skill.
- 2) **Student:** I have some training and/or education in this skill and/or have performed this skill in a training or educational setting (e.g., for a school project.)
- 3) **Apprentice:** I have limited experience in performing this skill under close supervision.
- 4) **Journeyman:** I have experience performing this skill across routine or predictable situations with minimal supervision or guidance.



5) **Master:** I have performed this skill independently across a wide range of situations. I seek guidance and advice from peers and colleagues only in unusually complex situations.

6) **Expert:** I advise and instruct others in carrying out this skill. I am consulted by other workers to assist them in this task because of my authoritative knowledge and experience.

The skills inventory was distributed to all employees in the division, and although participation in the skills inventory was voluntary, it was highly encouraged by division leadership. A total of 92 employees completed the skills inventory, representing 88% of employees at the time. Employees' responses were de-identified and then analyzed to determine how many employees rated themselves as novice, student, apprentice, journeyman, master, or expert at each of the skill domains.

The results of the skills inventory revealed a gap between the employees' self-assessed proficiency and the division's proficiency goals. Division leadership had established a goal that no more than 50% of employees would be at the apprentice level or lower in any skill domain, or, conversely, that at least 50% of employees would be at the journeyman level or higher. In other words, the division's goal was that at least half of the employees would have experience performing these skills across routine or predictable situations with minimal supervision or guidance. In some domains, the results of the skills inventory met or exceeded the division's goals. For example, in the design domain, 75% of employees rated themselves at the journeyman level or higher. In the evaluation domain, 64% of employees rated themselves as journeyman or higher. However, some domains fell short of the division's goals. Notably, only 47% of employees rated themselves as journeyman or higher in the analysis domain, and only 29% of employees rated themselves as journeyman or higher in the acquisition domain.

Most notable among the pilot study results was that employees collectively expressed a gap in one of the division's core competencies: front end analysis. According to their position description, employees in the Instructional System Specialist career field at the GS-12 level are expected to exhibit knowledge and skills in a wide range of analytical techniques within the Instructional System Design (ISD) field. They are responsible for conducting analyses to identify or validate training requirements, and they are expected to independently perform training situation analyses and job task analyses (NAWCTSD, 2017b). Similarly, employees in the Research Psychologist career field at the GS-12 level are responsible for conducting organizational analyses and other training analyses including training situation analyses (NAWCTSD, 2017a). But despite being a basic requirement of all GS-12 employees, 22% of employees rated their proficiency in analysis skills as Novice, which was defined as having no formal training, education, or experience in performing this skill (Miehl, 2019).

This lack of analysis skills is not unique to NAWCTSD. Villachica, Marker, and Taylor (2010) surveyed the International Society for Performance Improvement (ISPI) to understand what skills potential employers expect from entry-level instructional designers (IDs), and the extent to which entry-level IDs meet these expectations. In this study, failing to meet expectations meant that the entry-level ID either required significant assistance from colleagues to perform the skill, or was unable to perform the skill despite assistance from colleagues. The results revealed that, although analysis skills are highly sought after in the instructional design field, few entry-level IDs meet these expectations. For example, nearly 90% of respondents expected entry-level IDs to be able to conduct a front-end analysis or needs assessment, yet nearly 65% of respondents indicated that entry-level IDs did not meet this expectation. Similarly, just over 90% of respondents indicated that entry-level IDs should be able to conduct task

analyses, yet approximately half of respondents indicated that entry-level IDs did not meet this expectation.

Additional research indicates that this lack of analysis skills may be the result of a nationwide trend in higher education as it relates to the field of Instructional Design. West, Thomas, Bodily, Wright, and Borup (2017) conducted a comprehensive review of universities offering advanced degrees in Instructional Design and Technology (IDT) and found that analysis was underrepresented as a topic of study in even the best IDT programs. In their study, West et al. documented the number of courses offered by the top 5 institutions in areas such as Analysis, Design, and Evaluation. They found that, while the top five institutions offered 25 courses (combined) in Design, they only offered five courses in Analysis. The results of this study, along with the results of the skills inventory (Miehl, 2019) and the greater survey of employee skills in the instructional design field (Villachica, Marker, & Taylor, 2010) illustrate how it is possible, and in some cases even common, for individuals to hold an advanced degree in their field yet fail to either obtain or maintain proficiency in the core competencies of that field.

Although the pilot study yielded valuable data concerning the employees' skills, it also revealed some problems with the instrument itself. Upon completion of the skills inventory and review of the results, managers and employees alike noted that the instrument was only a self-assessment, and as such, was subjective and prone to personal bias. Managers, in particular, expressed concerns that some employees may have over- or under-estimated their proficiency. Some employees also noted that the number of skill statements (120 in total) was a bit overwhelming. In response to these concerns, I recognize the need for a measurable and objective set of criteria by which managers can evaluate the knowledge and skills of their employees and with which employees can objectively self-assess their own proficiency.

The gaps in employees' skills and the need for objective assessment criteria, which were revealed by the pilot study and seen through the lens of my positionality within the organization, led me to develop the problems statement for this dissertation in practice.

### Problem Statement

Employees and managers of NAWCTSD GT53 have experienced a series of complex and interrelated problems concerning employee development. Primarily, employees do not have any mechanism by which to proactively develop the specialized knowledge and applied skills required for career progression. This was revealed by the pilot study, which indicated that there is a gap between the employees' proficiency in certain critical skills and the proficiency goals for the division (Miehl, 2019). Furthermore, employees do not have access to specialized training for the unique knowledge and skills required for their assignment, and they may not be provided opportunities to develop the depth or breadth of skills expected for career progression. Finally, managers do not have objective measures by which to effectively assess the knowledge and skill level of their employees— independent of the employees' self-assessment, nor do employees have an objective set of measures by which to self-assess their proficiency. For these reasons, I believe NAWCTSD GT53 employees will benefit from this formalized and structured professional development (PD) program.

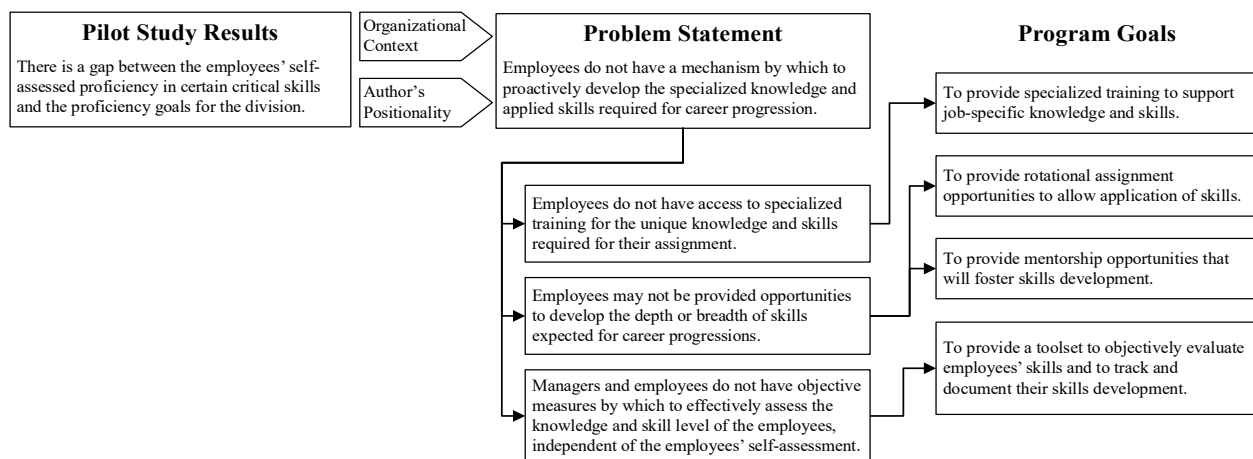
### Study Purpose

The purpose of this dissertation in practice was twofold: there was a practical purpose, and there was a research purpose. The practical purpose was to design a PD program in response to the problem statement described above, while the research purpose was to evaluate and refine

that program using mixed-methods empirical research. Each of these aspects of the study is fully described in subsequent chapters, but an introductory overview is provided here.

### Practical Purpose: PD Program Design

The practical purpose of this study—to design a PD program—was intended to address the complex problem of practice faced by NAWCTSD GT53 employees. The traceability from the results of the pilot study, through the details of the problem statement, to the goals of the PD program are illustrated in Figure 1 and described below.



*Figure 1. Traceability between the pilot study, problem statement, and program goals.*

The pilot study revealed a gap in certain critical skills that, seen through the lens of my positionality within the organizational context, led me to recognize the overarching problem statement—that GT53 employees lack a proactive method of skills development. This problem statement was characterized by a lack of specialized training, a lack of opportunities to develop the employees' skills, and a lack of objective measures to assess their knowledge and skills.

Accordingly, the PD program was designed to achieve four program goals:

- 1) To provide specialized training to support job-specific knowledge and skills.
- 2) To provide rotational assignment opportunities to allow application of skills.
- 3) To provide mentorship opportunities that will foster skills development.

- 4) To provide managers and employees a toolset to objectively evaluate each employee's skills and to track and document their skills development.

Each of these goals and the resulting program design was supported by research and literature, as described in Chapter 2, and the relationship between the literature and the program design are further described in Chapter 3. But for the sake of orienting the reader, note that this dissertation in practice resulted in the design of a PD program that includes prescriptions for specialized training, rotational assignments, mentorship arrangements, and a set of objective assessment measures.

#### Research Purpose: PD Program Evaluation

Once I completed the initial design of the PD program, I began a process of program evaluation. This phase of the study followed the tenets of design-based research, an empirical research method in which an intervention is subject to iterative cycles of evaluation and revision. From a researcher's perspective, this process was intended to add to our body of knowledge by providing empirical data regarding the real-world applicability of academic theories and models (The Design-Based Research Collective, 2003). The method is fully described in Chapter 4, but again, an overview is appropriate here to help orient the reader.

I evaluated my program design through a variety of methods including document reviews, expert panels, and consecutive iterations of a survey. Stakeholders were invited to review the initial drafts of program artifacts and to provide feedback and recommendations for revision. Expert panels evaluated the program design and artifacts against a set of usability and functionality specifications. A survey measuring stakeholders' perception of the useability and functionality of the program was administered before the first revision and the completion of the

final revision. This collection of qualitative and quantitative data informed revisions of the program artifacts and served to answer the research questions for this dissertation in practice.

### Research Questions

RQ1. To what extent do research-based interventions satisfy stakeholders' needs, as measured by a survey that assesses usability and functionality of the associated artifacts?

RQ2. How can qualitative feedback inform the formative evaluation of program artifacts?

RQ3. How does the design-based research process affect stakeholder's perception of artifact usability and functionality?

### Study Significance

The significance of this study is twofold. First, this study benefits NAWCTSD GT53. The training and mentorship opportunities will result in greater skill across the division, while providing peer support and supervisor to facilitate training transfer (Baldwin & Ford, 1988). As described in Chapter 3, training transfer is a significant part of the conceptual framework of this study. Second, this study adds to the body of knowledge in that it provides real-world applications of research-based theories. This study used design-based research as its methodology, which is an effective method of research in context to inform the contextual validity of theory (The Design-Based Research Collective, 2003). Therefore, this study was intended to validate the concepts of training transfer and the other theories and models that make up the conceptual framework of this resulting professional development program.

## CHAPTER TWO: LITERATURE REVIEW

### Introduction

This literature review explores the relevant literature that helps resolve the problem of practice expressed in Chapter 1. To help introduce this section, I will first describe the literature review according to Cooper's taxonomy of literature reviews (Cooper, 2003). Using Cooper's taxonomy, an author considers six characteristics of a literature review: focus, goal, perspective, coverage, organization, and intended audience. According to the construct of Cooper's taxonomy, my primary **focus** was on practices or applications that I could apply to my own PD program. However, I also looked for theories that were supported by research findings. The **goal** of this literature review was integration toward generalization. I wanted to bring together a diverse body of literature into a cohesive discussion, and to apply that extant knowledge to my problem of practice. Cooper describes the characteristic of perspective in a literature review as a continuum between neutral representation and espousal of a position. In this regard, my **perspective** tended towards espousal of a position. In choosing the literature as I did, I espoused a position toward those theories and models that I believed directly inform my problem of practice, or those phenomena and attributes that I believed I could effectively influence by realizing my program goals. In this regard, I intended to espouse a most pragmatic perspective. My **coverage** would best be described, according to Cooper's taxonomy, as representative (i.e., focusing on selected works that represent a larger body of knowledge) with a focus on central or pivotal works (e.g., meta-analyses and topic-centered literature reviews). I chose this approach out of necessity, based on the vast body of knowledge in my area of study. For example, the most prominent area of literature I chose to review was *training transfer*. Here, a simple search in my university's library system for the term "training transfer" yielded over 195,000 results.



Even limiting that search to academic, scholarly, and peer-reviewed journals, published only in the past 20 years, and having full-text offered through my school's library system, the search still yielded over 66,000 results. The sheer volume of literature helped inform (at least in part) the **organization** of my review, which is conceptual. In this regard, I organized my literature review to focus on training transfer, social learning theory, sociocultural development, and the APA/AERA/NCME Standards for Educational and Psychological Testing (2014). I also reviewed several non-academic resources such as federal policy manuals and Navy doctrine and references that are specifically relevant to my organization. Finally, my **intended audience** includes both specialized scholars and practitioners. To some extent, this literature review was written with my dissertation committee members in mind, with the intent of substantiating my program design with the supporting literature, as well as providing them with the confidence that I had done my due diligence and that I am well-read on the subjects at hand. I also considered my peers and colleagues at NAWCTSD, many of whom are specialized scholars in their own right, as another intended audience group. I hope to give this audience group a firm understanding of the theories and models underpinning the design of the very program which I hope to have them help me to implement. With that, I begin this literature review with the topic of training transfer.

### Training Transfer

Baldwin and Ford published a literature review on the subject of training transfer in 1988 in which they provided an operational definition of training transfer, proposed a framework to explain the process of training transfer, and described the factors that influence the process (Baldwin & Ford, 1988). This paper has proven to be a seminal work on the subject, having been cited over 4,700 times since its publication, as of July 2020 (Google scholar, n.d.). Thirty years

later, along with a third colleague, they again analyzed the body of literature on the subject with an updated meta-analysis (Ford, Baldwin & Prasad, 2018). In this contemporary work, they slightly revise their definition of transfer. They also provide an updated synthesis of the many factors that impact the transfer process, and they describe various interventions that enhance training transfer. These works provided the basis of, and direction for, my research into the subject of training transfer.

Baldwin and Ford's original framework for training transfer defines transfer, quite simply, as the degree to which employees take the knowledge, skills, and attitudes (KSAs) that they learned in training and apply them to their job. The framework points out two critical components of transfer: generalization and maintenance. The trainee must be able to apply the specific content learned in training to broader situations in the work environment (i.e., generalization) and they must retain the KSAs, or conversely, prevent decline of those KSAs over a period of time (i.e., maintenance). A graphical depiction of Baldwin and Ford's original framework is provided in Figure 2 (Baldwin & Ford, 1988).

The framework depicts three categories of factors that determine whether or not training transfer takes place (i.e., transfer determinants): trainee characteristics, training design, and the work environment. Trainee characteristics include the abilities and aptitude of the trainees, their motivation, and other personality factors such as their locus of control and need for achievement. Training design includes such characteristics as the incorporation of learning principles into the design of the training, and the sequencing and relevance of the content. The characteristics of the work environment include peer and supervisor support and the opportunity for the trainees (or, more aptly, employees) to apply their newly acquired KSAs on the job (Baldwin & Ford, 1988).

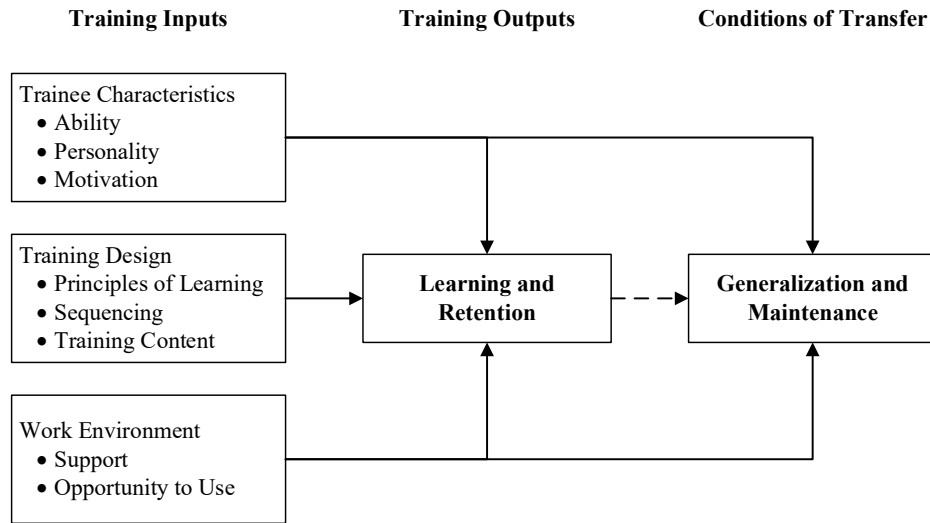


Figure 2. Baldwin and Ford's framework for training transfer (Baldwin & Ford, 1988).

According to the framework, all three groups of determinants (trainee characteristics, training design, and work environment) directly influence whether or not learning and retention take place. Learning and retention, in turn, directly influence the conditions of transfer, i.e., generalization and maintenance. Additionally, Trainee characteristics and the work environment directly influence generalization and maintenance, while training design only indirectly influences the conditions of transfer through its impact on learning and retention. (Baldwin & Ford, 1988).

In their more recent work, Ford, Baldwin, and Prasad (2018) again summarized the current body of transfer-related literature, they highlighted persistent gaps in the literature, and they proposed a series of strategies for future research. They also slightly expanded their definition of transfer, such that transfer not only refers to trainees applying their newly acquired KSAs on the job, but that the application of these new KSAs must result in meaningful changes in job performance. In summarizing the current research, they explored the factors that impact generalization and retention, and they prescribed various interventions that enhance transfer. (Ford, Baldwin & Prasad, 2018).

When analyzing the factors that impact generalization, Ford, Baldwin, and Prasad reference an earlier comprehensive meta-analysis on the subject by Blume, Ford, Baldwin, and Huang (2010). Blume et al. analyzed two of the three categories of transfer determinants—work environment and trainee characteristics. (Recall from the original framework that these two categories of determinants have direct influence on generalization and maintenance, while Training Design only has indirect influence.) Blume et al. found that trainee characteristics such as motivation and self-efficacy had a small to moderate effect on generalization, while the work environment, specifically the degree of supervisor and peer support, had significant influence on generalization (Blume, Ford, Baldwin, & Huang, 2010). Ford, Baldwin, and Prasad also considered research published after the 2010 meta-analysis and found continuing evidence that workplace support is essential for generalization (Ford, Baldwin & Prasad, 2018).

In analyzing the factors that impact retention, Ford, Baldwin, and Prasad identified several factors that may enhance retention or, conversely, factors which, when absent, may reduce retention. For example, task repetition, testing during training, and spaced practice were all associated with improved retention. However, a lack of opportunity to exhibit or practice newly acquired KSAs was found to inhibit retention, as was a lack of motivation or a lack of reward (Ford, Baldwin & Prasad, 2018).

Ford, Baldwin, and Prasad prescribed a series of interventions that, based on empirical research, have been shown to enhance transfer. Prior to training, they recommend providing the prospective trainees with a realistic preview of the training. Although this intervention only showed a small impact on transfer, this relatively simple intervention does improve the trainees' motivation (which is one of the determinants of transfer) and ultimately increases the trainees' willingness to practice and participate in the training. Additionally, they found evidence that

multiple learning strategies, including case studies, worked examples, and group discussions are effective at promoting transfer. They also found evidence that spaced practice—practice sessions distributed over time—are more effective at promoting transfer than massed practice. Specifically, massed practice may lead to better performance immediately following the training, but spaced practice led to better transfer retention. (Ford, Baldwin & Prasad, 2018).

Ford, Baldwin, and Prasad also identified the use of behavior modeling as a training design intervention to enhance transfer. In doing so, they referenced another meta-analysis, specific to behavior modeling, by Taylor, Russ-Eft, and Chan (2005). Behavior modeling training and the associated study are discussed in the training design section that follows.

Finally, Ford, Baldwin, and Prasad present directions for future research that are directly applicable to my study. Notably, they recommend creating post-training interventions to better enhance transfer. They also recommend taking a more problem-centered approach (or consumer-centric, as they refer to in a related study by Baldwin, Ford, and Blume in 2017). A problem-centered or consumer-centric approach refers to transfer research that focuses on the role of training interventions in the organization and includes greater involvement of training practitioners (Baldwin, Ford, & Blume, 2017). These recommendations are well aligned to the design of my program and my use of design-based research, as described in Chapter 3.

My synthesis of these two paramount articles provided me with anchor points for deeper research. Based on the key terms inherent in the original framework and guided by the findings and citations of the 2018 meta-analysis, my literature review now dives deeper into the topics of the work environment, trainee characteristics, and training design. My goal was to discover treatments that I could leverage in my program design to effectively influence transfer.

## Work Environment

It is clear from my initial research that several characteristics of the work environment play a major role in the process of training transfer (Baldwin & Ford, 1988; Blume, Ford, Baldwin, & Huang, 2010; Ford, Baldwin & Prasad, 2018). But to gain a deeper understanding of how the work environment influences transfer, I turned my attention to a recent meta-analysis that focused specifically on this topic. Hughes, Zajac, Woods, and Salas (2020) conducted a meta-analysis of 61 empirical studies to determine how peer support, supervisor support, and organizational support contribute to training transfer in general, and sustainment in particular. Incidentally, the term “organizational support” was not a term I had previously found in transfer-related literature. Hughes, Zajac, Woods, and Salas use the term to refer, simply enough, to support gained from leadership in the organization at a level higher than the employee’s immediate supervisor.

In their meta-analysis, Hughes, Zajac, Woods, and Salas found that support from all three levels—peer, supervisor, and organization—positively contribute to transfer and sustainment, and they do so to different degrees. Although organizational support encourages transfer, supervisory support has a greater impact than organizational support. Peer support has an even greater influence still. Hughes, Zajac, Woods, and Salas found that supervisor support and peer support have a more direct role in sustainment as well. But the authors also make a point that is particularly salient to my dissertation in practice; Peers and immediate supervisors may not have the authority to implement an organization-wide policy that encourages transfer, especially one that allows for practical application of learned skills. This is an area in which organizational support plays a unique and critical role (Hughes, Zajac, Woods, & Salas, 2020).

While the research cited thus far quantifies the extent to which determinants such as *peer support*, *supervisor support*, and *opportunity to perform* encourage transfer, they do not adequately describe these factors in qualitative terms. In this regard, researchers Grossman and Salas provide a descriptive explanation of these terms through their 2011 literature review. For example, they describe activities such as networking and sharing ideas with peers as positive examples of peer support. They also cite the ability of employees to observe their peers using the trained skills, as well as coaching their peers and receiving feedback from their peers as tangible examples of peer support (Grossman & Salas, 2011).

The term *supervisor support* is also somewhat ambiguous, and here again, Grossman and Salas provide clarification. They cite activities such as behavior modeling, goal setting, and providing feedback, recognition, and rewards as behaviors that help ensure transfer. With goal setting, they note that supervisors should provide pre-training and post-training goals, and that post-training goals should include proximal (short-term) and distal (long-term) goals (Grossman & Salas, 2011).

Even greater descriptive insight is provided by Govaerts and Dochy, who conducted a meta-analysis in 2014 specifically focused on the characteristics of supervisor support. They reviewed 99 empirical studies on the subject of training transfer, and from these studies, they synthesized the factors, activities, and behaviors that encompass supervisor support as it relates to training transfer. In their report, they provide a tabular list of 24 categories of supervisor support, and they provide a short description or example in each category. Some of their findings echo those of Grossman and Salas, such as behavior modeling, goal setting, and providing feedback and rewards. But they also provide additional examples such as clarifying why trainees were selected for training, demonstrating interest in the training content, expressing

encouragement and confidence in the trainees abilities, discussing the application of learned skills to the job, monitoring the trainees' application of learned skills, and tolerating mistakes by the trainees as they apply their newly learned skills (Govaerts & Dochy, 2014).

Interestingly, a subsequent literature review on the same subject by Tonhäuser and Bükér (2016) sub-divides many of the same determinants into two categories—action-related and attitude-related support—citing an earlier quantitative study by A. Hinrichs (2014). In this regard, behaviors such as discussing the application of learned skills to the job are action-related, while behaviors such as demonstrating interest in the training content are attitude-related (Hinrichs, A. 2014; Tonhäuser & Bükér, 2016). Both are important examples of supervisor support.

Regarding the final characteristic of the work environment—the opportunity to perform—the literature I have cited thus far says surprisingly little. But what is written on the subject makes clear the fact that this transfer determinant, *opportunity to use*, is not a complex phenomenon to be measured and analyzed. Rather, it is a simple, basic, and yet critical component of the model. In fact, as far back as 1988, Baldwin and Ford noted that there was little empirical evidence on the subject. In their 2018 update, Ford Baldwin and Prasad simply noted that inadequate opportunity can result in skill decay and thus reduced retention. However, they also reiterated, in a prescriptive list of transfer factors, that providing the opportunity to apply trained skills on the job is one of the most impactful transfer interventions related to the work environment. Here, again, Grossman and Salas offer a bit more explanation. They advise that lack of opportunity is the greatest obstacle or barrier to transfer. But they also note that allowing the opportunity to perform means allowing the trainee or employee sufficient time to do so, specifically by adjusting the employee's workload accordingly. They also advise that this timing should occur soon after the training, as long delays can lead to skill decay. (Grossman and



Salas, 2011). Finally, Tonhäuser and Bükér (2016) add that having a variety of work tasks on which to apply the newly learned skills has a positive and significant influence on transfer. Although the authors do not state so explicitly, the benefit of task variety appears to align with Baldwin and Ford's original construct of generalization, wherein trainees are able to apply the specific content learned in training to broader situations in the work environment.

### Trainee Characteristics

Baldwin and Ford (1988) cite a number of trainee characteristics that influence training transfer, including aptitude, locus of control, need for achievement, and motivation. However, they provide little insight into the ways in which these characteristics influence transfer. Likewise, in their 2018 meta-analysis, Ford, Baldwin, and Prasad provide little in the way of substantive discussion, apart from noting that trainee characteristics only show a small to moderate relationship with transfer. Instead, Ford, Baldwin and Prasad defer most of their discussion to the 2010 meta-analysis conducted by Blume, Ford, Baldwin, and Huang.

Blume, Ford, Baldwin, and Huang (2010) conducted a meta-analysis of 89 empirical studies on the topic of training transfer. Although they had several research questions dealing with measurement instruments, measurement bias, measurement timing, and measurement context, one research question was particularly salient to my literature review. They sought to determine the size of the relationship between transfer and trainee characteristics, work environment, training interventions, learning outcomes, and trainee reactions. Regarding trainee characteristics, they found that cognitive ability, conscientiousness, and voluntary participation showed a moderate effect on transfer. They also found that neuroticism, self-efficacy, and motivation showed a small to moderate effect on transfer. Finally, they found a small correlation

between transfer and a number of additional characteristics, including agreeableness, extraversion, locus of control, and goal orientation (Blume, Ford, Baldwin, & Huang, 2010).

At this point I feel it is important to note that I had almost no ability (if any) to influence trainee characteristics such as cognitive ability, conscientiousness, neuroticism, agreeableness, or extraversion through this study. Other characteristics such as motivation or self-efficacy may have indirectly benefited from my design interventions, and therefore they may have a small to moderate effect on transfer. But I did not measure these characteristics, nor did I specifically target these characteristics with my program design. I do find it noteworthy that voluntary participation shows moderate effect on transfer, and therefore I did make this a characteristic of my program.

### Training Design

This dissertation in practice includes a component of curriculum design. I prescribed the initial design characteristics for the curriculum in terms of an instructional strategy for each learning objective. I therefore found it prudent to explore the design characteristics that positively influence transfer, with the intent of incorporating those design elements into the curriculum design plan.

To determine the critical elements of training design, I cross-referenced the most prominent literature reviews and meta-analyses that I had retrieved thus-far, which were Baldwin and Ford (1988), Blume, Baldwin, Ford, and Huang (2010), Ford, Baldwin, and Prasad (2018), and finally Grossman and Salas (2011). I looked for the common elements that all of these studies have identified as having positive influence on training transfer, and I found several of these common elements that could be applied to my curriculum design.

Baldwin and Ford's original work refers to *stimulus variability*, which they describe as the practice of providing a variety of examples. Other studies use the words *mixed models*, and specifically prescribe using both positive and negative examples in training. Although not exactly identical, these two terms do provide a cohesive prescription. Another common element was to situate the training in a realistic environment. Again, Baldwin and Ford's initial work used the slightly different language (they prescribe *identical elements*), but they make clear that the examples and activities presented in training should correspond with those that the trainees are likely to encounter on the job. Finally, as previously mentioned, distributed practice was also a common recommendation.

One notable point of discussion was that the three most recent studies (Blume Ford, Baldwin, & Huang, 2010; Ford, Baldwin, & Prasad, 2018; Grossman & Salas, 2011) all recognized Behavior Modeling Training (BMT) as an effective design to promote transfer. Thus, I was led to a meta-analysis specifically focused on BMT and its effect on training transfer (Taylor, Russ-Eft & Chan, 2005). Taylor, Russ-Eft, and Chan describe BMT as a training design based on Bandura's social learning theory (discussed later in this chapter) in which the trainer clearly defines the behaviors (i.e., skills) to be learned, models or demonstrates the skills, allows the trainees to practice those skills, and provides feedback on the trainees' performance. Taylor, Russ-Eft, and Chan identified specific aspects of BMT that are particularly effective at promoting transfer. They recommend using mixed models, that is, both good and bad examples, when modeling the behavior. They also recommend allowing trainees to generate their practice scenarios and training the supervisors (although the authors use the word "superiors") concurrently with the employees (Taylor, Russ-Eft, & Chan, 2005). Additional discussion of BMT and its relation to social learning theory is provided in the *Social Learning Theory* section.

### Social Learning Theory

Albert Bandura published his Social Learning Theory in 1977, and later revised and renamed it Social Cognitive Theory in 1986 (McLeod, 2016). In 1989, Bandura and a colleague further described how the processes of social cognitive theory take place in an organization (Wood & Bandura, 1989). Bandura proposed that individuals learn behaviors by observing other people (or *models*) in their environment. This learning takes place through a series of four processes: attention, retention, reproduction, and motivation. An individual must notice that a behavior is being modeled (*attention*), he or she must remember that behavior (*retention*) and attempt to perform the same behavior independently (*reproduction*), and finally, the individual must be rewarded (*motivation*) (Bandura, 1971; Wood & Bandura, 1989; McLeod, 2016).

In their work on social cognitive theory (SCT) and organizational management, Wood and Bandura further describe elements of the modeling process, particularly for desired behaviors and skills, that take place in an organization. Referred to as *guided mastery modeling*, this type of modeling includes three critical elements. First, guided mastery modeling demonstrates general rules and strategies, as opposed to discrete responses to specific situations. This allows the learner to generalize the desired behaviors over a wider variety of situations. Second, guided mastery modeling allows for practice or repetition in a safe environment where errors have little consequence, such as through role playing in simulated scenarios. In this regard, feedback from the model (or master) is critical to reinforce retention of correct behaviors or correctly performed skills. Finally, guided mastery modeling includes what the authors call a transfer program. They recommend allowing the individual to apply the skill in a situation with a high probability of success in a relatively easy scenario. This initial success will give the individual confidence to move on to more difficult applications (Wood & Bandura, 1989).

I understand social cognitive theory and the characteristics of guided mastery modeling to be well aligned to the design of Behavior Modeling Training (BMT), and I have outlined my understanding of the parallels in Table 1.

***Table 1.***

*Social Cognitive Theory, Guided Mastery Modeling, and Behavior Modeling Training Compared*

<b>Social Cognitive Theory</b>	<b>Guided Mastery Modeling</b>	<b>Behavior Modeling Training</b>
Attention		Describe skills
Retention	Demonstrate rules and strategies	Provide models
Reproduction	Practice in a safe environment	Practice opportunities
Motivation	Transfer	Feedback

SCT notes that the learner must first notice, then retain the behavior. Behavior Modeling Training (BMT) begins by describing, then modeling the behaviors or skills to be learned. At this phase, guided mastery modeling prescribes demonstrating rules and strategies. The next step in social cognitive theory is reproduction, while guided mastery modeling prescribes practice in a safe environment, both of which align to providing practice opportunities in behavior modeling training. Finally, social cognitive theory relies on motivation as reinforcement. Here, the feedback provided in the transfer stage of guided mastery modeling, as well as the feedback provided in the last phase in behavior modeling training, serve as that reinforcing motivation (Bandura, 1971; Taylor, Russ-Eft, & Chan, 2005; Wood & Bandura, 1989). I used this matrix of characteristics to inform the design of my program curriculum.

## Sociocultural Theory

Russian psychologist Lev Vygotsky developed his sociocultural theory in early soviet-era Russia during the 1920s and 1930s (McLeod, 2018). Although his original writings are, of course, in Russian, there are many translations, compilations, and derived works available based on these original writings. For this literature review, I referenced several such works. For an overview of his theory, I referenced the website SimplyPsychology (McLeod, 2018, 2019), and for a more rigorous discussion I referenced an academic paper on Vygotsky's theory (Eun, 2018). In the latter, Eun synthesized a large body of literature, including several translations of Vygotsky's original writings, to provide a framework for understanding Vygotsky's concepts.

Vygotsky's theory of sociocultural development holds that learning and development rely on social interactions with others (McLeod, 2018). Two central ideas in the theory are the zone of proximal development (ZPD) and the more knowledgeable other (MKO) (McLeod, 2019). As McLeod describes, the ZPD represents the difference between what an individual knows or is capable of performing on his or her own, and what the individual is capable of learning with the support of the more knowledgeable other. The MKO can be an adult (in the case of child development) a teacher, or more experienced peer (McLeod, 2019).

Eun (2018) further describes the ZPD by providing what she calls a "spatial and temporal metaphor" (p. 18), allowing us to envision and depict the concept graphically as a (spatial) figure while describing the development process as it takes place over time (temporally). Eun references Vygotsky directly when describing the ZPD as the distance between what the individual knows and is capable of doing without assistance, known as the individual's actual development level (ADL), and that which the individual can learn with the support and guidance of a more capable peer. This definition is similar to that offered by McLeod on the SimplyPsychology website, but Eun goes on to describe the process of internalization and its

effect on the ZPD. Eun notes that as the individual internalizes, or learns over time, to perform without the support of the MKO, the newly acquired knowledge and skills become the basis for the next phase of development (Eun 2018). In essence, as the individual learns, the newly acquired knowledge and skills become the expanded ADL, and as the ADL expands, so does the corresponding ZPD. This relationship is depicted in Figure 3.

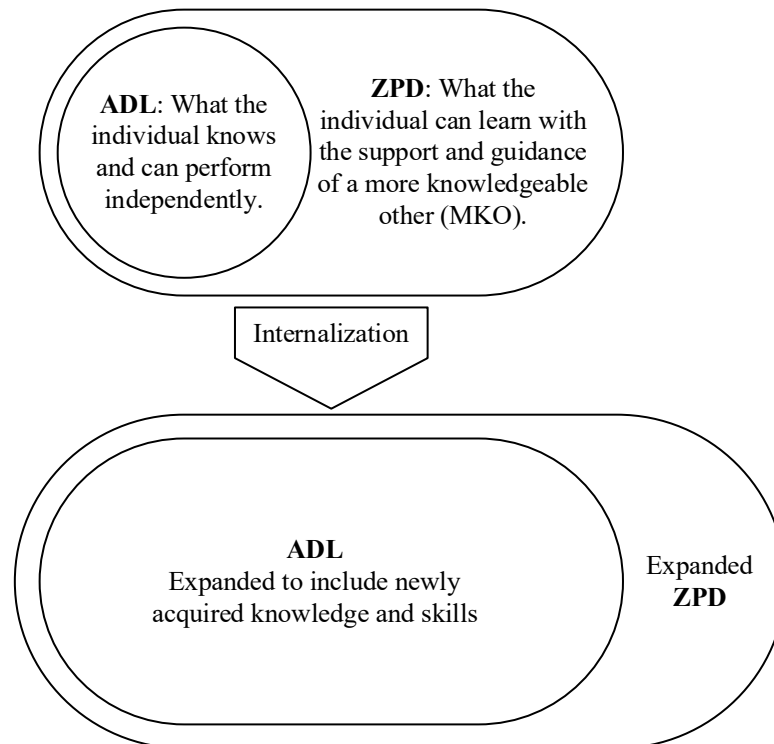


Figure 3. Expanding the actual development level (ADL) through internalization.

Note: Derived from Eun 2018.

As I formulated my idea for my dissertation in practice, sociocultural theory and the concepts of the *zone of proximal development* and the *more knowledgeable other* immediately appealed to me as a construct of a mentorship. I also recognized that a mentorship would satisfy several elements of training transfer (e.g., opportunity to perform, peer support, supervisor support, and feedback). I therefore used the concepts of Vygotsky's theory to form the structure of my mentorship program.

### AERA/APA/NCME Standards

The Standards for Psychological and Educational Testing, published jointly by the American Educational Research Association (AERA), the American Psychological Association (APA), and the National Council on Measurement in Education (NCME), were critical to my study, as I developed testing and evaluation instruments for my employees. Of particular interest was Chapter 11 Workplace Testing and Credentialing. This chapter points out that testing in the workplace is often used for *placement*, meaning decisions about how an individual is to be assigned and tasked, as well as *credentialing*, meaning how to determine an individual's skill or competence in a certain domain. The *Standards* recommends performing a job analysis as the first step in developing valid measures. It goes on to describe two types of measures: predictor measures, which are those presented in a test, and criterion measures, which are those performed on the job. Either type of measure must ultimately be linked to the behaviors and outcomes expected on the job, and the *Standards* describes methods to ensure this linkage (AERA/APA/NCME, 2014). Other sections that were important to my work include discussions on test validity (Chapter 1), reliability (Chapter 2) and fairness (Chapter 3), and guidance for test design and development (Chapter 4).

### Navy-specific Reference Manuals

Although they are not academic or scholarly resources, there are some Navy-specific resources that I referenced throughout my program development. These include two references associated with personnel qualification standards (PQS): the PQS writers' guide and the PQS unit coordinator's guide (Naval Education and Training Command, 2013, 2017). According to the PQS unit coordinator's guide, the PQS Program is a qualification system for officer, enlisted, government civilian, and civilian contract personnel used when certification of a minimum level



of competency is required prior to qualifying to perform specific duties. A PQS is a compilation of the minimum knowledge and skills necessary to qualify for a specific job. (Naval Education and Training Command, 2013, 2017).

The structure of a PQS includes sections listing requisite knowledge and demonstrated skills. Each knowledge or skill component includes a signature block in which a senior employee certifies that the learner has demonstrated the requisite knowledge or skill. A PQS template typically includes a testing section, where the trainee may be required to complete a written exam or an oral examination board, or both. Upon completion of the testing section, an authoritative signature codifies the trainee's completion of the qualification process. (Naval Education and Training Command, 2013).

I followed the format and structure of PQS in developing one set of artifacts for my program, the proficiency level rubrics. The PQS writers' guide provided templates and procedures for developing a PQS where none exists, as was the case in my organization. The PQS unit coordinator's guide provides instructions for how to execute and manage a PQS program once it is established. These two documents will serve as ready references following implementation of the program.

### Literature Review Summary

The rich body of literature presented in this section served to inform the design of the PD program. In the following chapter, the Conceptual Framework section describes how the various theories, models, prescriptions and interventions presented in this literature review came together to inform a cohesive program that, I hope, will effectively develop the knowledge and skills of the employees of NAWCTSD's GT53 division.

## CHAPTER THREE: PROGRAM DESIGN

This chapter has two major sections: *Conceptual Framework* and *Artifact Development*.

The first section, *Conceptual Framework*, describes how the theories and models described in the literature review (Chapter 2) informed the design of the PD Program. The second section, *Artifact Development*, details the steps taken to develop the initial draft of each artifact based on that conceptual framework.

### Conceptual Framework

Each of the four program goals (introduced in Chapter 1) is supported by a body of literature (described in Chapter 2). The literature, in turn, informed the design of the PD Program, as described in this chapter. An overview of this relationship is provided in Figure 4.

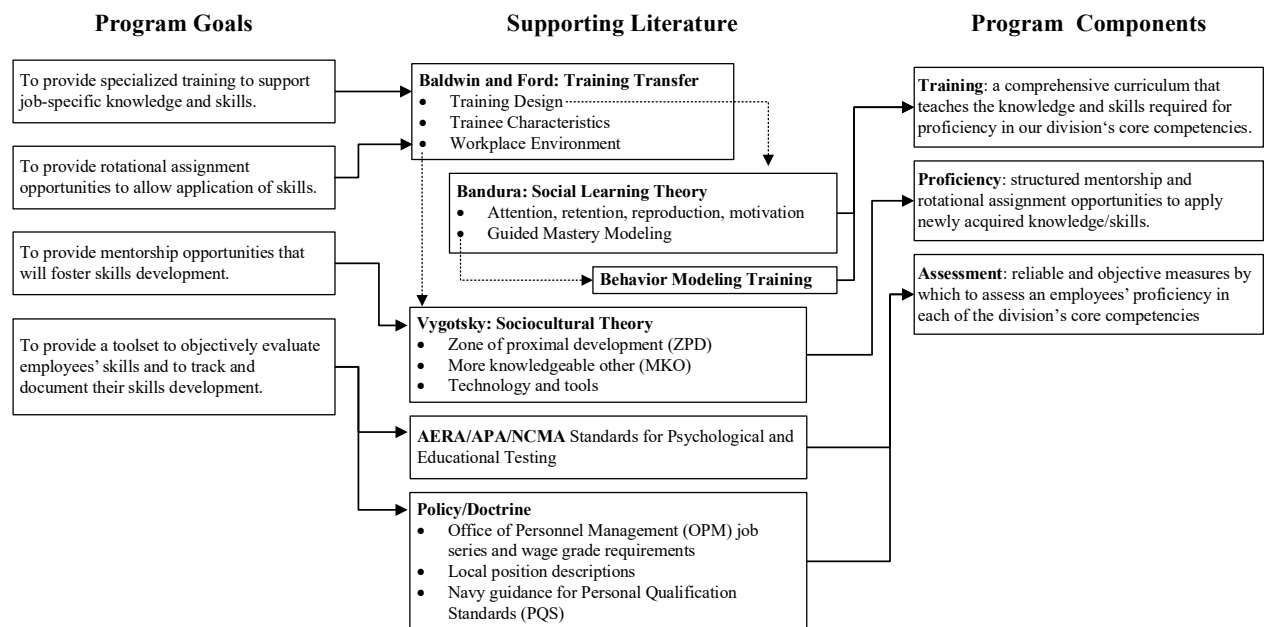


Figure 4. Links between program goals, supporting literature, and program components.

Based on the program goals—and supported by the review of literature—I designed a PD program that contains three components:

- **Assessment:** tools to evaluate employees’ knowledge and skill level (i.e., novice, journeyman, and expert) in each of the division’s core competencies (i.e., analysis, design, evaluation, and acquisition).
- **Training:** a comprehensive curriculum that teaches the knowledge and skills required for proficiency in the division’s core competencies.
- **Proficiency:** structured mentorship and rotational assignment opportunities to apply newly acquired knowledge/skills.

The following sub-sections provide a more detailed description of each of these components, including how the literature supports each of these design components.

#### Assessment

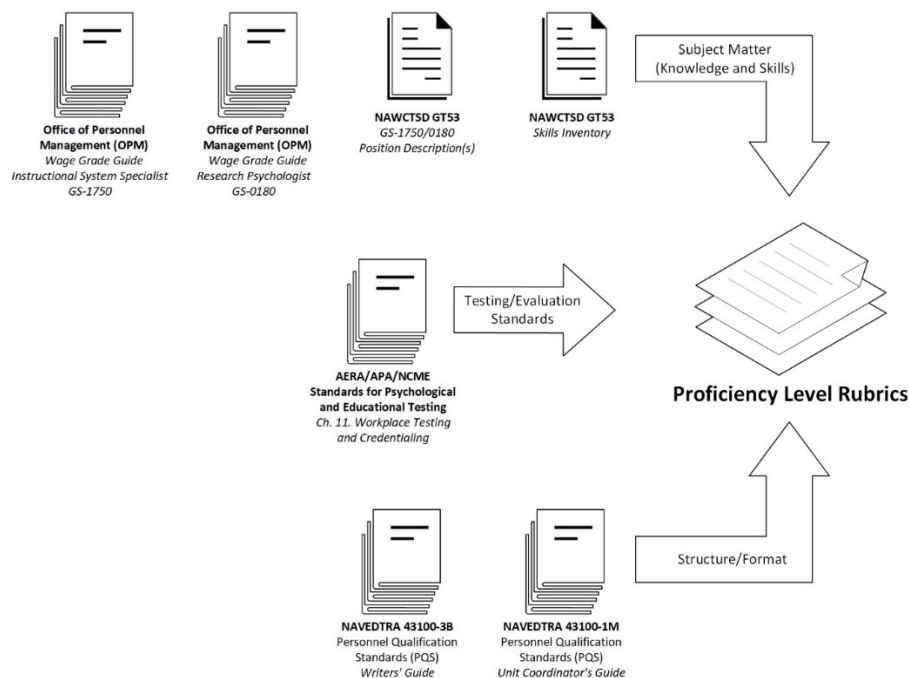
The assessment component is intended to satisfy the goal of providing managers and employees a toolset to objectively evaluate employees’ skills and to track and document the employees’ skills development. To implement this component, I developed a set of rubric-style instruments which I have labeled the Proficiency Level Rubrics (PLRs). A summary listing of the PLR collection is presented in Table 2.

**Table 2.**

*Listing of the Proficiency Level Rubric (PLR) Collection*

	<b>Analysis</b>	<b>Design</b>	<b>Evaluation</b>	<b>Acquisition</b>
<b>Novice</b>	Analysis Novice	Design Novice	Evaluation Novice	Acquisition Novice
<b>Journeyman</b>	Analysis Journeyman	Design Journeyman	Evaluation Journeyman	Acquisition Journeyman
<b>Expert</b>	Analysis Expert	Design Expert	Evaluation Expert	Acquisition Expert

I developed the PLRs based on a fairly wide selection of references, each selected for a specific purpose. The subject matter of each PLR, that is, the knowledge and skills assessed with each PLR, was determined by the OPM wage grade guides, local position descriptions, and the skill statements used for the pilot study skills inventory. The AERA/APA/NCME standards informed the testing and evaluation strategies. Finally, the Navy's PQS writers' guide and unit coordinator's guide informed the structure and format of the PLRs. The source documents and their relationship with the PLRs is depicted in Figure 5.



*Figure 5. Proficiency Level Rubric development based on a variety of references.*

I developed these PLRs following the format and structure of the Navy's Personnel Qualification Standard (PQS), as this is a format that is familiar to many employees in the division. The PQS format begins with a listing of both the general and specialized knowledge required for qualification. Signatures from designated personnel indicate the employee has successfully demonstrated the minimum level of knowledge of each topic through discussion and

interviews. Another section lists the skills required for qualification, and again, signatures from designated personnel indicate that the employee has successfully demonstrated proficiency in each of these skills. The PQS typically includes a final authoritative interview or a certification board conducted by a panel of experts. In this regard, the structure and content of such assessment measures was informed by the AERA/APA/NCME testing standards.

The AERA/APA/NCME Standards (2014) provide guidance for credentialing, where credentialing is described as determining if an employee has specific knowledge and skills required for a particular assignment. The Standards note that “credentialing focuses on an applicant’s current skill or competence in a specified domain” (p. 169). The Standards also note that “credentialing programs may exist at various levels, from novice to expert in a given field” (p. 169). This aligns with my design of the PLRs specific to the 4 domains of core competencies, at 3 levels of proficiency from novice to expert. The Standards also note that expert panels are often used for credentialing, a point that supports my use of expert panels as the final certifying authority for the senior-most PLRs. Finally, the Standards note that “The credentialing process may include testing and other requirements, such as education or supervised experiences” (p. 169). For all of these reasons, I believe the standards for workplace credentialing are quite applicable to the program as designed.

With regard to workplace testing, the APA/AERA/NCME Standards (2014) provide a selection of 16 standards, some of which apply only to employment testing (for hiring and promotion), some of which apply specifically to credentialing (as previously described), and some of which apply to both employment testing and credentialing. Credentialing standards dictate that the domain areas be clearly defined and justified. The standards direct that a rationale and evidence be provided to justify that the knowledge and skills being assessed are require for

the occupational performance. This evidence was provided by the OPM wage grade guides, local position descriptions, and the skill statements in the pilot study skills inventory, as they inform the content of the PLRs. The OPM wage grade guides describe, for each GS level (i.e., GS-12, GS-13, and GS-14) and for each job series (i.e., Instructional System Specialist and Research Psychologist) the appropriate nature of the assignment, the expected level of responsibility, and examples of suitable tasking. The local position descriptions are similarly aligned by both GS level and job series. Each position description includes a detailed description of the major duties of the position, knowledge required of the incumbent, the level of supervisory control, and the complexity, scope and effect of the assignment. The process I followed to derive knowledge and skill requirements from these references is detailed in the *Artifact Development* sub-section.

### Training

The training component of the PD program satisfies the second purpose of this dissertation in practice: To provide specialized training to support job-specific knowledge and skills. To satisfy this component, I developed a Curriculum Design Plan (CDP). The CDP defines the Learning Objectives (LOs) to be included in the curriculum. In addition to LOs, the CDP defines an assessment type and instructional strategy for each LO. Traceability between key points in the supporting literature, the training component of the PD program, and the resulting artifact is depicted in Figure 6.

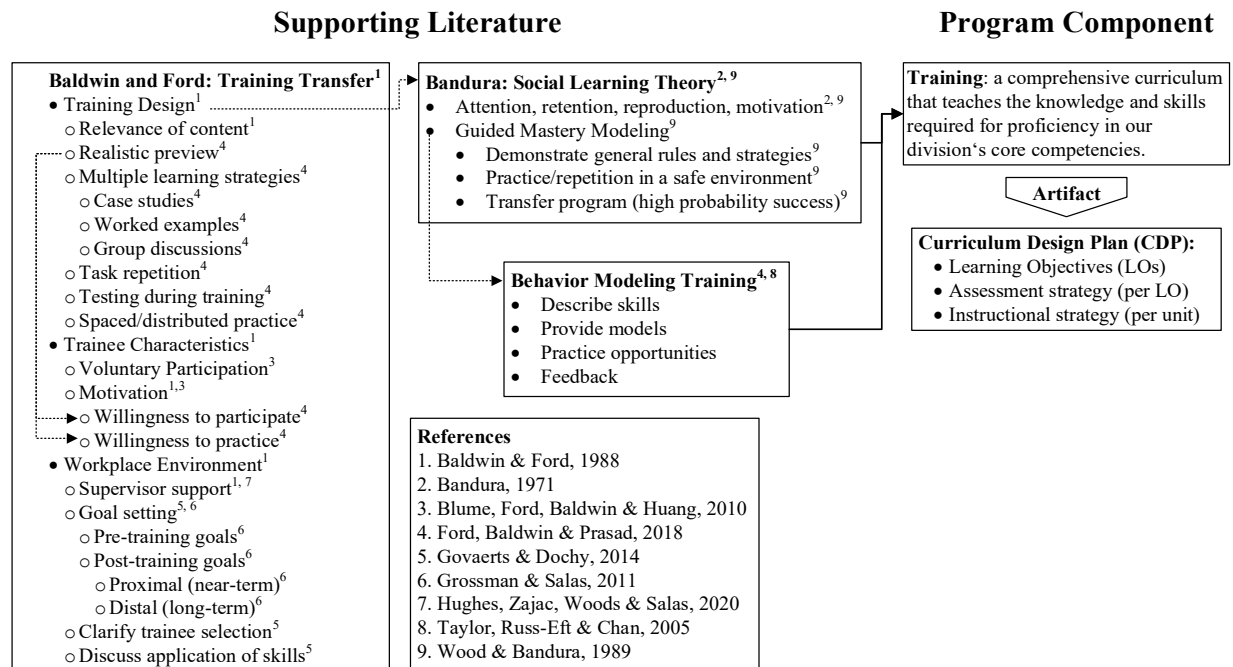


Figure 6. The training curriculum is based on the supporting literature.

The CDP employs instructional strategies and assessment strategies that leverage the key points of the supporting literature. For example, each lesson should include at least one case study selected from actual division projects, as well as a relevant worked example and group discussions. The assessment strategies include testing during the training, which may be presented as spaced or distributed practice. Instructional activities that support skills development are described in the instructional strategies section of the CDP, and they are designed based on Behavior Modeling Training. Each activity will include a description of the skills to be learned. This may be presented as a case study. The instructor will model the skill in a worked example, after which students will have an opportunity to apply the skill in a similar example. Finally, students will receive two forms of feedback on their work: group discussions and instructor feedback.

Additional measures are in place to further encourage transfer. Participation in the program (and any associated training) is strictly voluntary, with supervisors providing a realistic

preview of the training, a discussion of how the skills presented in training apply to the workplace, and clarification as to how trainees are selected to participate in the training. At the completion of each training event, supervisors will assist employees in establishing proximal and distal training goals.

### Proficiency

This program has two related goals—to provide rotational assignment opportunities that will allow application of learned skills, and to provide mentorship opportunities that will foster skills development. Both of these goals are intended to help employees attain and maintain proficiency in the division’s core competencies. To reach these goals, I propose implementing a structured program of rotational assignments and mentorship agreements. Employees will be assigned projects and tasking based on the proficiency goal(s) to which they aspire. To assist in reaching these goals, the employee will be paired with a mentor who has already reached or exceeded the target proficiency level for the given domain. The policies, procedures, and methods to implement this structured mentorship are defined by a Policy Manual.

The Policy Manual prescribes many of the characteristics of the workplace environment that have been identified in the literature as having a positive influence on transfer. These practices are identified in Table 3. For example, supervisors will be asked to provide a variety of work tasks while adjusting the employee’s workload to allow sufficient time to practice. The Policy Manual prescribes that supervisors monitor the employee’s application of the newly learned skills, while advising that supervisors demonstrate tolerance if the employee makes mistakes. Supervisors will be expected to provide feedback, recognition, and rewards for employees in a rotational assignment. The employees, for their part, will observe their peers using the trained skills during their rotational assignments. As they begin to apply the learned



skills, they will receive coaching and feedback from their peers. All of these behaviors and activities will be codified in a mentorship agreement between the employee, his or her mentor, and the supervisor.

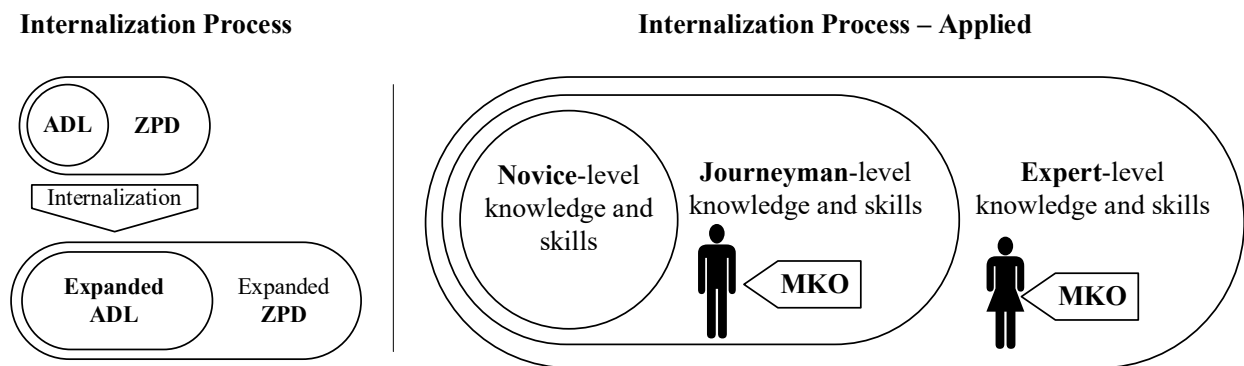
**Table 3.**

*Workplace Environment Characteristics that Encourage Transfer, and Associated References.*

<b>Feature</b>	<b>Reference</b>
<b>Peer support</b>	Baldwin & Ford, 1988. Hughes, Zajac, Woods & Salas, 2020
Networking	Grossman & Salas, 2011
Idea sharing	Grossman & Salas, 2011
Observing peers using skills	Grossman & Salas, 2011
Peers coaching peers	Grossman & Salas, 2011
Feedback from peers	Grossman & Salas, 2011
<b>Supervisor support</b>	Baldwin & Ford, 1988. Hughes, Zajac, Woods & Salas, 2020
Behavior modeling	Govaerts & Dochy, 2014. Grossman & Salas, 2011
Providing feedback	Govaerts & Dochy, 2014. Grossman & Salas, 2011
Providing recognition	Grossman & Salas, 2011
Providing rewards	Govaerts & Dochy, 2014. Grossman & Salas, 2011
Monitoring application of skills	Govaerts & Dochy, 2014
Mistake tolerance	Govaerts & Dochy, 2014
<b>Opportunities to perform</b>	Baldwin & Ford, 1988. Ford, Baldwin & Prasad, 2018
Allowing sufficient time	Grossman & Salas, 2011
Adjusting workload	Grossman & Salas, 2011
Providing a variety of work tasks	Tonhäuser and Büker, 2016

The primary purpose of providing rotational assignments is to provide opportunities to perform, as prescribed by Baldwin and Ford's training transfer model. Concurrently, the purpose

of arranging a mentorship relationship is to apply Vygotsky’s sociocultural theory to expand the employee’s knowledge and skills. Recall from Figure 3 (in Chapter 2) that, through the process of internalization, the student’s actual development level (that is, what the student knows and can accomplish independently) is expanded to include the newly acquired knowledge and skills. When this happens, the student’s ZPD (that is, what he or she is capable of learning with the support of a more knowledgeable other) expands as well to allow for further growth. This is illustrated on the left side of Figure 7. The design of the rotational assignments and mentorship is to apply that process of internalization, as depicted on the right side of Figure 7.



*Figure 7. The ADL is expanded to encompass the ZPD via the process of internalization.*

An employee begins at the novice level, where the expert-level knowledge and skills represent his or her ADL while the journeyman-level knowledge and skills occupy the novice’s ZPD. But, under the guidance of the MKO (i.e., the assigned mentor) the novice will gradually internalize the body of journeyman-level knowledge and skills until they represent his or her newly expanded ADL. At that point, the employee is ready to be assessed as a journeyman in that domain and, if willing, to begin the process again toward becoming an expert. Through this process, and supported by effective training curriculum, an employee may progressively develop his or her skills in any—or all—of the division’s core competencies.

## Synthesis of Assessment, Training, and Proficiency

These three components—assessment, training, and proficiency—form a cohesive program depicted in

Figure 8. Employees are at the center of the program, with the hexagon depicting the relationships between the employees and their managers, instructors, and mentors. Managers and employees can, together or independently, assess an employee's current knowledge and skill level. Depending on the employee's goals, he or she can enroll in targeted training modules where instructors teach the knowledge and skills required for proficiency in the division's core competencies. After training, the employee is assigned to a rotational assignment where a mentor helps the employee to attain proficiency in the chosen domain. At the completion of the rotational assignment, the employee can again be assessed, this time at the next highest proficiency level. Employees may choose to pursue mastery in one or several domains and, depending on the nature of the assignment, may pursue several domains at once.

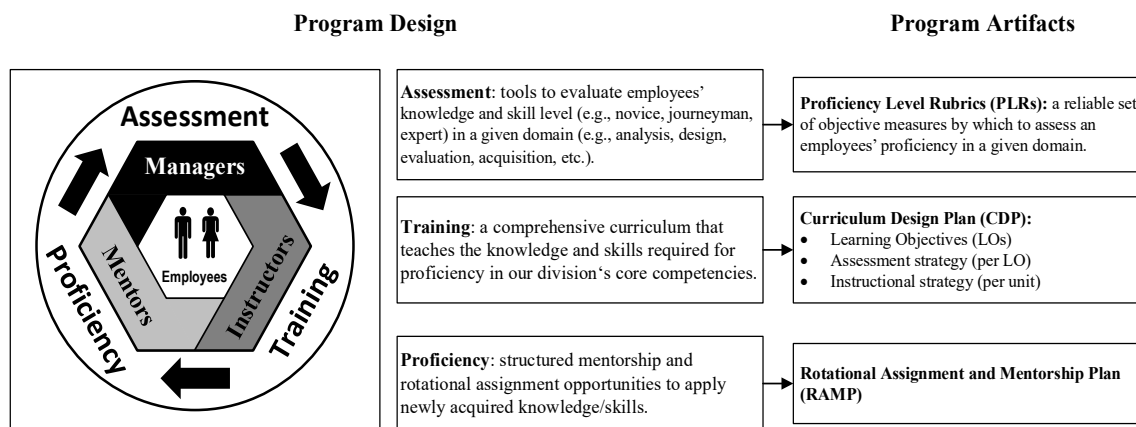


Figure 8. Infographic of program design with linkage to program artifacts.

The design presented in this section represents the conceptual framework of a PD program for the employees of NAWCTSD GT53. A detailed roadmap of the program design is provided in Figure 9.

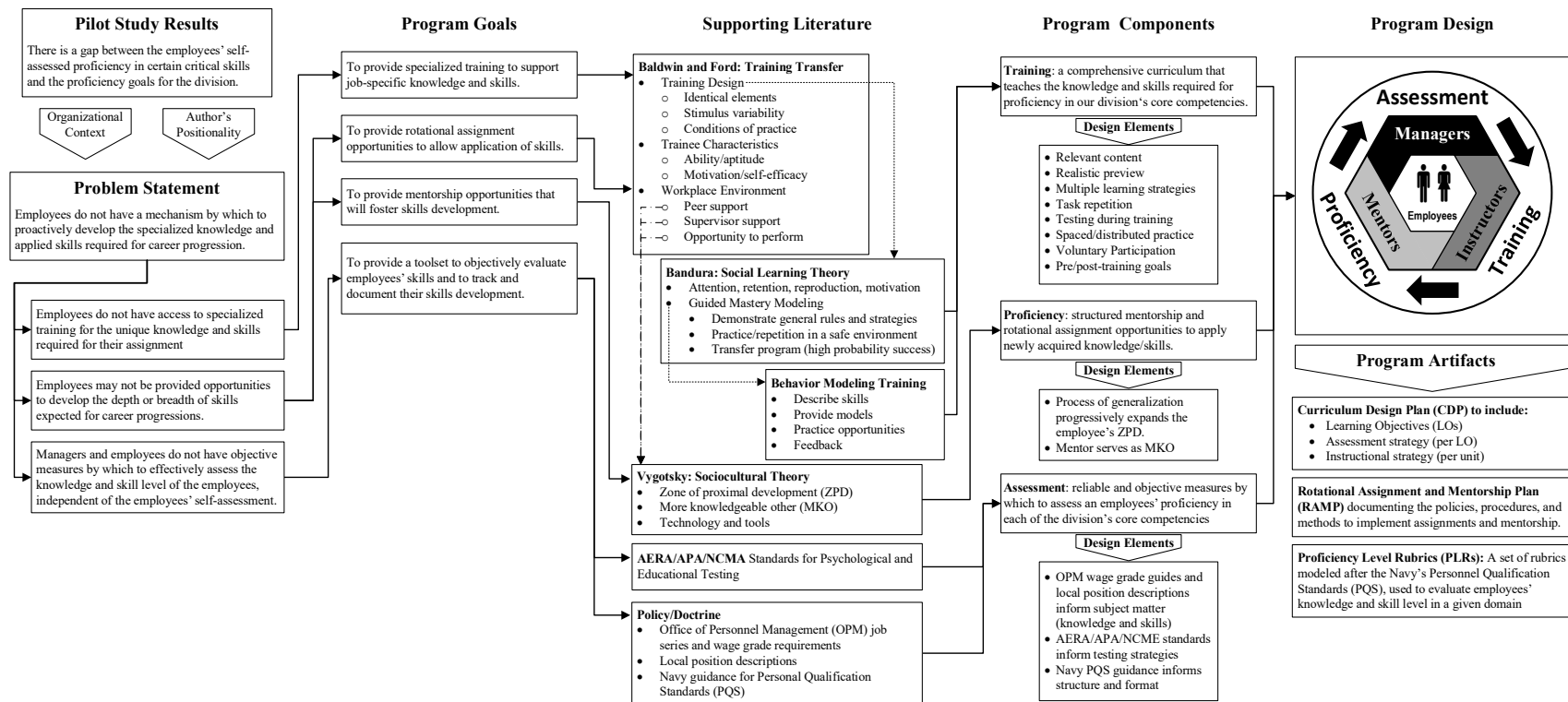


Figure 9. Detailed traceability from the pilot study results to program design.

### Artifact Development

I began my artifact development by conducting a detailed analysis of the instructional system specialist and research psychologist job series. The purpose of this analysis was to derive the knowledge and skills required for job proficiency. These knowledge and skill elements would directly serve as the assessment criteria for the Proficiency Level Rubrics. They would also indirectly serve as the basis of the learning objectives, defining the content of the curriculum design plan. Since my first goal was to determine employee assessment criteria, I consulted the Standards for educational and psychological testing (AERA/APA/NCME, 2014) as illustrated earlier, in Figure 5

The AERA/APA/NCME Standards (2014) describe employment testing for a variety of purposes—including placement and credentialing—both of which are relevant to the design of the PLRs. Employment testing for the purpose of placement, which refers to decisions regarding where to assign an individual within an organization, will be relevant to the use of the PLRs as they may inform decisions for rotational assignments. In addition, the *Standards* describe testing for the purpose of credentialing, which is the process of determining an employee's skill or competence in a given domain. This rationale for testing is specifically and appropriately aligned with the intent of the PLRs. The *Standards* point out that credentialing is usually voluntary and can take place at any level from novice to expert, which aligns to the design of the PLRs. The *Standards* also note that credentialing may include testing as well as supervised work experiences, the former being relevant to the design of the PLRs, and the latter being relevant to the eventual goal of PLRs informing rotational assignments.

The *Standards* prescribe validation of employment testing by ensuring traceability between the measures of job performance used in testing and the behaviors that an employee is

expected to exhibit on the job. Various possible paths of traceability are depicted in Figure 10 . The diagram differentiates between predictors on the left half of the diagram, and criteria on the right half, with predictors being those skills and abilities that are evaluated in the testing environment and criteria being those behaviors exhibited on the job. The diagram also differentiates between construct domains on the bottom half of the diagram, which are groups or categories of skills or behaviors, and individual measures on the top of the diagram.

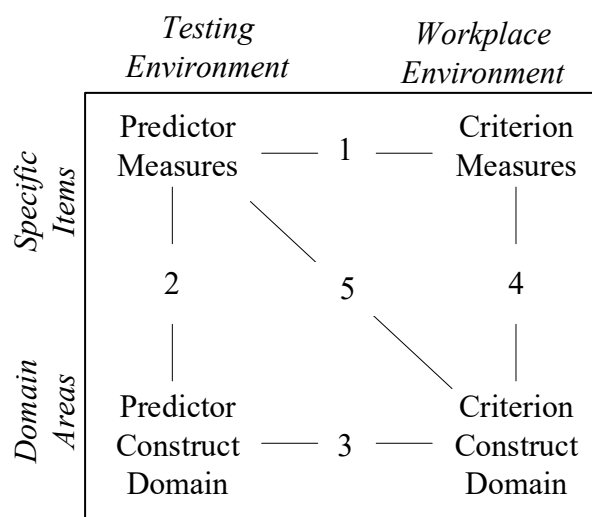


Figure 10. Traceability between Criterion and Predictor Construct Domains and Measures.

Note: Adapted from *Standards for Educational and Psychological Testing* (p. 172) by the American Educational Research Association, 2014, Washington, DC: AERA. Copyright 2014 by the AERA/APA/NCME.

The *Standards* explain the various relationships between predictors and criteria, and between construct domains and measures, each of which is depicted by a numbered line. For example, lines 2 and 4 illustrate how a single measure, whether predictor or criterion, should be linked to an associated domain area. This linkage, according to the *Standards*, can be verified by “logical analysis, expert judgement, and convergence with or divergence from conceptually similar or different measures” (p 172). Similarly, the *Standards* explain how the relationship

between the Criterion Construct Domain and the Predictor Construct Domain (line 3) can be inferred logically based on expert judgement and a systematic analysis of the job (AERA/APA/NCME, 2014).

I followed the guidance offered by the *Standards* to ensure that my Predictor Measures are linked to Criterion Measures and/or the Criterion Construct Domain. In other words, my intent was to ensure that the skills and tasks that I list on my PLRs are based on authentic performance tasks and the core competencies of the GT53 division. But in order to consider these linkages as described by the *Standards*, I found it helpful to expand the diagram offered by the *Standards* to encompass my own construct of core competencies, job duties and tasks, and the structure and content of the PLRs. This expanded construct is depicted in Figure 11 .

The category of Predictor Measures, i.e., specific items to be evaluated in the testing environment, I have labeled as PLR Tasks. These are the specific performance tasks that are listed in the PLRs for which the employees will be certified. The Criterion Measures, i.e., specific behaviors to be exhibited in the work environment, I have labeled as job duties and tasks. Subsequent sections describe my process for deriving these job duties and tasks in detail. The Criterion Construct Domain, i.e., the domain areas of the workplace environment, I have labeled as Core Competencies. These are the core competency domains of the GT53 Division, namely, Analysis, Design, Evaluation, and Acquisition. Finally, the Predictor Construct Domain, i.e., the domain areas as organized in the testing environment, I have labeled PLR Structure. This label refers to the PLRs being constructed according to the core competency domains (Analysis, Design, Evaluation, Acquisition) at three proficiency levels (Novice, Journeyman, Expert).

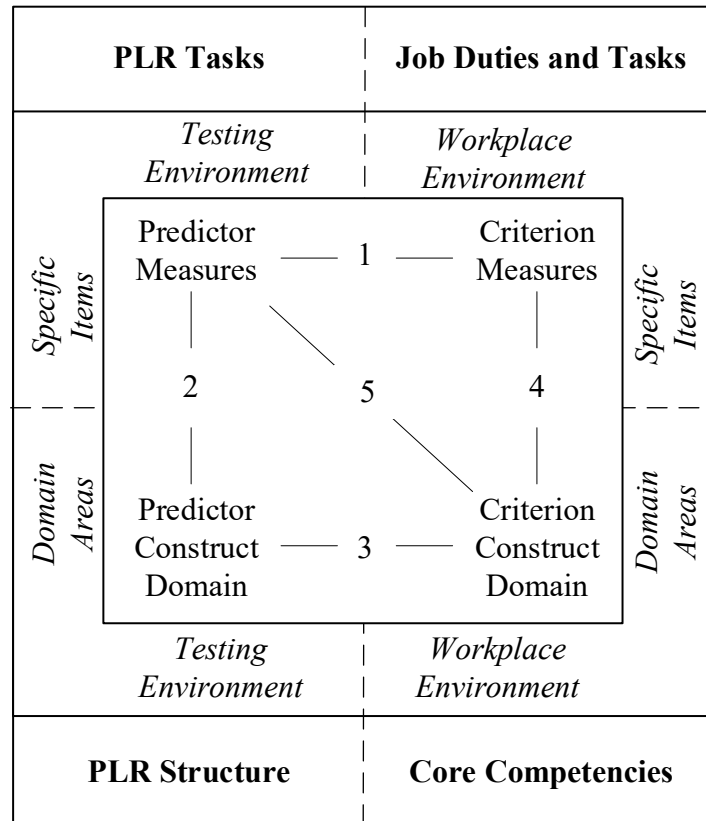


Figure 11. Traceability strategies applied to core competencies, tasks, and the PLRs.

Note. Adapted from *Standards for Educational and Psychological Testing* (p. 172) by the American Educational Research Association, 2014, Washington, DC: AERA. Copyright 2014 by the AERA/APA/NCME.

With this expanded diagram, I can now trace the links prescribed by the Standards as they apply to my program design. Principally, the predictor measures (i.e., PLR tasks) are based on the duties and tasks required on the job, as depicted by link 1. Similarly, the job duties and tasks (i.e., Criterion Measures) were derived from the Core Competencies (i.e., Criterion Construct Domain) and, conversely, the core Competencies inform the job duties and tasks, as depicted by link 4. Finally, the construct of my PLRs (i.e., the Predictor Construct Domain) is based on the Core Competencies of the division (i.e., the Criterion Construct Domain) as depicted by link 3.



The validation process prescribed by the *Standards* requires a fair degree of analysis. Indeed, the *Standards* prescribe that employment testing validation should begin with a job analysis to derive a body of information about the job, duties, tasks, and other relevant information. The *Standards* provide additional guidance in the section of *Standards for Workplace Testing and Credentialing* (p. 178 – 182) to confirm this requirement.

**Standard 11.2.** Evidence of validity based on test content requires a thorough and explicit definition of the content domain of interest.

**Standard 11.3.** When test content is a primary source of validity evidence in support of the interpretation for the use of a test for employment decisions or credentialing, a close link between test content and the job or professional/occupational requirements should be demonstrated. (AERA/APA/NCME, 2014, p. 178)

To summarize, the AERA/APA/NCME Standards for Educational and Psychological Testing prescribes a strategy for ensuring validity between test items and the workplace behaviors that the test items are intended to represent. This validation can be shown through a collection of traceability paths or linkages. But implementing this strategy requires a detailed definition of the content domain which is developed by conducting a comprehensive job analysis.

For guidance on how to conduct such an analysis I referred to the *Handbook: Instructional Systems Development/Systems Approach to Training and Education (Part 2 of 5 Parts)* (MIL-HDBK-29612-2A) (U.S. Department of Defense, 2001), commonly referred to as the *ISD/SAT Manual*. This manual provides guidance to Department of Defense (DoD) personnel for conducting a wide variety of analyses, including training situation analyses, educational requirements analyses, occupational analyses, mission analyses, job analyses, and task analyses.

The *ISD/SAT Manual* acknowledges that the ultimate purpose of these analyses is to identify critical tasks required for training, as well as to identify the standards, conditions, and performance measures for each of those tasks. This supports my intent to use the results of the analysis not only as the basis for the PLR items, but as the foundation of the Learning Objectives for the Curriculum Design Plan.

The handbook also notes that the nature and scope of the project should determine which of the various analyses need to be conducted. Accordingly, I chose to omit the training situation analysis, which is used to evaluate an existing training curriculum. I also omitted the educational requirements analysis, as the educational requirements for the subject positions had already been established. And I omitted the Mission Analysis, as it focuses on identifying and documenting the mission requirements of an operational military unit. These omissions left three types of analyses to perform: occupational analysis, job analysis, and task analysis. It is notable that the guidance for conducting an occupational analysis is extremely brief, noting that the process for an occupational analysis is the same as that for a task analysis, and referring the reader to the section on task analysis.

This left two types of analysis for consideration, a job analysis and a task analysis. While these are often conducted jointly and referred to as a Job/Task Analysis or JTA, the *ISD/SAT Manual* differentiates between the two. The *ISD/SAT manual* defines a job analysis as a method of listing all of the tasks necessary to perform a specific job or duty, while it defines a task analysis as the process of detailing how each task is performed, under what conditions each task is performed, and how well the individual must perform each task. I believe this aligns well with the *AERA Standards* direction to begin with a job analysis. Therefore, I began the process of conducting a job analysis by analyzing and synthesizing various references that define the job

requirements, including the Office of Personnel Management (OPM) grade level guides, local position descriptions, and the skills inventory instrument used in the pilot study.

### Analysis and Synthesis of OPM Grade Level Guides

Two OPM documents inform the level of responsibility for the subject positions:

1. Grade Level Guide for Instructional Work (U. S. Office of Personnel Management, 1989), which applies to the 1750 series.
2. Research Grade Evaluation Guide (U. S. Office of Personnel Management, 2006), which applies to the 0180 series.

I initially started with a document called the Position Classification Standard for Psychology Series, GS-0180 (U. S. Office of Personnel Management, 1968). It follows the same format as the grade level guide for the 1750 series, and it seemed best suited to yield comparable classification levels. However, on further analysis, I discovered that this document only applies to clinical and counseling psychologists, whereas psychologist employees withing GT53 are classified as research psychologists. The Position Classification Standard for Psychology Series differentiates between research and non-research positions (p. 7) and refers the reader to the Research Grade Evaluation guide for research positions.

Each of the references defines grade level differently. For GS-1750, the grade level guide (OPM, 1989) clearly defines expectations at the GS-05 through the GS-14 level. For each GS level, the grade level guide describes the level of responsibility expected at the associated level, and the nature of the assignment that would be appropriate at each grade level. However, for the 0180 series, the process is a bit more complicated. The Research Grade Evaluation Guide (OPM, 2006) describes four different factors (e.g., nature of the assignment, level of supervisory controls, etc.) and then describes three levels of complexity or responsibility for each factor. The

guide provides instructions for assigning point values for each level and factor, and the combined point values determine the appropriate GS grade level, from GS-11 through GS-15. I did not use the point system described in the grade evaluation guide because I was not specifically trying to grade a position. Rather, my intent was to generally align the expectations for entry-level, mid-level, and senior-level employees in the GT53 division. Therefore, I determined that the three levels described in the grade evaluation guide provided adequate structure for a preliminary analysis, subject to validation in this study. For the 1750 series, I compared characteristics from the GS-12 series through the GS-14 series, corresponding to the three levels of Instructional System Specialist positions held by GT53 employees.

To analyze the two documents, I first extracted the descriptions of each level and put them side-by-side in tables so I could compare them simultaneously. These tables are provided as Table 4 through Table 9. This process helped me identify differences across levels in each document. In some instances, I was able to locate parallel language structures across each level in a given section, and I used that parallel structure to highlight the progression from the lowest level to the highest level. In other cases, where the descriptions were not written in parallel structures, I simply compared each level to the next highest, identifying and noting differences in theme and meaning. Both methods helped clarify the differences between each level of seniority.

Finally, to synthesize the two OPM documents, I looked for common language or shared themes between the two documents at each level. I documented the themes for each of the three levels, associated as entry-level, intermediate-level, and senior-level. The results of this step are presented in Table 10 through Table 12.

**Table 4.**

*Nature of Assignment for GS-1750 Series, Instructional System Specialist*

GS-1750-12	GS-1750-13	GS-1750-14
<p>Employees establish instructional design, development, or evaluative criteria through the analysis of educational or instructional problems or questions. Assignments may be in a functional specialty area of education and training (e.g., instructor development), in a subject-matter area (e.g., advanced electronics), or may involve a grouping of courses. Assignments sometimes cut across a variety of specialty areas in education and training for a given organization, geographic area, or program area.</p> <p>Assignments are characterized by complicating factors, such as changing situations or educational developments in the field that outdated established guideline material, or the need to pull together two different but partially related fields (e.g., the field of engineering and the field of electricity/ electronics), that requires the employee to have knowledge of more than one field. Employees at this level often deal with matters that are controversial, unconventional, or novel. Assignments frequently require substantial adaptations or extensions of available guides and established procedures or, in some instances, the development of new approaches, methods, or techniques for specific applications.</p> <p><b>Key discriminators:</b></p> <ul style="list-style-type: none"> <li>Conduct ISD analysis, design, development, evaluation</li> <li>Deal with changing situations</li> <li>Deal with unconventional, novel matters</li> <li>May adapt existing guides</li> <li>May establish new procedures or methods</li> </ul>	<p>At this level, instructional specialists are recognized as authoritative consultants who plan and develop experimental programs, evaluate results, and use the findings in planning, developing, and installing new or modified programs. Assignments often involve program innovations or modifications that result in the need to provide training to staff who will be using the new programs or products. Troubleshooting duties frequently require providing problem-solving assistance to, and technical review and leadership over, other employees or other facets of the agency's, or major military command's, education, and training organization.</p> <p>Employees at this level resolve matters that are often controversial, complicated, or set general precedent; involve coordinating or negotiating matters of considerable consequence; or affect prominent and fundamental policy issues in the subject-matter field. Assignments typically require the development and application of new program methods, approaches, and technology. The employee's conclusions, recommendations, or determinations may result in setting official policy or obligating substantial program resources.</p> <p><b>Key discriminators:</b></p> <ul style="list-style-type: none"> <li>Recognized as authoritative consultants</li> <li>Provide problem-solving assistance, technical review and leadership to others</li> <li>Resolve complicated, controversial matters</li> <li>Coordinate or negotiate matters of considerable consequence</li> <li>Conclusions and recommendations result in setting official policy or obligating substantial program resources</li> </ul>	<p>Instructional specialists at this level typically provide leadership, advice, and guidance throughout their organizations and serve in key staff positions, such as a specialist at agency or major military command headquarters, or in a generalist capacity as top educator in a technical service school. They anticipate changes or new developments in the technology or in the educational field affecting their specialty areas and program operations. They develop advance plans to insure timely introduction of new or revised procedures, techniques, or operational concepts into the training program. They conceive, develop, and introduce new program objectives, goals, systems, and concepts. They propose new performance standards and evaluate ways and means of obtaining objectives. They design evaluation and quality control means to measure the effectiveness of program concepts or techniques. They use these means to determine if progress is being made toward attainment of program objectives and the necessity for program expansion, contraction, or revision, in view of current and anticipated needs.</p> <p><b>Key discriminators:</b></p> <ul style="list-style-type: none"> <li>Provide leadership, advice, and guidance to the organization</li> <li>Anticipate changes, new developments, develop advance plans</li> <li>Conceive, develop, and introduce new programs and systems</li> </ul>

*Note:* Adapted from U. S. Office of Personnel Management (OPM). (1989). *Grade level guide for instructional work*. Retrieved from <https://www.opm.gov/policy-data-oversight/classification-qualifications/classifying-general-schedule-positions/functional-guides/gsinstwk.pdf>

**Table 5.**

*Level of Responsibility for GS-1750 Series, Instructional System Specialist*

GS-1750-12	GS-1750-13	GS-1750-14
<p>Assignments may be made on a project or continuing basis; or they may be self-initiated on the basis of apparent need, in which case the supervisor is consulted for approval. Employees are relied upon to perform services, develop products, and take actions that are technically sound and valid. Supervisory review of completed work is primarily to determine general effectiveness and consistency with the educational philosophy and objectives of the program and with the policies of the organization.</p> <p>The products and services of work at this level affect a considerable number and variety of users (e.g., teachers in the elementary and secondary schools of a geographic area, instructors in a large technical service school that gives a wide variety of courses at various levels of complexity, or students in a large number of schools).</p>	<p>Specialists at this level typically ascertain the need for and generate surveys and studies. Supervisory review of initial plans is primarily to assess priorities, the feasibility of program and project proposals, and the availability of budget and other resources. Employees independently carry projects through to their conclusion. Completed work products are relied upon for soundness, accuracy, and adequacy of technical detail, and are normally not reviewed for such purposes. Review of work performance at this level is primarily for accomplishment of project and program objectives; for consistency with agency, or major military command, policies, philosophy, and goals; and for the quality of contributions to education and training programs.</p> <p>To stay abreast of developments within their specialty area, GS-13 specialists establish and maintain professional contacts with leading practitioners, researchers, and others in education and training institutions, research organizations, and industry. Work projects typically have a significant impact on a broad segment of the staff and student body in the education and training program that is evident throughout the agency or major military command. Products may radically change the training content, or the education and training techniques and methods used in the teaching of certain subjects to specific segments of the student population.</p>	<p>Instructional specialists at this level generate most of their own work and independently plan, organize, and carry out their studies. Their plans and proposals for major changes and/or new projects and programs are reviewed for priority, budget limitations, and for consistency with the broad objectives and policies of the organization. Review of their completed work is to assess degree of success in accomplishing objectives. The work has broad impact on a large number of education and training staff and students, usually in a service-wide technical training program or in an agency's or major military command's entire education and training program.</p>
<p><b>Key discriminators:</b></p> <ul style="list-style-type: none"> <li>Employees demonstrates technical competence</li> <li>Supervisor reviews their work to ensure it is sound</li> </ul>	<p><b>Key discriminators:</b></p> <ul style="list-style-type: none"> <li>Employees carry out work independently through to conclusion</li> <li>Supervisor reviews initial plans and completed work to for technical soundness</li> </ul>	<p><b>Key discriminators:</b></p> <ul style="list-style-type: none"> <li>Generate independently plan, organize, and carry out their own work</li> <li>Work is reviewed to ensure it complies with organizational policies</li> </ul>

*Note:* Adapted from U. S. Office of Personnel Management (OPM). (1989). *Grade level guide for instructional work*. Retrieved from <https://www.opm.gov/policy-data-oversight/classification-qualifications/classifying-general-schedule-positions/functional-guides/gsinstwk.pdf>

**Table 6.**

*Comparison of GS-0180 (Research Psychologist) Complexity Levels for Factor 1: Research Assignment*

Level A	Level C	Level E
<p>Research assignments have the following characteristics:</p> <ul style="list-style-type: none"> <li>• readily definable objectives;</li> <li>• limited in scope to investigating specific phenomena or problems, or are segments of related investigations;</li> <li>• require fairly conventional techniques;</li> <li>• involve applying existing theory or methods to areas previously investigated, but under different conditions, or involve adapting previous studies in light of changes in theory or improved techniques and instrumentation; and</li> <li>• result in contributions that add to scientific and professional knowledge or support developing new or improved methods and techniques.</li> </ul> <p>The researcher typically works as a project or team member.</p>	<p>Research assignments have the following characteristics:</p> <ul style="list-style-type: none"> <li>• the scope is broad and complex, requiring a series of comprehensive and conceptually related phases and studies;</li> <li>• problems are difficult to define;</li> <li>• require sophisticated research techniques; and</li> <li>• result in contributions that: <ul style="list-style-type: none"> <li>▪ answer important questions in the field;</li> <li>▪ account for previously unexplained phenomena;</li> <li>▪ open significant new avenues for further study;</li> <li>▪ confirm or modify a scientific theory or methodology;</li> <li>▪ lead to important changes in existing products, methods, techniques, processes, or practices; or</li> <li>▪ are definitive of a specific topic area.</li> </ul> </li> </ul> <p>The researcher typically works as a project member or as a primary investigator.</p>	<p>Research assignments have the following characteristics:</p> <ul style="list-style-type: none"> <li>• the scope and complexity are at a level requiring subdivision into separate phases, some of which are considerably broad and complex;</li> <li>• problems are exceptionally difficult and unyielding to investigation;</li> <li>• require unconventional or novel approaches or complex research techniques; and</li> <li>• results may include: <ul style="list-style-type: none"> <li>▪ a major advance or opening of the way for extensive related development;</li> <li>▪ progress in areas of exceptional interest to the scientific and professional community;</li> <li>▪ important changes in theories, methods, and techniques;</li> <li>▪ opening significant new avenues for further study; or</li> <li>▪ contributions answering important questions in the field.</li> </ul> </li> </ul> <p>The researcher typically works as a primary investigator but may also be a project member.</p>
<p><b>Key discriminators:</b></p> <p>Limited scope, readily definable</p> <p>Conventional techniques, applying existing methods</p> <p>Acts as team member</p>	<p><b>Key discriminators:</b></p> <p>Broad, complex scope</p> <p>Changes to existing methods/techniques</p> <p>Acts as team member or lead (PI)</p>	<p><b>Key discriminators:</b></p> <p>Subdivided into phases corresponding to level C</p> <p>Unconventional techniques, novel approach/methods</p> <p>Acts as lead (PI)</p>

*Note:* Adapted from U. S. Office of Personnel Management (OPM). (2006). *Research grade evaluation guide*. Retrieved from <https://www.opm.gov/policy-data-oversight/classification-qualifications/classifying-general-schedule-positions/functional-guides/gresch.pdf>

**Table 7.**

*Comparison of GS-0180 (Research Psychologist) Complexity Levels for Factor 2: Supervisory Controls*

<b>Level A</b>	<b>Level C</b>	<b>Level E</b>
<p>The supervisor typically assigns specific problems along with general instructions on the scope and objectives of the study. The supervisor or higher management makes any decisions to discontinue work, change emphasis, or change the research plan, and undertake them after receiving supervisory approval. The supervisor reviews work for adequacy of method, completeness, and appropriate interpretation of results.</p> <p>The researcher confers with the supervisor regarding problem definition, the relationship of the problem to the organization's broader research goals and developing a research plan.</p> <p>Supervisory or managerial direction and guidance help the researcher in the critical problem definition and planning stages, but do not negate the researcher's responsibility for adequately completing these steps.</p> <p>The researcher is expected to:</p> <ul style="list-style-type: none"> <li>• assume responsibility for the study and pursue it to completion;</li> <li>• solve problems ordinarily encountered in accomplishing the work with only occasional supervisory input;</li> <li>• interpret results; and</li> <li>• prepare entire, or sections of, reports and papers.</li> </ul>	<p>The supervisor may either assign a broad problem area to the researcher or allow the researcher to work with substantial freedom within an area of primary interest. The researcher has substantial freedom to identify, define, and select specific projects, and to determine the most promising research strategies and problem approaches. The supervisor:</p> <ul style="list-style-type: none"> <li>• approves plans calling for considerable investments of time or resources; makes final decisions concerning the direction of work and changes in or discontinuance of projects involving substantial research investments;</li> <li>• relies on the researcher's professional judgment to such an extent that the researcher's recommendations are ordinarily followed; and reviews final work and reports, principally to evaluate overall results, recommendations, and conclusions.</li> </ul> <p>The researcher is responsible, with little technical direction, for formulating hypotheses; developing and carrying out the research plan; determining equipment and other resource needs; keeping the supervisor informed of general plans and progress; addressing novel and difficult problems requiring modification of standard methods; analyzing and interpreting results; preparing comprehensive reports of findings; and working with users to interpret and implement research findings or technologies.</p>	<p>The supervisor provides broad administrative supervision, which is generally limited to approving staffing, funds, and facilities, and to providing broad guidance on agency policies and mandates. Technical supervision is consultative in nature. Management accepts the researcher's findings as technically authoritative, as a basis for decisions, and as acceptable for review by the scientific community.</p> <p>The researcher, working within the framework of management objectives and priorities, is responsible for:</p> <ul style="list-style-type: none"> <li>• formulating research plans and hypotheses;</li> <li>• carrying out the project plan;</li> <li>• interpreting findings and assessing their organizational and professional applicability; and</li> <li>• locating and exploring the most promising areas of research in relation to agency program needs and the state of the science or discipline.</li> </ul>
<p><b>Key discriminators:</b></p> <p>Supervisor assigns specific problem area and provides general instructions</p> <p>Researcher confers with supervisor for guidance</p> <p>Supervisor reviews and approves methods and results</p>	<p><b>Key discriminators:</b></p> <p>Supervisor assigns broad problem area and allows substantial freedom to define the scope</p> <p>Researcher exercises professional judgment,</p> <p>Supervisor approves final plan, reviews and approves final work.</p>	<p><b>Key discriminators:</b></p> <p>Researcher determines own research plans (determines own work assignment)</p> <p>Researcher is recognized as the ultimate technical authority</p> <p>Supervision is minimal, only for funding and resources</p>



*Note:* Adapted from U. S. Office of Personnel Management (OPM). (2006). *Research grade evaluation guide*. Retrieved from <https://www.opm.gov/policy-data-oversight/classification-qualifications/classifying-general-schedule-positions/functional-guides/gresch.pdf>

**Table 8.**

*Comparison of GS-0180 (Research Psychologist) Complexity Levels for Factor 3: Guidelines and Originality*

Level A	Level C	Level E
<p><i>Guidelines</i> include:</p> <ul style="list-style-type: none"> <li>existing theories and methods generally applicable to the research problem; or</li> <li>materials that may contain some inconsistencies, be partially defined, or provide several possible approaches to the problem.</li> </ul> <p><i>Originality</i> is demonstrated by:</p> <ul style="list-style-type: none"> <li>developing a complete and adequate research design by selecting and adapting the most appropriate approach, methods, or techniques for the problem at hand; and</li> <li>limited extension or modification of procedures or techniques, as required.</li> </ul>	<p><i>Guidelines</i> include:</p> <ul style="list-style-type: none"> <li>consist of existing literature in the field of limited usefulness due to contradictions, critical gaps, or limited applicability; or</li> <li>are largely absent because of the novel nature of the work.</li> </ul> <p><i>Originality</i> is demonstrated by:</p> <ul style="list-style-type: none"> <li>defining elusive or highly complex problems;</li> <li>developing productive hypotheses for testing;</li> <li>developing important new approaches, methods, and techniques;</li> <li>interpreting and relating significant results to other research findings;</li> <li>developing and applying new techniques and original methods of attack to solve important problems presenting unprecedented or novel aspects;</li> <li>isolating and defining critical problem features; and</li> <li>adapting, extending, and synthesizing theory, principles, and techniques into original or innovative combinations or configurations.</li> </ul>	<p><i>Guidelines</i> are almost nonexistent in pertinent literature. <i>Originality</i> and creativity are demonstrated by:</p> <ul style="list-style-type: none"> <li>discovering complex theory or methodology;</li> <li>contributing significantly to the development of new theory or methodology to supplant or add new dimensions to a previous framework; and</li> <li>solving problems and delivering results that markedly influence the scientific field or society.</li> </ul>
<p><b>Key discriminators:</b></p> <ul style="list-style-type: none"> <li>Can rely on existing methods from other studies</li> <li>Apply and adapt appropriate approach, method</li> </ul>	<p><b>Key discriminators:</b></p> <ul style="list-style-type: none"> <li>Research/studies develop new methods and techniques</li> <li>Solving important problems</li> </ul>	<p><b>Key discriminators:</b></p> <ul style="list-style-type: none"> <li>Develop complex new theory or methods</li> <li>Solving problems and providing results with significant influence</li> </ul>

*Note:* Adapted from U. S. Office of Personnel Management (OPM). (2006). *Research grade evaluation guide*. Retrieved from <https://www.opm.gov/policy-data-oversight/classification-qualifications/classifying-general-schedule-positions/functional-guides/gresch.pdf>

**Table 9.**

*Comparison of GS-0180 (Research Psychologist) Complexity Levels for Factor 4: Contributions, Impact, and Stature*

<b>Level A</b>	<b>Level C</b>	<b>Level E</b>
<p>The researcher defines problems, performs background research, develops and executes a research plan, organizes and evaluates results, and prepares reports of findings. Work is expected to result in, or has resulted in:</p> <ul style="list-style-type: none"> <li>• primary authorship of papers or reports filling narrow gaps in an existing framework of knowledge, to corroborate existing theory, or to report findings of limited scope; or co-authorship of a major paper or report of considerable interest to the scientific field;</li> <li>• providing information and technical support on assigned research projects to collaborators and managers; and</li> <li>• recognition for contributing to the project and communicating results outside the agency.</li> </ul>	<p>The researcher has demonstrated competence and productivity as evidenced by conducting rigorous research of marked originality, soundness, and value. Work is expected to result in, or has resulted in:</p> <ul style="list-style-type: none"> <li>• primary authorship of publications of considerable interest and value to the field;</li> <li>• conceiving and formulating research ideas supporting or leading to productive studies by others;</li> <li>• products that are significant in solving important scientific problems;</li> <li>• selection to serve on important committees and review panels of technical groups and professional organizations;</li> <li>• recognition by the scientific community as a significant contributor to the field of study;</li> <li>• acknowledgement of impact by end users as evidenced by favorable reviews or citation in the work of others;</li> <li>• invitations to make presentations to professional societies and others outside the organization on technical matters and management practices in the area of specialization; and</li> <li>• consultation by users and other researchers who are respected in their fields of study</li> </ul>	<p>Work at this level includes many of the following:</p> <ul style="list-style-type: none"> <li>• primary authorship of a number of important papers including seminal or synthesis publications, some of which have had a major impact on advancing the field or are accepted as authoritative in the field; contributions to inventions, designs, techniques, models, or theories are regarded as major advances and open the way for further developments or solving problems of great importance to the professional community, the organization, or the public; being sought as a consultant by colleagues who are themselves recognized experts in the field;</li> <li>• recognition by the scientific community as an authority in the field; requests from highly-respected colleagues to collaborate with the researcher; attracting new researchers to the field; invitations to address or to assume a leadership role in national professional organizations and associated committees; and selection to lead research to solve large and complex problems.</li> </ul> <p>In addition, researchers at this level typically perform a variety of advisory activities based on their scientific reputation and standing such as:</p> <ul style="list-style-type: none"> <li>• contributing significantly to professional symposia defining the state of the discipline and new or emerging areas in the field; contributing to strategic research planning and program development; participating in major technology or information transfer activities of great importance to the scientific field, the agency, or the public; or participating in applying the research to important management and policy decisions.</li> </ul>
<p><b>Key discriminators:</b></p> <ul style="list-style-type: none"> <li>Primary author for small/simple papers</li> <li>Contributor to major papers/reports</li> <li>Provides technical support to team</li> <li>Contributes to the project</li> </ul>	<p><b>Key discriminators:</b></p> <ul style="list-style-type: none"> <li>Primary author for significant papers</li> <li>Work products solve significant problems</li> <li>Acknowledged by end users for (positive) impact</li> <li>Consulted by others, presents technical matters outside of the organization</li> </ul>	<p><b>Key discriminators:</b></p> <ul style="list-style-type: none"> <li>Leads research to solve large complex problems</li> <li>Consultant to senior colleagues</li> <li>Participates in major technical activities for the agency</li> <li>Contributes to strategic planning and program development</li> </ul>

*Note:* Adapted from U. S. Office of Personnel Management (OPM). (2006). *Research grade evaluation guide*. Retrieved from <https://www.opm.gov/policy-data-oversight/classification-qualifications/classifying-general-schedule-positions/functional-guides/gresch.pdf>

**Table 10.**

*Comparison of Entry-level Criteria for GS-1750 and GS-0180 Series*

<b>GS-1750 (Instructional System Specialist)</b>	<b>GS-1080 (Research Psychologist)</b>
Work is limited scope, readily definable	Limited scope, readily definable
Work applies conventional techniques and existing methods	Conventional techniques, applying existing methods
Employees demonstrate technical competence	Can rely on existing methods from other studies
Employee acts as team member	Apply and adapt appropriate approach, method
	Acts as team member
	Provides technical support to team
	Contributes to the project
	Primary author for small/simple papers
	Contributor to major papers/reports
Supervisor reviews the employees' work to ensure it is sound	Supervisor reviews and approves methods and results
	Supervisor assigns specific problem area and provides general instructions
	Researcher confers with supervisor for guidance
<b>Common Characteristics</b>	
<ul style="list-style-type: none"> <li>• The employee's work is readily definable and limited in scope</li> <li>• The employee applies conventional techniques and existing methods</li> <li>• The employee demonstrates technical competence, relying on existing methods from other studies and applying appropriate approaches and methods</li> <li>• The employee acts as team member, contributing to the project and providing technical support</li> <li>• The employee's supervisor reviews the employee's work, including the methods and results, to ensure the work is technically sound</li> </ul>	

**Table 11.**

*Comparison of Mid-level Criteria for GS-1750 and GS-0180 Series*

<b>GS-1750 (Instructional System Specialist)</b>	<b>GS-1080 (Research Psychologist)</b>
Employees carry out work independently through to conclusion	Researcher exercises professional judgment, Research/studies develop new methods and techniques Changes to existing methods/techniques
Provide problem-solving assistance, technical review and leadership to others	Acts as lead (PI) Primary author for significant papers
Recognized as authoritative consultants	Consulted by others, presents technical matters outside of the organization
Resolve complicated, controversial matters	Solving important problems
Coordinate or negotiate matters of considerable consequence	Broad, complex scope
Conclusions and recommendations result in setting official policy or obligating substantial program resources	Work products solve significant problems Acknowledged by end users for (positive) impact
Supervisor reviews initial plans and completed work to for technical soundness	Supervisor approves final plan, reviews and approves final work. Supervisor assigns broad problem area and allows substantial freedom to define the scope
<b>Common Characteristics</b> <ul style="list-style-type: none"> <li>• The employee exercises professional judgment to independently carry out work to conclusion</li> <li>• The employee acts as a team or project lead, providing technical assistance, review, and leadership to others</li> <li>• The employee is recognized as authoritative consultant by others, presenting technical matters outside of the organization</li> <li>• The employee resolves important problems and complicated, controversial matters with broad complex scope and considerable consequence</li> <li>• The employee's work solves significant problems and has a positive impact, with their conclusions and recommendations setting official policy or obligating substantial program resources</li> <li>• The employee's supervisor reviews his/her work plans and final work products</li> </ul>	

**Table 12.**

*Comparison of Senior-level Criteria for GS-1750 and GS-0180 Series*

<b>GS-1750 (Instructional System Specialist)</b>	<b>GS-1080 (Research Psychologist)</b>
Provide leadership, advice, and guidance to the organization	Consultant to senior colleagues Researcher is recognized as the ultimate technical authority Acts as lead (PI)
Generate work independently	Researcher determines own research plans (determines own work assignment)
Plan, organize, and carry out their own work	Unconventional techniques, novel approach/methods
Conceive, develop, and introduce new programs and systems	Develop complex new theory or methods
Anticipate changes, new developments, develop advance plans	Participates in major technical activities for the agency Contributes to strategic planning and program development Leads research to solve large complex problems Subdivided into phases corresponding to level C Solving problems and providing results with significant influence
Work is reviewed for compliance with organizational policies	Supervision is minimal
<b>Common Characteristics</b> <ul style="list-style-type: none"> <li>• The employee is recognized as the ultimate technical authority, providing leadership, advise, guidance and consultation to senior colleagues</li> <li>• The employee generates, plans, organizes, and carries out his/her own work independently</li> <li>• The employee conceives, develops, and introduce new programs and systems using unconventional techniques and novel approach/methods.</li> <li>• The employee receives minimal supervision. His/her work is reviewed only for funding and resources allocation and to ensure it complies with organizational policies</li> </ul>	

## Analysis of Local Position Descriptions

While OPM provides broad instruction for employees assigned anywhere in the federal government, NAWCTSD also relies on locally generated Position Descriptions (PDs). These PDs define the nature of the assignment for employees assigned to the GT53 division at NAWCTSD. Accordingly, the next step in my process was to analyze these PDs. To do so, I first inventoried all of the PDs in the NAWCTSD GT53 PD library, which includes 41 distinct PDs. I reviewed these PDs in order to understand their similarities and differences, and to find the ones with the widest applicability. Figure 12 depicts the process used to select representative PDs.

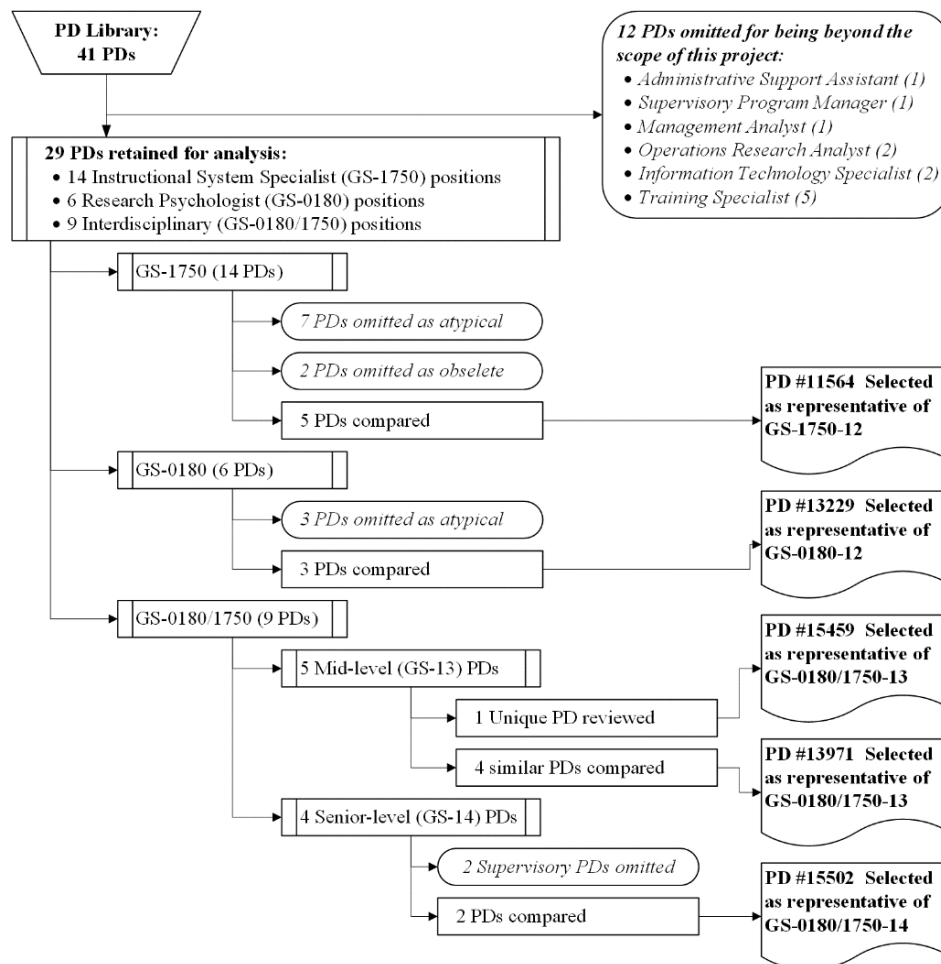


Figure 12. Flow diagram of the selection process for GT53 position descriptions (PDs).



This Dissertation in Practice targets the two job series that represent the majority of GT53 employees: Instructional System Specialist (GS-1750) and Research Psychologist (GS-0180). Of the 41 PDs in the GT53 library, 12 PDs applied to job series other than Instructional System Specialist (GS-1750) or Research Psychologist (GS-0180).

- One PD applied to an *Administrative Support Assistant* position.
- One PD applied to a *Supervisory Program Manager* position.
- One PD applied to a *Management Analyst* position.
- Two PDs applied to *Operations Research Analyst* positions.
- Two PDs applied to *Information Technology Specialist* positions.
- Five PDs applied to *Training Specialist* positions.

Although these positions provide vital contributions to the GT53 division, they do not represent the job series targeted by this dissertation in practice. Therefore, these twelve PDs were not considered. Removing these 12 PDs from consideration, 29 PDs remained.

- Fourteen PDs applied to Instructional System Specialist (GS-1750) positions.
- Six PDs applied to Research Psychologist (GS-0180) positions.
- Nine PDs applied to interdisciplinary (GS-0180/1750) positions.

#### Fourteen Instructional System Specialist (GS-1750) Position Descriptions

Of the fourteen Instructional System Specialist GS-1750 PDs, seven PDs referenced assignment at an alternative geographic location under an alternative pay band. These seven PDs represent a very small portion of the GT53 workforce, with each of these PDs representing, at most, a single employee. In fact, two of these PDs do not represent any current employees, so that these seven PDs only represent five current employees. Given the limited applicability of these PDs, they were not considered for further analysis. In addition, two PDs were found to be obsolete because they reference a position structure no longer in use by the division.

The five remaining Instructional System Specialist PDs were essentially identical in content with minor differences in presentation. Most differed only in the introductory paragraph, assigning the position to different branches within the division. They also represented a wide span of approval dates, from as early as 1998 to as recent as 2017. One notable difference was that four of these PDs required a SECRET security clearance, whereas the fifth requires a TOP SECRET clearance. However, this difference in security clearance does not have an influence on the knowledge and skills required by the PD. Given the similarity in content, the range of approval dates, and the difference in security clearance requirements, I selected the most recently approved of these PDs *not* requiring a TOP SECRET clearance, which is PD# 11564 (Department of the Navy, 2015) as the most representative sample of Instructional Systems Specialist (GS-1750-12) PDs in the library.

#### Six Research Psychologist (GS-0180) Position Descriptions

Of the six Research Psychologist (GS-0180) PDs, three PDs represented atypical positions within the GT53 division. One of these PDs documented requirements for a position at the GS-11 level. Although the division may occasionally employ a research psychologist at the GS-11 level, this is a rare exception, and the division does not currently have any employees assigned this PD. The other two atypical PDs were specific to assignment at an alternative geographic location under an alternative pay band. Again, the division does not currently have any employees assigned under these PDs. These three atypical PDs were not considered.

I compared the three remaining GS-0180-12 PDs for similarities and differences and found no substantive differences. Two PDs had differences in font and page layout, for example, subdividing paragraphs into additional levels of indenture, but these did not result in any difference in content. One PD references a more stringent security clearance requirement (i.e.,

TOP SECRET vs. SECRET) but this difference is not germane to the knowledge and skills required for the position. Finding no substantive differences in the three remaining PDs, I selected the most recently approved PD *not* requiring a TOP SECRET clearance, PD #13229 (Department of the Navy, 2008), as the representative PD for Research Psychologists working at the GS-12 level.

#### Nine interdisciplinary (GS-0180/1750) Position Descriptions

While employees at the GS-12 level are differentiated by job series, either Research Psychologist (GS-0180) or Instructional System Specialist (GS-1750), once they are promoted to the GS-13 level or above they occupy Interdisciplinary GS-0180/1750 positions. The PD library includes nine interdisciplinary GS-0180/1750 PDs, five at the GS-13 level and four at the GS-14 level. Of the five PDs at the GS-13 level that I compared, I found one unique PD that did not match the other four in format or content. However, the other four are almost identical, with only minor differences in the introductory paragraph and conditions of employment. For example, three of the PDs designate assignment to air/land system projects in the introductory paragraph, while a fourth designates assignment to surface warfare projects. Furthermore, two of the PDs included additional travel requirements in the conditions of employment, and one PD requires a TOP SECRET clearance. Notably, I found one PD to be missing the specific formal education requirements. However, I believe this to be an erroneous omission, since all of the Research Psychologist and Instructional System Specialist positions include formal education requirements mandated on OPM Policy. Regardless of these differences, there were no substantive differences in the knowledge and skill requirements of the 4 similar PDs. Therefore, I selected the PD #13971 (Department of the Navy, 2017) as the representative sample of these four similar PDs and I retained the unique PD, #15459 (Department of the Navy, 2018a) as

another representative sample of the interdisciplinary Research Psychologist/Instructional System Specialist (GS-0180/1750) requirements at the GS-13 level.

Finally, I compared the four GS-0180/1750-14 PDs. I found that two of these PDs describe supervisory positions, specifically, the Branch Head and Division Head positions. Since this Dissertation in Practice is not intended to target the supervisory positions, I excluded these PDs from further analysis. I then compared the two remaining interdisciplinary GS-0180/1750-14 PDs. I found one notable difference and one editorial difference. PD #14391 (Department of the Navy, 2009) applies specifically to an outdated branch title and designator, whereas PD #15502 (Department of the Navy, 2018b) applies to the division at-large. I also found one paragraph which was moved in the layout of the document. The paragraph's content, referring to knowledge requirements for the position, was identical in both documents. However, it was moved from the *Supervisory Controls* section of the older PD #14391 to the *Knowledge Required by this Position* section in the newer PD #15502. Apart from these two differences, the two non-supervisory GS-0180/1750-14 PDs were identical. Given that PD #15502 appeared to be an update of PD #14391, with the updated applicability and the knowledge requirement paragraph moved to the correct location, I selected PD #15502 as the representative GS-0180/1750-14 PD.

As a result of an exhaustive analysis of the NAWCTSD PD library, five PDs were chosen to represent the knowledge and skills targeted by this dissertation in practice.

- PD# 11564, Instructional Systems Specialist GS-1750-12 (Department of the Navy, 2015)
- PD #13299, Research Psychologist GS-0180-12 (Department of the Navy, 2008)
- PD #15459, Interdisciplinary GS-0180/1750-13 (Department of the Navy, 2018a)
- PD #13971, Interdisciplinary GS-0180/1750-13 (Department of the Navy, 2017)
- PD #15502, Interdisciplinary GS-0180/1750-14 (Department of the Navy, 2018b)

## Compiling PD Knowledge and Skill Requirements

Each of the local Position Descriptions follows a similar format, such as the following:

- I. Introduction
- II. Major Duties and Responsibilities
- III. [Evaluation] Factors
  - Factor 1. Knowledge and Skills Required by the Position
  - Factor 2. Supervisory Control
  - Factor 3. Guidelines
  - Factor 4. Complexity
  - Factor 5. Scope and Effect
  - Factor 6. Personal Contacts
  - Factor 7. Purposes of Contacts
  - Factor 8 Physical Demands
  - Factor 9. Work Environment

Once I had chosen the five PDs to use for this project, I followed a process of extracting required knowledge and skill statements from each section of each PD. Predictably, Section II and Factor 1 yielded the majority of the knowledge and skill statements, but other sections yielded material as well. For example, I retrieved the statement “Projects require planning, development, and application of innovative instructional strategies to highly complex training problems” (Department of the Navy. 2018a, p. 5) from PD# 15459, Factor 4 Complexity. From that line I extracted the skill statement: *Plan, develop, and apply innovative instructional strategies to highly complex training problems*. Some such statements in the PD actually yielded several skill elements. For example, I would dissect a statement such as *knowledge and skills in the design and evaluation of interactive courseware* into four separate elements;

- *Knowledge in the design of interactive courseware*
- *Skills in the design of interactive courseware*
- *Knowledge in the evaluation of interactive courseware*
- *Skills in the evaluation of interactive courseware*

This would allow me to differentiate between required knowledge and required skills and would also allow me to assign these knowledge and skill elements to the appropriate domain (e.g., design and evaluation).

This process yielded over 560 elements. Certainly, there was a great degree of repetition in this list, as several of the PDs have areas of overlap. However, I was not concerned with redundancy in this step. My intent was to fully capture the requirements of each of the selected PDs in a master repository. These statements would eventually be sorted and filtered according to domain and level, so that they could be assigned to the appropriate Proficiency Level Rubric. At that point I would remove duplicate items.

One final source from which I compiled skill statements was the NAWCTSD GT53 Skills Inventory referenced in the pilot study. This excel spreadsheet was developed by division employees and approved by the division head prior to the conduct of this study. The Skills Inventory lists 120 skill statements that are intended to encompass the breadth of work performed by GT53 employees. Of the 120 skill statements, 56 are in the core domains being considered by this project, and they are already organized by domain.

Once I had a raw list of knowledge and skill requirements, I began the task of removing duplicates, editing them for spelling and grammar as well as clarity, and organizing them by domain and level. My goal with this step was to compile a list of knowledge and skill statements that would become the content of the PLRs (and ultimately the foundation of the learning objectives). This final list of knowledge and skill statements is provided in Table 28 through Table 31 in APPENDIX A: EXTRACTED KNOWLEDGE AND SKILL STATEMENTS. While this process yielded the content of the PLRs, the format of the PLRs was driven by Navy guidance on developing Personnel Qualification Standards (PQS).

## Review of Navy Personnel Qualification Standards (PQS) Guidance

I chose to model my Proficiency Level Rubrics (PLRs) after the Navy's Personal Qualification Standards (PQS). The Naval Education and Training Command (NETC) provides two related references that inform the design and development of PQS materials:

- Personnel Qualification Standards (PQS) Writers' Guide (NETC, 2013).
- Personnel Qualification Standards (PQS) Unit Coordinator's Guide (NETC, 2017).

Both the Writers' Guide and the Unit Coordinator's Guide define PQS as "a compilation of the minimum knowledge and skills that an individual must demonstrate in order to perform specific duties" and both prescribe PQS to be used "when certification of a minimum level of competency is required" (NETC, 2013, p. 8; 2017, p. 4). Both references confirm that PQS is applicable to military personnel as well as contracted and government civilians, and that PQS may be used at both ashore and afloat organizations (i.e., on ships as well as in land-based organizations). This is essential to my project, as I intend to use this with government civilians at an ashore activity. The PQS references also point out that PQS should be considered an integral part of a comprehensive training system. The Unit Coordinator's guide, in particular, affirms that PQS not only demonstrates that the employee is trained, but that the employee is able to transfer that training to on-the-job performance. This aligns well to the overall design of my PD Program.

Each PQS has three main sections: *Fundamentals*, *Systems* and *Watchstations*. The *Fundamentals* section lists the basic knowledge topics that support the duties to be performed. The *Systems* section describes the equipment, systems, sub-systems, components, and component parts that the employee is to operate and maintain. And the *Watchstations* section lists the tasks, procedures, and evolutions that the trainee must demonstrate. It is notable that the PQS does not contain content or learning materials. Rather, the PQS contains a list of knowledge and skill

requirements with a signature block following each item. A mentor or senior employee—referred to as the *qualifier*—signs each signature block indicating that the trainee has satisfied the requirement. In the case of knowledge items, the trainee demonstrates his or her knowledge through discussions with the qualifier who then signs that item in the PQS. Similarly, for performance items or skills in the *Watchstations*, the trainee demonstrates performance of the skill to the satisfaction of the qualifier at which point the qualifier signs that item in the PQS.

The final page of a PQS contains a series of signatures that indicate recommendations and approval of the trainee’s qualification. These recommendations and approvals may include requirements for a written exam or an oral interview board. After the recommendations and approvals have been signed, the final signature block is signed by the *Certifying Officer*, at which time the trainee is considered qualified to perform the relevant duties (NETC, 2017).

The PQS references do allow for variance from standard PQS format. Specifically, PQS policy allows for “PQS-type” booklets to be developed in situations when it is not necessary or not feasible to develop a fleet-wide PQS. Such is the case with my PLRs. Accordingly, I followed the guidance of the PQS Writers’ Guide and the PQS Unit Coordinator’s Guide to develop my PLRs with characteristics similar to PQS. The PLRs contain a *Knowledge* section and a *Skills* section, which correspond to the *Fundamentals* and *Watchstations* sections of a PQS, respectively. I chose to omit the *Systems* section because GT53 employees do not operate or maintain any unique equipment or systems. Following the *Knowledge* and *Skills* sections, each PLR contains an *Endorsement and Certification* section. This section contains a series of signature blocks that serve as recommendations for certification, including an oral board for certification at the *Expert* level. The final certification block is signed by the employee’s Branch



Head for certification at the *Novice* and *Journeyman* levels, and by the Division Head for certification at the *Expert* level.

I developed a total of 12 PLRs representing three levels of proficiency (novice, journeyman, and expert) in each of four domains (analysis, design evaluation, and acquisition). A sample PLR—that of the Analysis Journeyman—is provided in the Sample Proficiency Level Rubric section of APPENDIX B: EXCERPTS OF PROGRAM ARTIFACTS.

### Learning Objective Development

The Learning Objectives (LOs), which form the foundation of the Curriculum Design Plan (CDP), were in turn based on the knowledge and skill requirements that I developed for the PLRs. This approach was in keeping with the guidance provided by the ISD/SAT Manual (U.S. Department of Defense, 2001). The ISD/SAT manual prescribes the conduct of a Job and Task analysis to identify the skill requirements and supporting knowledge required to perform a job, and this is the process I have outlined that led to the content of the PLRs. Once the knowledge and skill requirements have been established, the ISD/SAT manual prescribes a tailorable process to design instructional materials, the first step of which is to develop LOs.

Learning Objectives, according the ISD/SAT manual, contain three parts—a behavior, a condition, and a standard. The behavior defines what the student must know or be able to do (the knowledge or skill), the condition defines the situation in which the student is expected to demonstrate the behavior, and the standard defines the criteria for acceptable performance. Accordingly, I used the PLR knowledge and skill statements as the behavior for each LO and added a condition and standard. I assigned the conditions based on the verb and type of behavior. For example, knowledge objectives with verbs like *compare*, *summarize*, or *recall* were given a condition statement that identified whether or not references would be used, such as “After

reviewing applicable references...” or “From memory and without references...” Typical condition statements for performance objectives with verbs such as *construct*, *evaluate*, or *modify* include “Given a notional project scenario and supporting project data...” or “Given a unit of instructional content and supporting design documents...” Finally, I assigned the standard statement based on the type (knowledge or skill) and, for skill behaviors, whether the behavior demonstrated was procedural or resulted in a measurable product. Knowledge-based objectives were assigned the standard “satisfying the minimum requirements on a written or verbal exam.” Skill-based objectives were assigned one of the following, based on the context of the skill:

- “...satisfying the minimum requirements on a product checklist or rubric.”
- “...satisfying the minimum requirements on a process checklist or rubric.”
- “...satisfying the minimum requirements on a combined product/process checklist or rubric.”

Thus, a PLR skill statement such as *Tailor Data Item Descriptions (DIDs) to develop Contractor Deliverable Requirements Lists (CDRLs)* resulted in a learning objective as follows: *Given a notional project scenario, supporting project data, and applicable references, tailor Data Item Descriptions (DIDs) to develop Contractor Deliverable Requirements Lists (CDRLs), satisfying the minimum requirements on a product checklist or rubric.*

### Curriculum Planning

With a complete set of Learning Objectives, I began some initial curriculum planning to develop the Curriculum Design Plan (CDP). Here again, I followed the guidance provided by the ISD/SAT Manual (U.S. Department of Defense, 2001), which prescribes a series of tailorable steps that begin with LO development and include categorizing LOs by learning type and level,

clustering and sequencing LOs into a hierarchy, and finally identifying assessment strategies and instructional methods for each LO.

I began by categorizing the LOs according to Bloom's revised taxonomy, as described in Anderson's text *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's* (2014). I categorized each LO by the knowledge domain, or the type of knowledge it elicits, either factual knowledge, conceptual knowledge, procedural knowledge, or metacognitive knowledge. I also categorized each LO by the level of learning, or cognitive process, such as remember, understand, apply, analyze, evaluate, or create. I used the knowledge domain and cognitive process to assign instructional strategies and assessment strategies. I associated the four knowledge domains to four different instructional strategies. The instructional strategies associated with each of the four knowledge domains are shown in Table 13. Similarly, I associated the cognitive processes with specific verbs in the performance statement of each LO, and in turn I associated each verb to a related assessment strategy. The cognitive processes associated LO verbs, and associated assessment strategies shown in Table 14.

***Table 13.***

*Knowledge Types and Associated Instructional Strategy*

<b>Knowledge Domain</b>	<b>Instructional Strategy</b>
Factual knowledge	Lecture and assigned readings
Conceptual knowledge	Exhibit with examples and non-examples
Procedural knowledge	Demonstration with worked examples
Metacognitive knowledge	Case study with indirect discourse

**Table 14.**

*Cognitive Processes, Verbs, and Associated Assessment Strategies*

<b>Cognitive Process</b>	<b>Verb</b>	<b>Assessment Strategy</b>
Remember	Recall	Prompted response, fill-in-the-blank
Understand	Exemplify	Selected response, constructed response (*Using NEW content)
Understand	Summarize	Selected or constructed themes or summaries
Understand	Compare	Mapping
Apply	Execute	Provide familiar task (well-known procedure), evaluate product/result
Apply	Implement	Provide unfamiliar problem - evaluate process, product, or both
Analyze	Differentiate	Selected/constructed response, identify most relevant/important parts
Analyze	Organize	Constructed/selected outline, table, matrix, or hierarchy
Evaluate	Check	Process or product checklist
Evaluate	Critique	Evaluate student-generated critique (product)
Create	Generate	Constructed response - product
Create	Plan	Constructed response - product (worked solutions)
Create	Produce	Product checklist/rubric

To complete the curriculum planning, I clustered and sequenced the LOs into a series of modules and topics. Here again, I followed the guidance provided by the ISD/SAT manual (U.S. Department of Defense, 2001), which provides several options for clustering and sequencing LOs. I clustered related objectives together into topics, then sequenced those topics in job performance or chronological order if such an order exists, or simple-to-complex order in the remaining cases. I compiled the complete list of LOs, including their assigned assessment and instructional strategies, clustered and sequenced according to the module and topic hierarchy, into the completed Curriculum Design Plan (CDP). An excerpt of the CDP, including the Module-Topic hierarchy and a selection of LOs, is provided in the Curriculum Design Plan Excerpt section of APPENDIX B: EXCERPTS OF PROGRAM ARTIFACTS

#### Policy Manual Development

The last artifact I developed for this program was the Policy Manual. For this, my process was less systematic and more so a process of codifying the design elements prescribed by my research. For example, the section of the Policy Manual that describes mentorship is based on my research and understanding of sociocultural theory, as I described in my literature review. Similarly, the Policy Manual describes how the users shall implement the training curriculum and the assessment rubrics, and this guidance is also based on the research I described in my literature review and the Conceptual Framework section of this chapter. Finally, some of the Policy Manual content, particularly the Roles and Responsibilities section, is based on my own knowledge of the organization and my positionality within the organization. An excerpt of the Policy Manual is provided in the Policy Manual Excerpt section of Appendix B. This concludes the development of artifacts supporting the PD Program.

## CHAPTER FOUR: RESEARCH DESIGN AND METHODOLOGY

This dissertation in practice followed the tenets of design-based research, an emerging form of empirical research that combines theoretical design and practical application (The Design-Based Research Collective, 2003). I chose this methodology because it aligned well with the requirements and intent of the dissertation in practice required for my doctoral studies. Design-based research focuses on designing and testing an intervention that is situated in an authentic context and supported by relevant literature and theory (Anderson & Shattuck, 2012). This research methodology is well aligned to the University of Central Florida (UCF) Curriculum and Instruction EdD program, and specifically the dissertation in practice. The UCF EdD program has students study practice-based problems to generate real world solutions, while the dissertation in practice is intended to address a complex problem of practice in a professional environment (University of Central Florida, 2020). Furthermore, due to its unique combination of theoretical design and practical application, design-based research typically involves collaboration between the researcher and practitioners (Anderson & Shattuck, 2012; The Design-Based Research Collective, 2003). Again, this aligns well with the dissertation in practice, which is intended to be conducted as a partnership between the student, faculty, and the mentor/client. (University of Central Florida, 2020). Accordingly, I conducted this study in close collaboration with the employees and leadership of the NAWCTSD GT53 Division.

### Phased Approach to Design-Based Research

Design-based research often follows a phased approach, such as the model proposed by Pool and Laubscher (2016), wherein program artifacts are designed, evaluated, and revised based on evaluation results. In this model, each phase concludes with a design evaluation, and the data

collected in that evaluation inform artifact revision in the subsequent phase. I followed this phased approach with the program artifacts in this study, specifically, the Proficiency Level Rubrics (PLRs), the Curriculum Design Plan (CDP) and the Policy Manual.

In phase 1 of my research, I developed initial drafts of all program artifacts and conducted a preliminary evaluation of those artifacts. In phase 2, I revised the program artifacts based on the data collected in phase 1, and I conducted a holistic evaluation of the revised artifacts. In phase 3, I again revised the program artifacts in response to data collected in the previous phase, and I conducted a final evaluation of the artifacts. I compared the results of the final evaluation against the results of the preliminary evaluation in order to measure program improvement, and I considered respondents' qualitative feedback for further indications of their perspectives. These research activities are further detailed in the Data Collection Methods and Data Analysis sections, later in this chapter. The results of each phase are detailed in CHAPTER FIVE: RESEARCH RESULTS 5.

In order to evaluate the program artifacts objectively through each phase, I developed a set of functionality and usability specifications for each artifact. The functionality specifications describe the ways in which each artifact serves the purpose for which it was designed, while the usability specifications describe how users will be able to effectively use the artifacts. Having this set of specifications allowed me to evaluate the artifacts consistently across each phase of my research, and it also allowed me to measure program improvement from the initial draft of the artifacts to the final program revision. The specifications for the PLRs, the CDP, and the Policy Manual are provided in Table 15, Table 16, and Table 17, respectively.

**Table 15.**

*PLR Functionality and Usability Specifications*

<b>Type</b>	<b>Specification</b>
Functionality	The domain categories documented in the PLRs (i.e., Analysis, Design, Evaluation, and Acquisition) accurately reflect the GT53 Division's core competencies.
Functionality	The proficiency levels documented in the PLRs (i.e., Novice, Journeyman, Expert) are accurately aligned to the expectations for employees in the GT53 Division.
Functionality	The Knowledge items listed in the PLRs accurately reflect the scope of domain-level knowledge required for GT53 employees.
Functionality	The Skill items listed in the PLRs accurately reflect the scope of domain-level skills required for GT53 employees.
Usability	The assessment criteria listed in the PLRs are objective, i.e., they are not subject to opinion or personal bias.
Usability	Proficiency assessment criteria appear to be reliable, i.e., an employee would likely be assessed consistently by several independent assessors.
Usability	Using the PLRs, employees can independently conduct a self-assessment of their domain-level proficiency.
Usability	Using the PLRs, Division Leadership can accurately assess an employee's domain-level proficiency.



**Table 16.**

*CDP Functionality and Usability Specifications*

<b>Type</b>	<b>Specification</b>
Functionality	The Learning Objectives (LOs) listed in the CDP are comprehensive, i.e., they encompass all of the applicable domain-level Knowledge, Skills, and Attitudes (KSAs).
Functionality	The LOs are aligned to appropriate learning levels.
Functionality	The assessment strategies prescribed in the CDP will be effective at assessing the content of each LO at the appropriate learning level.
Functionality	The instructional methods prescribed in the CDP will be effective at teaching the content of each LO at the appropriate level.
Usability	Instructional Designers and Subject Matter Experts will be able to design effective training based on the guidance provided in the CDP.

**Table 17.**

*Policy Manual Functionality and Usability Specifications*

<b>Type</b>	<b>Specification</b>
Functionality	The proposed mentorship agreements, as described in the Policy Manual, will be effective in helping the employee develop their skills.
Functionality	The proposed rotational assignments, as described in the Policy Manual, will allow employees to apply their newly learned skills.
Usability	The Policy Manual provides clear guidance for how the Assessment portion of the Assessment-Training-Proficiency program will be implemented.
Usability	The Policy Manual provides clear guidance for how the Training portion of the Assessment-Training-Proficiency program will be implemented.
Usability	The Policy Manual provides clear guidance for how the Proficiency portion of the Assessment-Training-Proficiency program will be implemented.

### Sampling Method and Rationale

The population for this dissertation in practice was the employees and managers of GT53. This population can be categorized in three sample groups: the management team, the leadership team, and the employees. Each of these groups was sampled for different data collection activities, as described in the Data Collection Methods section.

The management team consists of the division head and six branch heads. The division head is the immediate supervisor of the six branch heads. Each branch head in turn manages approximately 15 - 20 employees, and in this role, they have unique insight into personnel issues such as employee development. When collecting data from the management team, all members were included in the sample. The management team regularly collaborates on programs and policies that concern the employees of the division and were therefore well-suited to participate in the design of the professional development program.

The leadership team is an expansion of the management team. In addition to the division head and six branch heads, the leadership team also includes the six GS-14 level technical leads. The leadership team performs strategic planning and execution of all the division's work, with the technical leads providing technical oversight and guidance. In this respect, the technical leads have specific insight into program execution and tasking. As with the management team, the members of the leadership team often collaborate on division-wide initiatives. Their expertise was particularly insightful in helping to evaluate the subject matter of the PD program. When sampling both the leadership team and the management team, I requested their support through the division head. The division head is not only the authoritative leader of both teams, but he was also my de facto client for this dissertation in practice.

The largest and perhaps most critical pool of participants in this research study were the 100 or so employees of the division. Research has shown that employee involvement in new

programs and policies helps increase the employees' sense of ownership (Grawitch, Ledford, Ballard, & Barber, 2009). Grawitch et. al. (2009) found that having employees involved in every stage of a program, including (or especially) early in program development, increases the likelihood that the program will meet the employees' need and that employees will actually participate in the program. It therefore seemed critical that the employees would be involved with this program at its inception, if I were to expect them to enroll in the program once it is fielded. To sample the employees, I began by briefing them on the purpose and design of the program, as well as the data requirements and methods to support my dissertation in practice. I then solicited their participation through corporate email. This sampling method was used for the pilot study and received an 88% response rate. I therefore anticipated similar success with this dissertation in practice. However, I realized only a fraction of the participation that I expected. In the first phase of data collection, 29 employees responded to a survey and 20 employees responded to a request for qualitative feedback. In phase 2, all seven members of the leadership team—including the Division Head—participated in the program-level review, and 20 participants responded to the final survey.

Some data collection activities required sampling of employees to support expert panel workshops. In these instances, I again solicited participation through corporate email with instructions for interested volunteers to respond to their branch head. I then asked branch heads to select 2-3 employees from each branch who represented a broad spectrum of their branch in terms of tenure, experiences, and skillset. This resulted in sample of 15 individuals who, collectively, represented the division's professional diversity. These employees provided detailed qualitative feedback on the program artifacts, as described in the sub-sections that follow.

### Data Collection Methods

I used three data collection methods for this study: document reviews, surveys, and expert panels to collect both qualitative and quantitative data. In Phase 1, I used all three methods to evaluate the initial draft of the program artifacts. In Phase 2, I used the management team as an expert panel to evaluate the program holistically. In Phase 3, I use a survey to measure program improvement. These activities are summarized in Table 18.

**Table 18.**

*Data Collection Methods at Each Phase of Data Collection*

	Document Review	Surveys	Expert Panels
<b>Phase 1</b>			
Proficiency Level Rubrics (PLRs)	All	EE	EP
Curriculum Design Plan (CDP)	All	EE	EP
Policy Manual	All	EE	LT
<b>Phase 2</b>			
Personas review			MT
<b>Phase 3</b>			
Proficiency Level Rubrics (PLRs)		EE	
Curriculum Design Plan (CDP)		EE	
Policy Manual		EE	

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*Note:* *EE = Employees.* *EP = Expert Panel (select employees).*  
*MT = Management Team.* *LT = Leadership Team.*

The preliminary evaluation of all artifacts began with a document review in which all members of the division were allowed the opportunity to review and comment freely on the documents. I collected qualitative feedback in a comment matrix—a common tool and a common approach that is familiar to all GT53 employees. The comment matrix was a simple spreadsheet

in which reviewers identified the relevant document, page, and line number, and recorded their comments and recommendations. I distributed draft documents and a blank comment matrix to all division employees via corporate email. and 19 employees responded with feedback. The comment matrix allowed me to compile, organize, and analyze comments from all respondents in a single document.

Employees were also asked to answer a survey concurrently with the document reviews. The survey format allowed me the broadest access to the greatest number of participants, while providing consistent quantitative data with which I could track progress toward meeting the functionality and usability specifications. The survey items were drawn directly from the functionality and usability specifications and asked respondents to evaluate the degree to which the artifacts met those specifications. The survey also included three free-response opportunities for respondents to provide qualitative feedback. The survey instrument, as it was presented to respondents, is reproduced in APPENDIX C: SURVEY INSTRUMENTS.

The evaluation of each artifact was also the subject of a series of expert panels in Phase 1, as outlined in Table 18. For those expert panels attended by employees, I solicited volunteers from all six branches. This resulted in a representative sample of employees from the division at large. I coordinated with the GT53 Division Head to establish the leadership team expert panel. The leadership team meets regularly (typically bi-weekly), and they are well-accustomed to collaborating on division-wide strategic initiatives such as the subject of this dissertation. I simply requested that the expert panel review of the Policy Manual be the subject of one such meeting.

Evaluation culminated with a program-level evaluation in Phase 2, using *personas* to evaluate the integrated design of the PD program. Lidwell, Holden, & Butler, (2010) describe personas as personal profiles meant to notionally represent members of the user population.

Lidwell et al. describe the use of personas as a method to test design features and user interactions. They recommend establishing no more than three primary personas, and as many as four secondary personas, depending on the variance in the user population. Clark (2016) provides an applied example of using personas to evaluate a curriculum design effort. In Clark's study, she established three student personas and three instructor personas to evaluate the redesign of a doctoral program. For my program-level evaluation, I established 3 personas representing a junior, mid-level, and senior-level employee. The persona representing a junior-level employee has relatively little experience, and therefore did not require a secondary persona. However, the mid-level and senior-level personas each had two secondary personas, with varying depth and breadth of experiences. The personas profiles upon which I based my Phase 2 review are presented in Table 19.

I used the personas as the basis for a series of use cases in which all of the artifacts were evaluated holistically as a series of use cases. Each persona served as the subject employee of a single use case. An expert panel, made up of members the management team, ran each use case in three steps.

1. Panel participants assessed the persona's experience against the Proficiency Level Rubric (PLRs). The participants' individual assessments were compared, and a single consensus assessment was adopted.
2. Panel participants discussed which training modules (as outlined in the CDP) would likely benefit the persona in achieving the next level of proficiency.
3. Finally, the participants—in their role as members of the management team—collaborated to determine a possible rotational assignment and mentor for the persona based on actual and current division tasking.

Following each use-case, I prompted the expert panel to discuss two central questions:

1. Did the use case result in a holistic prescription, i.e., one that includes a valid and objective assessment, appropriate training assignments, and a rotational assignment and mentor that will benefit the employee, and if not, how could this be improved?
2. Did the artifacts effectively facilitate documentation and decision-making tasks required to complete each of the three steps, and if not, how could this be improved?

The first question was intended to initiate a discussion of the program's functionality, while the section question initiated a discussion of the program's useability. I documented the discussions of these two questions in workshop minutes, and I analyzed the minutes for trends and themes. The results of this workshop were used to support minor revisions to the program, primarily to the policy manual, as described in the Phase 2 Analysis and Results section of Chapter 5.

**Table 19.**

*Persona Profiles Used for Program Review*

<b>Persona Name</b>	<b>Persona Profile</b>
New-Hire Nancy ( <i>Junior-level</i> )	<p>Nancy graduated from UCF (M.S. in ISD) in 2017. She worked in industry for 3 years, wrote lesson design specs and storyboards for levels 1-2 ICW and ILT. She was hired (GS-12) this year. On her first NAWC assignment, a JTA for maintainers, she has created a draft task list from references, she has attended workshops, collected data in the spreadsheet, and she attends weekly IPRs and takes point tasking from GS-13 team lead.</p> <p>Nancy wants to learn more about analysis.</p>
Mid-Career Mike ( <i>Mid-level</i> )	<p>Mike has been at NAWC for 12 years, including 3 years as an ELE (7-9-11 step). Was selected to GS-13 three years ago. As an ELE, Mike did a rotation in contracts. He has done several technical proposal evals. For his first 3 years after his ELE experience, he was a courseware reviewer and later a team lead on a major courseware contract. For the past 6 years he has been the overall team lead on an aviation platform that went through IPRD, IMRD, TSFD, and is now under contract producing levels 1-4 ICW and devices.</p> <p>Mike wants to be an expert in courseware and device evaluation.</p>
Industry-Boss Betty ( <i>Secondary mid-level</i> )	<p>Betty is an ISD with 12 year's industry experience. She has developed all kinds of DoD training deliverables, worked from entry-level ISD to ISD team lead, to project lead, and finally PJM in industry. She has led teams of up to 15 ISDs on projects outside of NAWC (private industry). Betty has been with NAWC for three years now. She is TPOC for a courseware effort leading a team of 5 ISD, and she was just selected to GS-13 this month.</p> <p>Betty wants to focus on design and acquisition.</p>
Retirement-Ready Ron ( <i>Senior-level</i> )	<p>Ron has been at NAWC since 1997. He has been a GS-13 since 2011. He has completed countless JDAs, TSAs and TSRAs, produced TSDs, IPRDs, IMRDs. He has led several major courseware contracts as TPOC. He has done source selection for a major IDIQ MAC and a single award IDIQ for courseware—technical eval for one and past performance for the other. He also led a team responding for an REA on the courseware contract. Ron is writing an acquisition package for a new IDIQ for analysis and courseware.</p> <p>Ron “Just wants to see where he falls”</p>
Branch Head Bob ( <i>Secondary senior-level</i> )	<p>Bob came to NAWC in 2007 after 9 years in industry. While in industry, he was an Authorware programmer and an ISD. He led teams as small as 3 ISDs and a project with 30 ISDs. At NAWC he has worked 2 major courseware efforts, EPOC and LCS and source</p>



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selection for TDPC MAC and LCS IDIQ. He was TPOC for LCS and also did FEAs for several LCS systems. He was tech lead for Surface and Undersea for about 4 years, leading teams doing countless TSAs and TSRAs. He became a branch head 3 year ago.

Bob is sure he is an expert at everything—just ask him.

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*Note. The personas profiles are written with terms, acronyms, and expressions that the participants would understand without any further clarification.*

### Data Collection Under COVID-19 Restrictions

At the time of writing (2020 - 2021) the local area—and in fact, the entire nation—was responding the COVID-19 pandemic. The entire NAWCTSD workforce was in an extended telework status for over 18 months. While this had the potential to impact data collection, fortunately, impact was minimal. There was no impact to document reviews, as documents were distributed, and feedback collected easily through online corporate email. Likewise, surveys were not impacted by a remote workforce. But the expert panels, which were critical to each phase of data collection, were conducted remotely vice face-to-face. NAWCTSD staff have MS Teams accounts, which allowed for online collaboration and virtual meetings. Recent research has shown that virtual focus groups are just as effective as face-to-face focus groups (Richard, Sivo, Orlowski, Ford, Murphy, Boote, & Witta, 2018). Richard et. al. compared the results of online and face-to-face focus groups, and they found that they were equally effective in terms of the amount and quality of ideas they generated. Indeed, my online expert panel workshops yielded rich and descriptive qualitative data which contributed significantly to my research.

### Trustworthiness

I took several steps to ensure the trustworthiness of the data I collect. For division-wide data collection such as the comment matrices and surveys, data was reported anonymously to reduce any possible bias. When convening expert panels, I solicited attendees that were

representative of the makeup of the division. Following expert panel workshops, I shared results with all attendees, allowing attendees to identify missing or incorrect input. This step ensured that all of the voices on the expert panel were heard. Finally, I used triangulation between the document reviews, survey results, and expert panels to emphasize common themes and trends.

## CHAPTER FIVE: RESEARCH RESULTS

This program used mixed-methods empirical research to evaluate a selection of artifacts supporting a professional development program. Stakeholders were asked to answer a survey to evaluate the first draft of program artifacts. They were then asked to provide written (qualitative) feedback on those documents, and some stakeholders were selected to participate in expert panel workshops. Program artifacts were revised based on those data, and a final survey was issued to evaluate the revised artifacts. This chapter presents the results of this research.

The data collected in this study were used to answer three research questions:

RQ1. To what extent do research-based interventions satisfy stakeholders' needs, as measured by a survey that assesses usability and functionality of the associated artifacts?

RQ2. How can qualitative feedback inform the formative evaluation of program artifacts?

RQ3. How does the design-based research process affect stakeholder's perception of artifact usability and functionality?

Quantitative data collected in Phase 1 helped to answer RQ1, while the qualitative data from Phases 1 and 2 supported RQ2. Finally, RQ3 was answered by comparing quantitative data from Phases 1 and 3, and by considering qualitative data collected in phase 3. The methods of data analysis, and the results they yielded, are further detailed in the sub-sections of this chapter.

### Phase 1 Analysis and Results

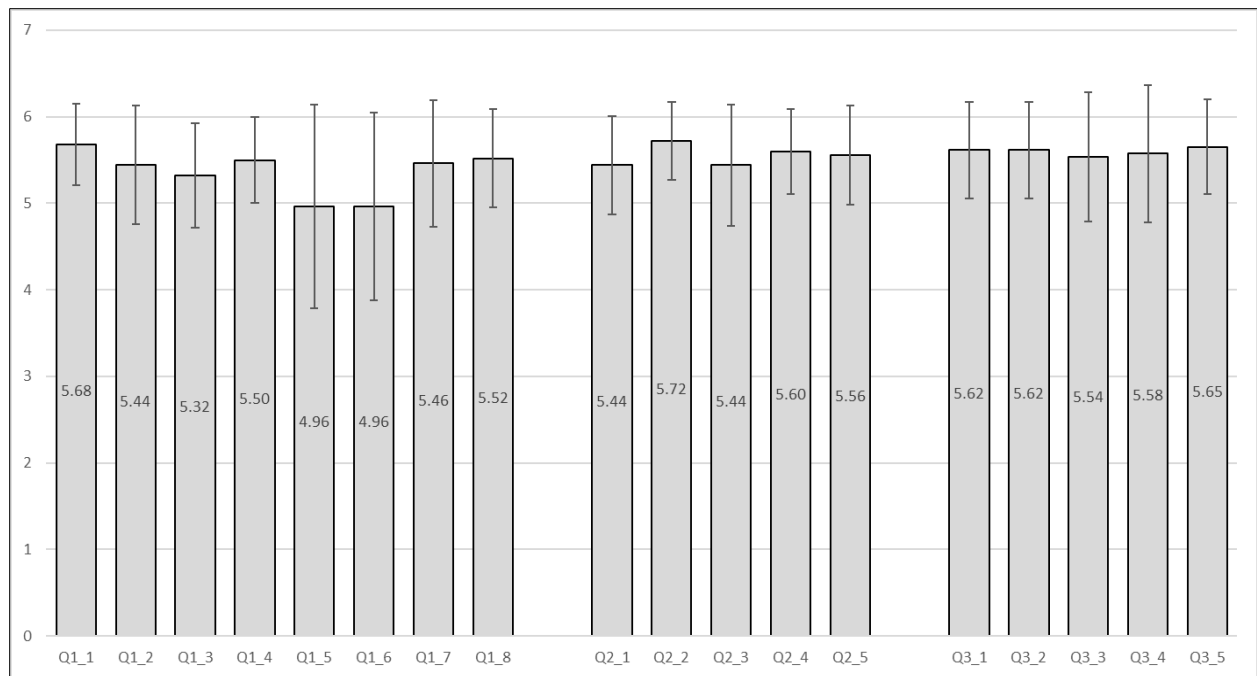
In the first phase of my research, I collected data through three methods: a survey, document reviews, and expert panel discussions. The survey provided both qualitative and quantitative data, while the document reviews and expert panels each yielded mostly qualitative

results. I considered each of these data sets individually, then aggregated the three sets into a unified set of feedback and used this to develop recommendations for revision.

### Phase 1 Quantitative Data

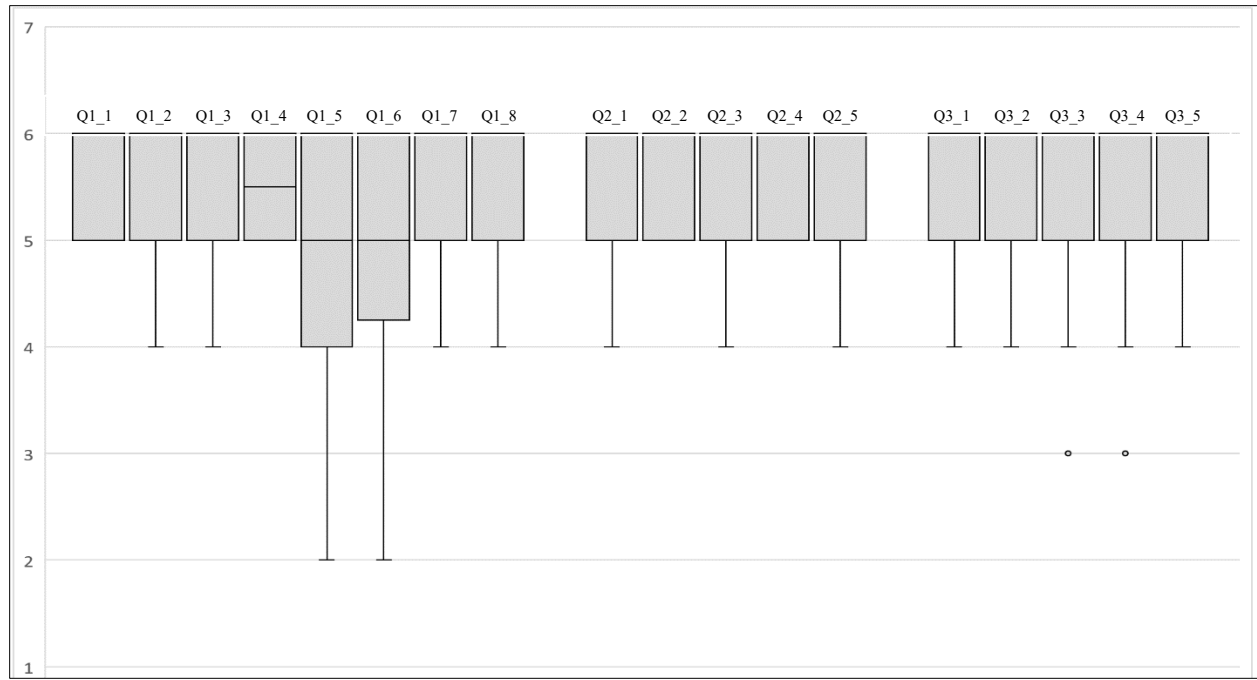
The quantitative data collected in Phase 1 served to answer my first research question: *To what extent do research-based interventions satisfy stakeholders' needs, as measured by a survey that assesses usability and functionality of the associated artifacts?* Survey results indicate that, overwhelmingly, respondents agreed with the positive statements regarding functionality and usability of the program artifacts. In that regard, the data answered the research question. However, minor variations in the data pointed to opportunities for improvement, which were further explored through qualitative feedback.

The Phase 1 survey asked respondents to evaluate the extent to which the artifacts met the functionality and usability standards. The survey was distributed to 100 division employees, and 28 employees responded. Responses were assigned numerical values from 1 to 6, with 6 representing “Completely Agree” and 1 representing “Completely Disagree.” A null value was assigned for “Unknown, Cannot Determine” so that these responses would not bias the results in either direction. Descriptive statistics are provided in Figure 13. Almost all of the mean measures were between 5 and 6, corresponding to the scale values of *Strongly Agree* or *Completely Agree*, and there was little variation in the results. I did note, however, two of the items had slightly lower mean values and slightly larger standard deviation values. I noted this minor variation for further consideration.



*Figure 13. First Survey Results-Mean and Standard Deviation*

While there was little variation in the Phase 1 survey data, I felt that further analysis might allow me some insight into which questions—and therefore which functionality and usability specifications—required some measure of improvement. To further analyze the survey results, I calculated the median score and interquartile range for each question. These results are provided in Figure 14. The top of the interquartile range (i.e., third quartile value) was at the top of the range for every question and, as a result, was inconclusive. Therefore, I relied on the median value and first quartile values. Most of the questions yielded a median value of 6, with only five of the 18 questions yielding a lower value. Analyzing the first quartile values, most were 5, with only two of the 18 questions yielding a lower value. But here again, items Q1\_5 and Q1\_6 had slightly lower values than all other items. Since both items refer to the assessment criteria in the PLRs, I noted their values for further investigation in the qualitative feedback.



*Figure 14. First Survey Results-Median and Quartile Values*

#### Phase 1 Qualitative Data

In Phase 1 of my data collection, qualitative data were drawn from three sources: document reviews, expert panel workshops, and open-ended questions in the survey. The document reviews yielded the largest quantity of qualitative data, while the expert panel discussions yielded the most detailed and insightful data. I compiled and analyzed these data to answer my second research question:

*RQ2. How can qualitative feedback inform the formative evaluation of program artifacts?*

I began compiling my qualitative data by combining all of the individual respondents' document review comment matrices into a single spreadsheet with three separate tabs—one for comments collected on the PLRs, one for comments on the CDP, and one for comments on the Policy Manual. I added two more tabs to this spreadsheet—one for survey comments and one for comments from the expert panel sessions. This process yielded over 700 individual comments or qualitative data points.

Once I had all of the qualitative data compiled, I set about to categorize the data according to type and theme. I recognized four types of data: general comments, editorial comments, comments on the content of the artifacts and comments on program policies.

General comments were not actionable, that is, they did not provide any information on which I could base corrections or revision to the artifacts. However, a majority of the general comments expressed positive feedback for the ATP program. Although they were not actionable, I felt that these comments were noteworthy in that they collectively illustrate the respondents' support and approval of the design of the program. I collected 33 such comments, a small sample of which are provided in Table 20.

***Table 20.***

*Sample of Comments Expressing Program Support*

<b>Source</b>	<b>Comment</b>
Doc Review	Awesome!
Doc Review	I LOVE THIS IDEA!!!!
Doc Review	Sign me up. I want to do this!
Doc Review	I like the PQS-like format and structure proposed for this program.
Doc Review	This is a great outline. It's important to understand everything we do in the division. I would definitely attend all of them.
Workshop	I'm impressed with how thorough this is, it gives everything you need to know joining the division
Survey	I wish this program was in place when I started at NAWCTSD!
Survey	I loved the rotational idea. How great.
Survey	I believe mentorship and rotations would be very helpful.

Source	Comment
Survey	This is long-overdue. It will help ambitious employees develop their careers and assist Branch Managers develop their employees.
Survey	I am looking forward to participating in the ATP Professional Development Program!
Survey	A program such as the ATP Professional Development Program is one that is a long time in coming, and very much needed for our division, especially in RRL. The program is well thought out, comprehensive, and provides a roadmap to proficiency in the core competencies of GT53. I also believe that, given the necessary full support at all levels within our division to make it successful, this program will serve to further unify our efforts, and promote collaboration among the different branches that make up GT53.

Editorial comments were those comments that addressed spelling, grammar, punctuation, font, use of acronyms, layout and arrangement of the documents, and minor wording changes that would not influence the meaning of my writing. There were over 200 such comments, all of which came from the document reviews. (Understandably, the survey and expert panel workshops did not yield any editorial comments.) These comments did not warrant any further analysis or discussion. I simply validated each editorial comment and incorporated those that I found to be valid.

The remaining qualitative data, which numbered in excess of 430 unique comments, I categorized as either Content or Policy data. Content data refer to the content of the deliverables,



while Policy data refer to the eventual implementation of the ATP program. I coded each of these comments according to one of the codes listed in Table 21. These codes emerged inductively through the coding process, and I consulted with my dissertation advisor for guidance throughout the process. After coding all of the content and policy comments, I reviewed all of the comments under each code to identify and document associated themes. These themes are documented in Table 22 and Table 23.

***Table 21.***

*Phase I Qualitative Data Codes*

<b>Content Codes</b>	<b>Policy Codes</b>
Terms and Definitions	Program Sequence/Progression
Add Content/Knowledge/Skills	Opportunities to Perform
Delete Content/Knowledge/Skills	Duration/Time Limits
RRL Content	Prior Experience
Alignment–Domain/Level	Roles and Responsibilities
Content Cluster and Sequence	Sign-off, Signature Authority
LOs–Verbs	Oral Board Concerns
LOs–Conditions and Standards	Voluntary Participation
Assessment Strategies	Reporting Requirements
Instructional Strategies	

**Table 22.**

*Content Themes*

<b>Code</b>	<b>Theme</b>
Terms and Definitions	Include a glossary to define key term used in the program.  Add a bibliography to the program documents to identify references and resources
Add Content	Add content relating to training technologies and lifecycle logistics.  Add additional government acquisition topics such as evaluating contractors' past performance and comparing open competitive acquisition with sole-source acquisition.
Delete Content	Compress the content related to evaluating Interactive Courseware.
RRL Content	Inclusion of RRL-related content would be irrelevant to those employees not assigned to support the RRL program.  The requirement to perform RRL tasks in completion of several PLRs would be limiting to those employees not assigned to the RRL program.
Alignment–Domain/Level	Align performance tasks or knowledge content at lower levels than those at which they were originally presented.  Associating given tasks with the titles of “Novice” or “Journeyman” may be misleading.
Content Cluster and Sequence	Clarify whether the numbering of the modules indicate the sequence in which the training should be administered.  Clarify how the organization of the content in the PLRs aligns with the clustering and sequencing of the LOs presented in the CDP.
LOs–Verbs	Clarify several of the verbs in the LOs, especially contribute, demonstrate, exercise, and summarize.
LOs–Conditions and Standards	The condition “From memory and without references...” as used throughout the LOs in the CDP may be inappropriate.  The use of the word “appropriate” and those objectives that use the phrase “satisfying the minimum requirements...” may be subjective, and therefore difficult to assess fairly.
Assessment Strategies	Clarify how a rubric would be used to assess a constructed response.

	Clarify how a demonstration with worked examples would be implemented as an assessment strategy.?
	The correct answer to summarizing a procedure may be subjective, and therefore difficult to assess fairly.
Instructional Strategies	Provide a greater focus on self-study than lecture in the instructional strategies.
	Provide more examples of real-world applications in the role playing.

**Table 23.**

*Policy Themes*

<b>Code</b>	<b>Theme</b>
Program Sequence/Progression	Clarify the progression through the iterative cycles of assessment, training, and proficiency described in the Policy Manual.  Short-term rotational assignments may not be feasible for all employees.
Opportunities to Perform	The need to rotate between branches and assignments may limit the opportunity to perform all of the requisite skills in a given domain.  Some of the requisite skills are performed quite infrequently, and therefore would rarely present an opportunity to perform.
Duration/Time Limits	Clarify the time it would take to complete all of the requisite skills in all of the PLRs.
Prior Experience	Clarify how senior employees might get credit for their prior experience.  Current employees may be (or should be) assessed at a level above novice, depending on their tenure.
Roles and Responsibilities	Provide additional clarification of the roles and responsibilities of the branch heads, technical leads, mentors, and the program administrator.  There is an apparent overlap between the roles and responsibilities of the branch heads and technical leads.
Sign-off, Signature Authority	Establish an objective set of criteria associated with each signature item in the PLRs, specifically the information required for Knowledge items.
Oral Board Concerns	Employees are not accustomed to this type of assessment, and therefore it may be extremely stressful for some.

Some of the negative experiences that employees have had associated with promotion interviews might be present in the oral board experience as well.

Include an option to present a portfolio of completed work to support expert-level certification.

#### Voluntary Participation

Clarify how employees might benefit from participation in the program and consider whether employees will participate voluntarily if the program is not mandatory.

Clarify if Continuous Learning Points (CLPs) will be awarded for participating in the program.

Clarify the relationship between this professional development program and existing standards for employee performance.

Consider that if the relationship between the professional development program and existing employee performance standards were clear, employees might be more willing to participate in the program.

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## Phase 1 Revisions

I made a number of document revisions based on the qualitative feedback received in Phase 1. I implemented these revisions by incorporating the compiled stakeholder comments into each of the program artifacts using the *Track Changes* features of MS Word. I acknowledged each general comment (i.e., those that were not actionable) and incorporated the editorial comments as appropriate. These two steps—acknowledging general comments and incorporating editorial comments—were relatively straightforward. Then I turned my attention to the content and policy feedback. Considering this feedback holistically, comparing the quantity and themes of the qualitative feedback as well as the implications of the first survey results, I identified the following program revisions to complete Phase 1:

- **Develop a Compendium that includes a glossary, bibliography, reference links and self-study materials.** This compendium is described in the policy manual, but it will not be developed as part of this study due to time constraints. Rather, I have proposed that the SMEs in GT53 should develop the contents of the compendium as they develop the program curriculum.
- **Expand the CDP to better define the instructional strategies and the assessment strategies.** In Phase 1, each instructional and assessment strategy was defined by a single, simple phrase such as *Demonstration with worked examples* or *Selected or constructed themes or summaries*. The revision to the CDP includes an expanded description of the activities prescribed for each instructional and assessment strategy.
- **Develop a cross-reference matrix to allow program participants to identify training modules and topics that correspond to PLR domains and levels.** Each LO in the CDP is based on a corresponding knowledge or skill item in a PLR. However, the LOs in the

CDP are clustered into modules and topics that do not directly correspond to the domains and levels of the PLRs. The cross-reference matrix allows program participants to determine the training modules and topics that best support their PLR activities.

- **Expound on the Oral Board policy.** The section of the Policy Manual that describes the conduct of the Oral Examining Board for Expert level has been expanded to allow the candidate to present a brief or portfolio of his or her completed projects.
- **Develop an alternative sign-off policy for prior experience.** In those instances where an employee enrolls in the ATP Program with significant prior experience in one or more of the PLR domains, the Policy Manual describes a method by which that employee may be given credit for that experience. In such an instance, all of the knowledge components must first be signed off using the standard process. This step ensures that the experienced employee indeed has the requisite knowledge. However, in lieu of performing all of the tasks for which the participant claims prior experience, he or she would be given the opportunity to provide a brief or portfolio to a body of SMEs in a forum much like the oral board as described in the Expert certification. The Policy Manual notes that this alternative certification for prior experience is only allowed at the Novice and Journeyman level, but not at the Expert level.
- **Develop an alternative sign-off policy for infrequent tasks.** Stakeholders provided feedback to the effect that certain skills are performed relatively infrequently across the GT53 division. In those instances, the requirement to perform such skills pursuant to certain certifications may hamper the participants ability to complete a given PLR. The Policy Manual now allows SMEs in the GT53 Leadership Team to omit or “strike through” a small number of performance tasks if, in their judgement, those tasks are not

required to show proficiency in the domain. Ultimately, GT53 leadership will need to determine if the infrequency of such tasks warrants their removal from the program.

- **Develop Short-Term Program Initiation Policy.** The Policy Manual directs the Division Head to identify a body of SMEs from the GT53 leadership team who will serve as certifying officials in the first two years of the ATP program. This policy is required for program initiation because, at the inception of the program, none of GT53 employees will have met the requirements to sign off knowledge or skill components, i.e., none will be certified Journeymen or Experts, able to sign the Novice or Journeyman tasks.

All of these revisions were incorporated into the applicable artifacts. Many of them required significant planning and consideration. After incorporating these changes, I reviewed each artifact for editorial quality and renamed each with “rev 1” in its title.

### Phase 2 Analysis and Results

Phase 2 of my research began after the revisions compiled from Phase 1 were implemented. With Phase 2 of my research, I continued to answer RQ2: *How can qualitative feedback inform the formative evaluation of program artifacts?* In this phase, the qualitative feedback came from the GT53 management team who served as an expert panel. Notional personnel profiles, or personas, were presented to the panel during two management team meetings. Throughout the meetings, I participated in discussions with the team (as I am also a member of the management team) and I captured discussion notes which I later transcribe into a descriptive transcript. I managed the presentation materials, facilitated discussion, answered their questions. I believe our familiar professional relationship ensured an open discussion and free flow of ideas and feedback.

The management team reviewed the PLRs against each profile to determine the likely proficiency level of the persona. The management team then conferred to determine which training modules would likely benefit the persona in achieving the next level of proficiency. Finally, the management team discussed possible assignments and mentoring opportunities for the persona. At the completion of each persona review, the management team discussed implementation of the program as a whole and the usability of the program artifacts. This process yielded several key topics of discussion:

- **Strategic planning:** As we conducted the portion of the personas exercise where we identify assignments and mentors, several participants noted that assignment planning should be done as a function of strategic planning. I explained that, according to the policy manual, branch rotations and reassignment are in fact based on strategic planning efforts. However, the topic also led to discussion of Individual Development Plans, or IDPs, which are required for all entry-level employees but optional for all others in our division.

**Resolution:** The management team came to consensus that an IDP is recommended for program participants, and I agreed to add this requirement to the policy manual.

- **Project availability:** When asked whether the program provided a holistic prescription, the Division Head noted that, although the program offered a holistic prescription, real-world constraints may impede implementation of such a prescription. In particular, project availability—or lack thereof—may limit an employee’s assignment opportunity.

**Resolution:** I was not able to offer an absolute resolution to this issue. The strategic planning approach described in the previous paragraph will help identify opportunities and alleviate some constraints. In addition, I have added allowances in the Policy Manual



for infrequent tasks, in response to Phase 1 feedback. However, the division will still need to consider real-world constraints when implementing the program.

- **Funding for implementation:** Following the discussion outlined in the previous paragraph, I questioned whether the Division Head thought we would have similar challenges in funding the labor required to develop the curriculum outlined in the CDP. I recognized that all of the labor performed by GT53 must be funded by a project, while funding for employee development is severely limited. In this discussion, I expressed my own concerns that the curriculum development effort may face funding challenges.

**Resolution:** The Division Head noted that there is a method in place to request funding for improvement initiatives. (I am familiar with the program, and I equate it to the way in which academia pursues grant funding.) The Division Head stated that he believes we have a solid foundation on which to develop a proposal to request funding for curriculum development. This is an effort I intend to pursue at the completion of this study.

- **Multiple simultaneous signatures:** A participant asked whether overlapping items can be signed off at once. For example, an employee that participates in a data collection workshop in support of an analysis project could get experience in multiple skills at once, such as "Collect data from Subject Matter Experts (SMEs) in an interview or workshop setting" and "Use existing data collection tools and templates to collect data." I noted that it would be acceptable—and is in fact common in the performance of PQS—to have more than one skill signed off at once. In response, another participant questioned how we would then filter out “granted” signatures—meaning signatures where the signer signs a number of items (either knowledge or skills) simply to appease the request of the employee. This, unfortunately, is also common in the performance of PQS. The

participant proposed a business rule stating that an employee is not permitted to get all signatures signed off by the same person on the same day. I offered that the endorsers have the responsibility to enforce the integrity of the signature process. The participant noted that on further consideration, there are good checks in place such as the two endorsers and Branch Head signature required for Novice and Journeyman certification, and the oral board requirements for Expert.

**Resolution:** I offered that I would better describe the roles and responsibilities of signers in the Policy Manual, giving particular attention to a discussion of integrity.

- **Opportunities at a given level:** As we evaluated skills at the expert-level for a persona portrayed as a GS-13, a participant questioned whether an employee at the GS-13 level would have the opportunity to provide advisory and consultative services (which is the language used to define the Expert level). I noted that, in my experience, employees who have shown the ability and aptitude to perform at a higher level are often given the opportunity to do so. As a result, I believe a high-performing, high achieving GS-13 enrolled in this program will have the opportunity to provide advisory and consultative services, as called for by the PLRs. Furthermore, the very design of this program is to provide employees the opportunity to perform the required skills particularly in a way that encourages growth and advancement.

**Resolution:** I did not offer resolution to this issue, other than to offer my personal anecdotal response. Upon further consideration, I am confident that I have categorized the task of providing “advisory and consultative services” at the correct level, as this task is derived from the GS-13 Interdisciplinary (1750/0180) Position Description PD #13971 (Department of the Navy, 2017) and the senior-most level of the Research Grade

Evaluation Guide (OPM, 2006). In other words, it is required of GS-13 employees and expected of our senior-most technical experts.

- **Studied knowledge versus experiential learning:** Participants discussed the knowledge items, particularly those with the verb “summarize” and noted that this level of knowledge can easily be learned simply through self-study. At least one participant noted that this type of learning is inferior to the deep, rich knowledge gained through experience. A participant proposed that the employees should perform the skills first, in order to gain a certain depth of knowledge. I offered that the program is designed to have the employees learn the basic, supporting knowledge first in order to perform the skills. I reminded the participants that at the expert level there is an oral board that tests overarching level of expertise.

**Resolution:** The participants agreed that the oral board would satisfy the requirement for in-depth questioning of the employees’ level of expertise.

- **Mentoring versus coaching:** After the portion of the personas exercise in which we selected a mentor, a participant questioned whether we meant mentor or coach. Some discussion ensued regarding the differences between coaching and mentoring. Ultimately, the participant offered me reference links to OPM policy on coaching and mentoring.

**Resolution:** I agreed to review the differences and evaluate whether mentor was the appropriate title for the role. After further review, I determined that the role, as I have defined it, shares elements of both coaching and mentoring. I chose to keep the title of mentor, as the mentor/protege relationship is one that is familiar to the workforce.

Recall that this phase of my research was intended to answer (at least in part) RQ2: *How can qualitative feedback inform the formative evaluation of program artifacts?* In response to RQ2, the qualitative feedback collected in Phase 2 added two additional requirements to the Policy Manual: a requirement to have an IDP in place for all program participants, and further descriptive details about the roles and responsibilities of signers, including a discussion of integrity. Additionally, I reviewed the differences between coaching and mentoring and opted to keep the title of Mentor for the role defined in this program.

Beyond answering RQ2, Phase 2 served as an integrated review of the entire program. The case studies allowed the management team to apply each of the program elements to arrive at a unified prescription. To this end, I was encouraged by both the process and the results. As the workshop progressed, I witnessed the managers considering each situation, weighing their options, and making decisions that would ultimately benefit these “notional” employees—the personas. Although they encountered some obstacles (e.g., Does our workload allow for the necessary assignments? Do we have the staff to support the mentorship? Do we have the funding we need?) they were ultimately able to work through the process and arrive at a prescription. Similarly, I was encouraged by the team’s results. For example, the group collectively decided that New-Hire Nancy would likely have the knowledge and skills required to complete the Analysis-Novice PLR, and she would be working through the Analysis-Journeyman PLR. They identified the *Requirements Analysis* module as recommended training for Nancy, and they identified a real-world project in GT532 to which Nancy could be assigned, along with an actual member of GT532 to be named as a mentor. I believe the management team’s ability to complete each notional scenarios is an indicator that the program can be successfully implemented.

### Phase 3 Analysis and Results

In Phase 3 of my research, I delivered the revised program artifacts to the division and re-issued the survey. This time, I distributed the survey to 109 employees (the division had grown slightly since the first survey) and 20 employees responded. The intent of Phase 3 was to answer RQ3. *How does the design-based research process affect stakeholder's perception of artifact usability and functionality?* I found that respondents continued to express support and endorsement for the program through qualitative feedback. However, quantitative data did not show measurable improvements on the survey when comparing Phase 1 to Phase 3. I will discuss the implications of this finding in the following chapter.

To answer the research question, I began by compiling the mean and standard deviation of each item in the second survey and comparing these results to the corresponding data from the first survey. This comparison is presented in

Figure 15 and summarized in Table 24. Although the results of the second survey did indicate that all measures were firmly in the range of *Strongly Agree* or *Completely Agree*, they showed little variation. I found it curious that some measured means decreased slightly from the first survey to the second, so I relied on statistical analysis to more clearly and accurately compare first and second survey results.

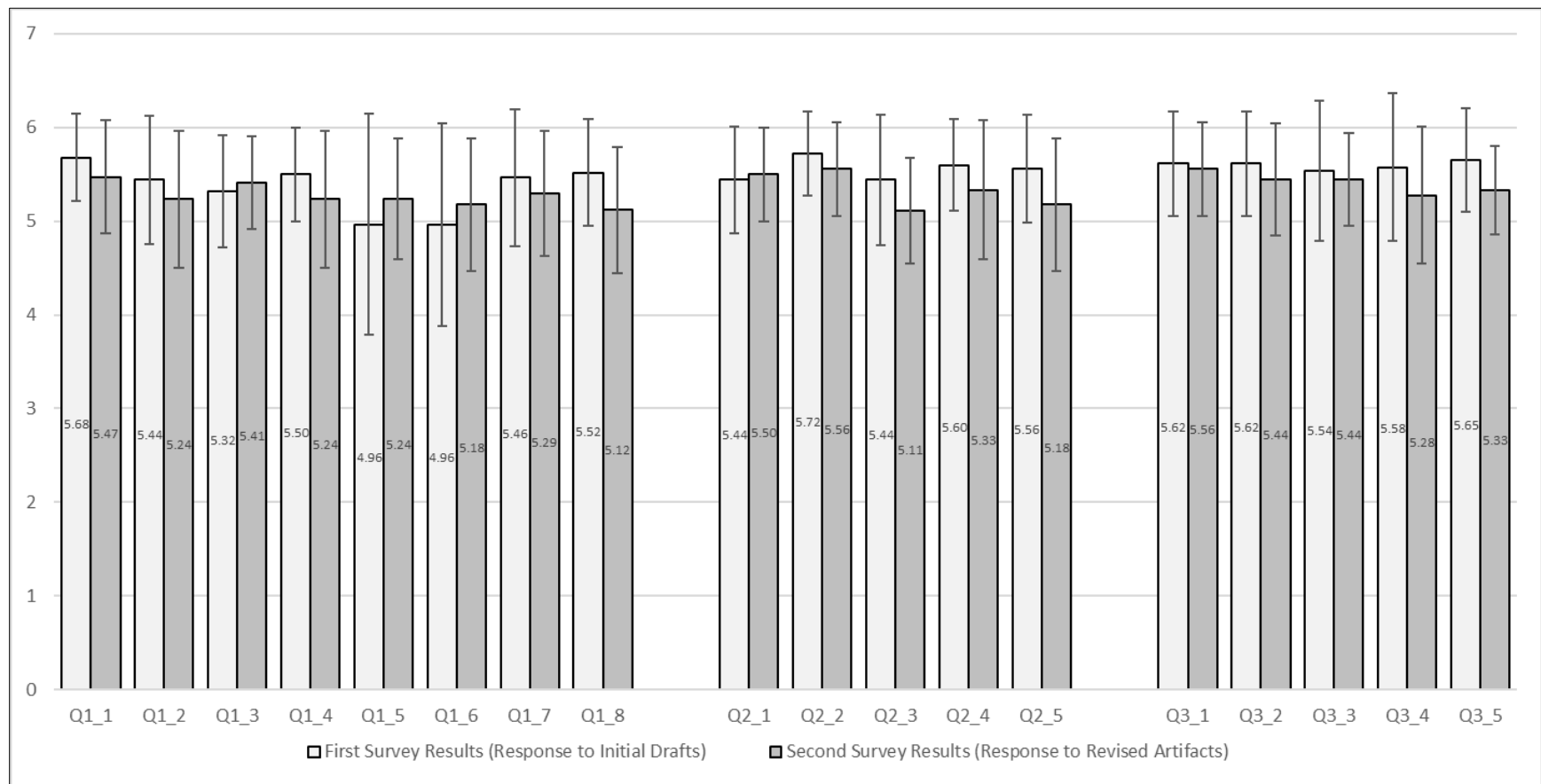


Figure 15. Comparison of First and Second Survey Results

**Table 24.***Comparison of Mean Values of First and Second Survey*

	<b>Question</b>	<b>Survey 1 (M)</b>	<b>Survey 2 (M)</b>	<b>Mean Difference</b>
<b>Question Group 1: PLRs</b>				
	Q1_1	5.68	5.47	-0.21
	Q1_2	5.44	5.24	-0.21
	Q1_3	5.32	5.41	0.09
	Q1_4	5.50	5.24	-0.26
	Q1_5	4.96	5.24	0.27
	Q1_6	4.96	5.18	0.21
	Q1_7	5.46	5.29	-0.17
	Q1_8	5.52	5.12	-0.40
<b>Question Group 2: CDP</b>				
	Q2_1	5.44	5.50	0.06
	Q2_2	5.72	5.56	-0.16
	Q2_3	5.44	5.11	-0.33
	Q2_4	5.60	5.33	-0.27
	Q2_5	5.56	5.18	-0.38
<b>Question Group 3: Policy Manual</b>				
	Q3_1	5.62	5.56	-0.06
	Q3_2	5.62	5.44	-0.17
	Q3_3	5.54	5.44	-0.09
	Q3_4	5.58	5.28	-0.30
	Q3_5	5.65	5.33	-0.32

For my statistical analysis, my intent was to consider each set of results as they were grouped according to program artifact: Questions Q1\_1 through Q1\_8 (Question Group 1) asked about the PLRs, questions Q2\_1 through Q2\_5 (Question Group 2) referred to the CDP, and questions Q3\_1 through Q3\_5 (Question Group 3) referred to the Policy Manual. I tested for internal consistency of the results within each of these groups using a test of Cronbach's alpha.

Each question group showed acceptable internal consistency. For the PLR group,  $\alpha = 0.80$ . For the CDP group,  $\alpha = 0.81$ . Finally, for the Policy Manual group,  $\alpha = 0.79$ .

Finding acceptable consistency within each group, I used the mean value of each question group as a variable for further analysis. Next, I tested the assumption of normality, required to use parametric statistics, using the Shapiro-Wilk Normality Test. The results were mixed, as presented in Table 25.

**Table 25.**

*Shapiro-Wilk Normality Test Results*

<b>Variable Group</b>	<b>Result (<i>W</i>)</b>	<b>Threshold (<i>p</i> = 0.10)</b>	<b>Pass/Fail</b>
Survey 1, PLR group	0.88	0.90	Fail
Survey 1, CDP group	0.83	0.90	Fail
Survey 1, Policy Manual group	0.81	0.90	Fail
Survey 2, PLR group	0.96	0.90	Pass
Survey 2, CDP group	0.92	0.90	Pass
Survey 2, Policy Manual group	0.88	0.90	Fail

Finding some of my data sets to be not normally distributed, I used non-parametric tests to compare first and second survey results. I performed two such comparison, one to compare the matched pairs of first and second survey results for those participants who completed both surveys, and another to compare all results from the first survey against all results from the second survey. I used the Wilcoxon Signed-Rank Test to compare the dependent samples of those participants that completed both the first and the second survey ( $N = 14$ ). For the PLR group, results were statistically insignificant,  $Mdn = 5.5$  in the first survey compared to  $Mdn = 5.3$  in the second survey, and effect size was small ( $W = 19$ ,  $p = .21$ ,  $d = -0.15$ ). For the



CDP group, results were statistically insignificant, Mdn = 5.5 in the first survey compared to Mdn = 5.2 in the second survey, and effect size was moderate ( $W = 13$ ,  $p = .29$ ,  $d = -0.24$ ). For the Policy Manual group, results were statistically insignificant, Mdn = 5.7 in the first survey compared to Mdn = 5.5 in the second survey, and effect size was small ( $W = -7$ ,  $p = .41$ ,  $d = -0.06$ ). These results are summarized in Table 26.

Finding no statistically significant results between the matched pairs, I then ran three Mann-Whitney tests to compare the entire set of first survey results to entire set of second survey results. Again, these data were not normally distributed. For the Proficiency Level Rubrics, results were statistically insignificant in comparing the first survey (Mdn = 5.5,  $N = 28$ ) to the second survey (Mdn = 5.3,  $N = 17$ ), and effect size was small ( $U_A = 205$ ,  $p = .22$ ,  $d = -0.18$ ). For the Curriculum Design Plan, results indicated a small, but statistically significant decrease in the measure when comparing the first survey (Mdn = 5.6,  $N = 25$ ) to in the second survey (Mdn = 5.3,  $N = 17$ ) and effect size was moderate ( $U_A = 140$ ,  $p = .03$ ,  $d = -0.64$ ). Finally, results for the Policy Manual were statistically insignificant when comparing the first survey (Mdn = 5.8,  $N = 26$ ) to the second survey (Mdn = 5.4,  $N = 18$ ) and effect size was moderate ( $U_A = 174$ ,  $p = .08$ ,  $d = -0.41$ ). These results are summarized in Table 26.

**Table 26.**

*Phase 3 Results Summary*

Measure	Artifact	Result (p)	Effect Size (d)
Wilcoxon Signed-Rank Test			
	Proficiency Level Rubrics	.21	-0.15
	Curriculum Design Plan	.29	-0.24
	Policy Manual	.41	-0.06
Mann-Whitney Test			
	Proficiency Level Rubrics	.22	-0.18

Curriculum Design Plan	<b>.03</b>	-0.64
Policy Manual	.08	-0.41

*Note. The independent samples (Mann-Whitney Test) of the Curriculum Design Plan revealed the only statistically significant result, and this result was slightly negative.*

While the quantitative data did not show statistically significant improvement, the qualitative data collected through the final survey were again quite positive. Respondents expressed general support for the program, much like the comments collected in Phase 1 and presented in Table 20. In addition, others spoke directly to the implementation of feedback and revision of artifacts. A brief sample of qualitative feedback drawn from the final survey is provided in **Table 27**.

**Table 27.**

*Final Survey Qualitative Feedback*

<b>Theme</b>	<b>Feedback</b>
Support	<p>I think the overall design of the program looks great. I am hoping to see this come to life. I think it would definitely give us a chance to grow, develop, and refine our skills.</p> <p>Program is well thought out and clearly presented. The documents alone are a great asset and the program will certainly help individuals and the programs we support.</p> <p>A lot of thought, analysis, and effort were clearly a part of this very thorough and complete body of work.</p>
Revisions	<p>Excellent implementation of the feedback provided. The revisions and enhancements to each of the documents are fantastic -- well thought out, very thorough, and relevant.</p> <p>I reviewed the revised material and verified that my comments and suggestions were properly addressed, and that any of the changes caused unintended negative consequences that required further revision that I could detect.</p>

I appreciated Figure 1 in the CDP for clearly demonstrating the relationship and application of the literature review to this effort. *[Figure 1 was added in revision.]*

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In addition to these supportive comments, some respondents provided feedback in the second survey that warranted additional consideration. For example, one respondent questioned the condition used in several learning objectives which requires the student to recall from memory without consulting references. Although I considered the respondent's concern, the use of this condition was intentional. In the design of the program, I assigned this condition according to the cognitive process of the objective, expecting the student to recall from memory without consulting references. I therefore intent to retain this condition as it has been presented. Another respondent recommended incorporating practice with instructional treatments. However, practice is clearly prescribed in the instructional treatment section of the Curriculum Design Plan, as a component of both Guided Mastery Modeling and Behavior Modeling Training. I considered these and several other comments from the Phase 3 survey for future implementation.

Recall that the overarching purpose of Phase 3 was to answer RQ3, which asks how the design-based research process affects stakeholders' perception of artifact usability and functionality? Qualitative data showed continued stakeholder support for the program as well as endorsement for the incorporation of Phase 1 and Phase 2 revisions. However, the quantitative data did not indicate any statistically significant improvement, I will discuss the implications of this finding in the following chapter.

## CHAPTER SIX: SUMMARY, DISCUSSION, AND CONCLUSION

### Introduction

The setting for this study was a specialized division within a large military organization. The division is staffed by approximately 100 civilian federal employees. The majority of these employees are either Instructional System Specialists or Research Psychologists, and most of them hold a master's degree or higher. However, despite being highly skilled and highly educated, these employees lack a clear path to career development within the organization. The purpose of this study was to design and evaluate a professional development (PD) program for the employees and managers of the division.

This chapter begins with a concise summary of this study and a synopsis of the associated research findings. The chapter then presents a discussion of these findings and their practical implications. The chapter concludes with a brief assessment of some of the study's limitations and a set of recommendations for future research. This chapter is intended to provide the reader with a high-level understanding of this dissertation in practice and its contributions to the body of knowledge in the broader fields of curriculum design and professional development.

### Summary

As an employee of NAWCTSD and a member of the GT53 division for over 14 years, I have come to recognize a series of interrelated challenges impeding employee development within the division. Specifically:

- Managers and employees alike lack any objective measures by which to effectively assess the employees' knowledge and skill level.

- Employees do not have access to specialized training for the unique knowledge and skills required for their assignment.
- Employees do not have any formal means by which to proactively develop the specialized knowledge and applied skills required for career progression.
- Employees may not be provided opportunities to develop the depth or breadth of skills expected for career progression.

In response to this complex problem of practice, I designed a PD program based on a review of relevant literature and guided by a selection of related theories and models. The program includes elements of assessment, training, and proficiency in the division's core competencies. The design of the program is documented in a collection of program artifacts which includes a set of Proficiency Level Rubrics (PLRs), a Curriculum Design Plan (CDP), and a Policy Manual.

After designing the program and developing the program artifacts, I began the design-based research phase of my study. In design-based research, the researcher collects qualitative and quantitative data to inform revisions to a program's design (The Design-Based Research Collective, 2003). Accordingly, I presented my artifacts to the members of the division and asked them to evaluate the functionality and usability of the individual artifacts and the program at large. Quantitative data were collected through a series of Likert-scale questions in a survey, while qualitative data were collected through document reviews and expert panel workshops. I revised the artifacts based on these data, and then presented the holistic program to an expert panel of division managers. After analyzing their feedback, I re-issued the survey and compared the final results to the initial results. My analysis of these data informed the answers to my research questions, described in the Findings section that follows.

## Findings

My research questions span the iterative phases of the design-based research process and, as a result, so do my findings. Research question 1 (RQ1) uses data to evaluate the initial design of the program: *RQ1. To what extent do research-based interventions satisfy stakeholders' needs, as measured by a survey that assesses usability and functionality of the associated artifacts?* Research question 2 (RQ2) investigates the use of data to evaluate and revise the program artifacts: *RQ2. How can qualitative feedback inform the formative evaluation of program artifacts?* Finally, research question 3 (RQ3) investigates the effectiveness of the process by comparing the initial products to the end results: *RQ3. How does the design-based research process affect stakeholder's perception of artifact usability and functionality?*

### Findings for Research Question 1

In response to RQ1, I found that research-based interventions certainly do satisfy the stakeholder's needs, in terms of functionality and usability. This is most evident from the results of the first survey. Stakeholders overwhelmingly agreed (either “mostly” or “completely” according to the scale) with positive statements about the functionality and usability of the artifacts. Although I looked for and found minor variations in the data, I also found it noteworthy that these data were consistently clustered near the top or “positive” end of the scale. Mean and median values were between 5 and 6 on a 6-point scale for every question, and upper quartile ranges were all above 5 points. Even lower quartile ranges were above 5 on all but two questions, and for those two questions, the lower quartile ranges still stayed on the positive end of the scale. If further evidence were needed, the comments listed in Table 20 further attest to the stakeholders' favorable response to the program.

### Findings for Research Question 2

In response to RQ2, I found the variety of sources and formats of qualitative data useful for different types of formative and summative evaluation. The document reviews certainly yielded the greatest quantity of feedback, which was most useful for editing the contents of the artifacts. And while the document review comments addressed a broad range of feedback, from editorial comments to more substantive suggestions, the expert panel workshops revealed much richer details. Through these discussions, I was able to truly understand of the stakeholders' confusion, questions, or concerns with the program. However, these workshops only represented a small sampling of the body of stakeholders, and as a result, I had to consider each expert's feedback critically against the larger body of data. Finally, the holistic program review served as both formative evaluation and a summative evaluation, informing program revisions and validating that the managers would be able to implement the program as designed. The qualitative data collected through document reviews, the expert panel workshops, and the holistic program review drove a number of program revisions which are presented in the Discussions section. All combined, the qualitative data collected through document reviews, expert panel workshops, and the holistic program review were instrumental in revising and improving the program, and each in its own way.

### Findings for Research Question 3

Findings for RQ3 were mixed. Qualitative data showed continued positive feedback, support and endorsement for program revisions, and some recommendations for additional improvements. However, from a quantitative perspective, I did not find measurable improvement in my program artifacts from initial draft to final release. To be more accurate, I did not find any statistically significant measure of improvement when comparing initial survey results to final

survey results. In fact, one variable actually showed a minor, although statistically significant decrease in its measure of stakeholders' perception. In the Limitations section of this chapter, I share some possible interpretations of this finding.

### Discussion

In this section, I present a series of discussions relevant to the findings of the study. I detail the design efforts which, I believe, led to the positive findings of RQ1. I also describe the revisions made in response to the findings of RQ2. Finally, I present direction for program implementation based on incorporation of elements of the literature review.

#### Initial Design Efforts

Perhaps the most surprising result of this study is the fact that quantitative data failed to show any statistically significant measure of improvement when comparing initial survey results to final survey results. I can only speculate as to why this occurred. To begin with, one could make the argument that, based on the overwhelmingly positive result of the first survey, there simply wasn't much room for improvement. It may be that, in response to RQ1, I simply "got it right the first time" and that all the revisions I made, relevant to RQ2, were little more than minor adjustments. Certainly, I took deliberate steps to follow the guidance and apply the theories and models found in my literature review. For example, the AERA/APA/NCME Standards (2014) specifically recommend that for workplace testing and credentialing programs, practitioners should conduct a comprehensive job analysis to ensure traceability between assessment items and desired workplace behaviors. Similarly, the ISD/SAT manual (U.S. Department of Defense, 2001) prescribes a series of analyses, beginning with job and task analyses, prior to designing any training curriculum. I adhered to this guidance and followed the recommendations explicitly. I developed the PLRs based on a detailed analysis of the



employee's job requirements. Federal policy, as well as locally generated position descriptions, yielded an extensive list of knowledge and skill requirements. I categorized these according to domain and level and compiled them into 12 PLRs reflecting the division's four core competencies, with each competency at one of three levels of expertise. Each of the PLRs includes a section for final certification, based on the guidance for credentialing provided by the Standards for Psychological and Educational Testing (AERA/APA/NCME, 2014). The knowledge and skill requirements of the PLRs also became the basis of the learning objectives (LOs) in the CDP.

I took similar steps to follow the practices prescribed by the ISD/SAT manual (U.S. Department of Defense, 2001), and I implemented sound instructional design based on Bloom's revised taxonomy (Anderson, 2014) and the Understanding by Design curriculum development model (McTighe & Wiggins, 2004). The ISD/SAT manual prescribes that LOs should contain three parts: conditions, behaviors, and standards. Therefore, to convert the PLR requirements into viable LOs in the CDP, I treated each PLR item as a behavior statement (either knowledge or skill), and I added conditions and standards. This process yielded over 200 LOs, and I organized these LOs into a series of 9 training modules and 56 training topics. I assigned an instructional treatment type and an assessment strategy to each LO based on Bloom's revised taxonomy (Anderson, 2014). I also developed an overview of each module based on the Understanding by Design model of curriculum development (McTighe & Wiggins, 2004). Finally, I developed a prescriptive instructional design section to guide those instructional designers who might be tasked to develop this curriculum in the future.

My instructional prescription incorporated many of the features found in the literature review to enhance learning and retention and to encourage training transfer. For example, all of

the content is relevant to the employees' work assignments (Baldwin & Ford, 1988), and each lesson will include a discussion of how the skills presented in training apply to the workplace (Govaerts & Dochy, 2014). Each topic will incorporate multiple learning strategies, task repetition, testing during training, and spaced or distributed practice following training (Ford, Baldwin & Prasad, 2018). Finally, each module is to include activities that follow the rules of Behavior Modeling Training, a model in which the instructor describes the skills to be learned, provides a model of the skills, allows practice opportunities, and provides feedback (Ford, Baldwin & Prasad, 2018; Taylor, Russ-Eft & Chan, 2005). Ultimately, it seems these efforts were recognized in the positive response to RQ1 and the lack of improvement noted in RQ3. So, perhaps it was unrealistic to expect measurable improvement in subsequent revisions.

### Design Revisions

The data captured throughout the research phases informed a number of program revisions. Following Phase 1 data collection, which included document reviews and expert panel workshops, I added a requirement to the policy manual for a Compendium that would include a glossary, bibliography, reference links and self-study materials. I also expounded on the Oral Board policy, and I expanded the CDP to better define the instructional strategies and the assessment strategies. I develop a cross-reference matrix that allows program participants to identify training modules and topics that correspond to PLR domains and levels. Finally, I developed a short-term program initiation policy and alternative sign-off policies for prior experience and infrequent tasks.

While Phase 1 data included ample actionable feedback, I also received some feedback that I did not incorporate. I chose not to incorporate feedback which was not supported by my analysis, or which was contrary to the literature. For example, some employees recommended

removing infrequent or unfamiliar tasking, even though these tasks were supported by job and task analyses. I chose to keep these tasks in the set of requirements, but I added provisions in the policy manual for assessing infrequent tasks. Also, the literature indicates that voluntary participation would improve participants' motivation, thereby encouraging transfer (Baldwin & Ford, 1988; Blume, Ford, Baldwin & Huang, 2010; Ford, Baldwin & Prasad, 2018). Yet several employees questioned the decision to make participation voluntary, and some recommended making the program mandatory. I did not implement this feedback.

Phase 2 yielded a body of qualitative data from the holistic program review. This review served as both formative evaluation and a summative evaluation. As formative evaluation, the program review drove several program revisions. On the advice of the panel experts, I added a requirement to the policy manual for program participants to have an Individual Development Plan (IDP) in place. The IDP is an existing but seldom-used tool for division employees. To be clear, I did not design the IDP. I merely added the requirement to implement the IDP as a companion to my PD program because managers believed it would support the implementation of the project. I also expanded the roles and responsibilities section of the Policy Manual, giving particular attention to a discussion of integrity for those charged with signing the assessment rubrics. Panel discussions also led me to validate that I had categorized certain tasking at the correct level and that the oral board would satisfy the requirement for in-depth questioning of the employees' level of expertise. Finally, as an instance of summative evaluation, the program review gave me a "go/no-go" marker telling me that the managers were ready and able to implement the program as designed.

Ultimately, I believe that both sets of survey results accurately represent the stakeholders' positive views of the functionality and usability of the program. I maintain my position that the

iterative process of evaluation and revision produced qualitative improvements, even if these improvements were not recognized in the quantitative data. Finally, I interpret these results as providing positive validation that, following the widely accepted processes of analysis and design, I have produced a functional, usable set of artifacts and a well-designed PD program.

### Direction for Implementation

Some of the curriculum design features are carried forward into the policy manual, since they address not only the design of the curriculum but the implementation of the program as well. For example, participation in the training is strictly voluntary (Blume, Ford, Baldwin & Huang, 2010) and supervisors will clarify how employees are selected to participate in the training (Govaerts & Dochy, 2014). In addition, supervisors or instructors will provide a realistic preview of the training (Ford, Baldwin & Prasad, 2018), and at the completion of each training event, supervisors or instructors will assist employees in establishing short-term and long-term goals for applying the learned skills (Govaerts & Dochy, 2014; Grossman & Salas, 2011). The Policy Manual also prescribes rotational assignments and mentorship arrangements based on Vygotsky's concepts of sociocultural development including the zone of proximal development (ZPD) and the more knowledgeable other (MKO) (Eun, 2018; McLeod, 2018, 2019).

The design features that are inherent in the program design are codified by the program artifacts. For example, the AERA/APA/NCME Standards (2014) call for assessment items for workplace testing and credentialing to be linked to authentic job requirements, and in this program they are. Similarly, the learning objectives in the curriculum plan are based on a job and task analysis, and the verbs used in the learning objectives are aligned to the desired type and level of learning, in accordance with the guidance provided by the ISD/SAT manual (U.S. Department of Defense, 2001). Furthermore, the instructional treatments are aligned to

knowledge types and assessment strategies are aligned to cognitive domains, both according to Bloom's revised taxonomy (Anderson, 2014). These features will likely remain with the program, provided the artifacts are not revised significantly.

However, some design features are only suggested by the program artifacts, and still others might only be implemented if the participants adopt them into their workplace culture. For example, Grossman and Salas (2011) cite supervisors' behaviors that help ensure transfer, such as goal setting, providing feedback, recognition, and rewards, expressing encouragement and confidence in the trainees abilities, and discussing the application of learned skills to the job. Govaerts & Dochy (2014) provide further examples, such as clarifying why trainees were selected for training, demonstrating interest in the training content, expressing encouragement and confidence in the trainees abilities, discussing the application of learned skills to the job, monitoring the trainees' application of learned skills, and tolerating mistakes by the trainees as they apply their newly learned skills. The literature also makes several recommendations for peer support, which has a great influence on skills sustainment (Hughes, Zajac, Woods, and Salas, 2020). Peers should exhibit behaviors such as networking, idea sharing, coaching, giving and receiving feedback (Grossman & Salas, 2011). From my position not only as a researcher but as a stakeholder in the leadership of the division, I intend to provide my personal oversight and guidance throughout the program's implementation (outside of the scope and span of this study) to ensure these features are understood and adopted to the greatest extent possible.

### Implications

This dissertation in practice has implications for a variety of communities: for the employees and managers for whom the PD program was developed, for the fields of

Instructional Design and Curriculum Design, for higher education, and for the greater body of knowledge concerning design-based research and training transfer.

This study clearly has implications for the employees and managers of NAWCTSD's GT53 division. Principally, the division now has a PD program to begin to address its complex problem of practice. The PD program, as presented in this study, includes a variety of design features that were drawn from the literature, and which are intended to ensure training transfer takes place. While some of these features are inherent in the program design, others will not be evident until the program is implemented. So, even as this program is presented to the division, the employees and managers will share the responsibility of implementing the program as prescribed.

This study also has implications for higher education, in that it provides an applied example of design-based research being used for a doctoral dissertation in practice. This study was performed pursuant to the degree of Doctor of Education, specializing in Curriculum and Instruction, at the University of Central Florida. This program carries a particular requirement for a dissertation in practice. Program policy directs that the dissertation in practice address a real-world complex problem of practice. My study represents just such a project, and it stands as an example of how design-based research can satisfy these and similar requirements. Future students of this program, and students of doctoral programs with similar requirements, should consider design-based research as a viable methodology for a dissertation in practice.

Finally, this study has implications for the greater body of knowledge concerning training transfer. This study adds to that body of knowledge, I believe, in a unique way. Whereas most studies could be considered *reactive*, documenting what has been shown in the past to enhance transfer, I consider this study to be *proactive*, demonstrating a path forward—a prescriptive

method by which to incorporate these features into a program. I believe this to be a unique feature of this study, with valuable implications to the greater body of knowledge.

Throughout my literature review, and indeed far beyond the sample of literature that I reviewed, there is a vast body of knowledge validating the measures that encourage or enhance training transfer. From Baldwin and Ford's seminal literature review in 1988 to their updated meta-analyses (Blume, Ford, Baldwin, and Huang, 2010; Ford, Baldwin & Prasad, 2018), including the related literature review by Grossman & Salas (2011) and the myriad of focused studies such as the meta-analysis of Behavior Modeling Training by Taylor, Russ-Eft, and Chan (2005), the meta-analysis focused on workplace environment by Hughes, Zajac, Woods, and Salas (2020), the meta-analysis focused on the characteristics of supervisor support by Govaerts and Dochy (2014) and the literature review on the effects of supervisor support by Tonhäuser and Bükér (2016), all of these studies documented, in simple terms, what has worked in the past. They do so by analyzing interventions that are already in place, already established, and already implemented. But this study, with its inclusion of the Program Design presented in Chapter 3, demonstrates a series of methods by which to implement these proven measures into a real-world program of practice.

In their 2018 meta-analysis, Ford, Baldwin, and Prasad recommended taking a more problem-centered approach to ensuring training transfer occurs. Baldwin, Ford, and Blume (2017) made a similar recommendation, this time referring to a more consumer-centric approach. In this context, a problem-centered approach includes a greater focus on the role of the training intervention in the organization. and a consumer-centric approach is one that includes greater involvement of training practitioners. It is my contention that this study, with its detailed discussion of program design tied to a conceptual framework, is a working example of a

problem-centered and consumer-centric approach. This study is problem-centered in that it prescribes a solution to an authentic problem of practice, and it is consumer-centric in that it prescribes the solution to be implemented by an authentic body of training practitioners, i.e., the employees and managers of the GT53 Division of NAWCTSD. In this regard, I believe this study adds unique value to the greater body of knowledge by moving from an academic, theoretical perspective to a situated, practical perspective.

### Limitations

While I have suggested the possibility that there was little room for improvement in my initial design, I also question the likelihood of this suggestion. I find the idea contradicted by the fact that I received so much qualitative feedback in the form of suggestions for improvement. In fact, I did make numerous edits and significant revisions in response to the qualitative feedback, and I do believe that my edits and revisions reflect qualitative improvements. I simply did not produce any quantitative data to show as much. And so, perhaps the answer lies in how my survey data were collected.

One possibility, which might explain the overwhelmingly positive responses on both the initial and final surveys, is that perhaps my trustworthiness efforts in data collection were not effective. In Chapter 1, I noted that my personal and professional relationships with members of the division, particularly my supervisory position with my direct reports, had the potential to introduce bias into the program. I did take measures to reduce any such bias, as described in Chapter 4. Nevertheless, employees may have felt pressure not only to participate, but to provide favorable feedback. It also appears, in hindsight, that my presentation of survey items may have been biased toward positive results. That is, I essentially asked each participant, “Do you agree with these statements?” I then presented a series of positive statements such as:



*The assessment criteria are objective...*

*The LOs are aligned to appropriate learning levels...*

*The Policy Manual provides clear guidance...*

Respondents might have been apt to apply in the affirmative—particularly if they were enthusiastic about the program overall. I offer recommended solutions to both of these possible sources of bias in the Recommendations for Future Research section.

One of the greatest limitations of this study, at least by my own acknowledgement, was the time required to effectively carry out design-based research. In addition to the activities normally associated with a doctoral dissertation—collecting, analyzing, and documenting my research—this study included the additional activities of designing and developing the intervention. In a year-long dissertation, I spent the better part of 6 months developing the PD program and additional time revising my artifacts based on my first set of data. But to be clear, I would not have had it any other way. From the beginning of my studies, I was intent on producing a dissertation in practice that had a practical purpose. I value the scholar-practitioner focus of my chosen EdD program, and I think that design-based research affords an opportunity to not only conduct mixed-methods empirical research, but to do so with the added benefit of producing an intervention with practical applicability. Doctoral students considering a design-based research study should simply recognize this time requirement and plan according.

Another limitation of this study, related to the aforementioned time constraint, was that this study does not measure the effectiveness of the designed program. I anticipate it might take months to begin implementation, and perhaps years to realize the benefits of the program. Consider that this program, as designed, includes the curriculum design *plan*, but not the actual curriculum. As such, the staff of the GT53 division will need to develop that curriculum

according to the plan. Beyond developing the curriculum, the employees and managers will need to begin the process of assessing employees' knowledge and skills, assigning employees to their rotation assignments, and arranging the mentorship arrangements. These assignments and mentorships will require time to implement, just as Eun (2018) describes the process of internalization taking place over time. And so it seems that only time will tell the extent to which my PD program benefits my stakeholder community, but I believe the time spend designing the program was time well spent.

One additional limitation of this study is its generalizability. By introducing this limitation, I must distinguish between the generalizability of the *processes* followed throughout this study, and the generalizability of the *results*. Furthermore, and more specifically, I must distinguish between the *research* results and the program *design* results. It is specifically the program *design* results that are limited in their generalizability.

Certainly, the processes described in this dissertation in practice are generalizable. In fact, the generalizability of the processes may be this study's most significant contribution to the greater body of knowledge. The utility of the processes described in Chapter 3, which are based on the literature presented in Chapter 2, are ultimately validated by the data presented in Chapter 5. Practitioners could presumably follow the same design process and expect similarly successful results. But while the processes are quite generalizable, the specific results of these processes, that is, the content of this PD program, are quite limited in their applicability. The design results reflect the unique knowledge and skill requirements of the Instructional System Specialists and Research Psychologists assigned to the GT53 Division of NAWCTSD. In this regard, the program design presented herein is limited in its generalizability to a very specific segment of the Instructional System Specialist and Research Psychologist workforce.

### Recommendations for Future Research

In the previous section, I identified several limitations to my study. As this study was conducted as a doctoral dissertation, I think it is fair to say (and somewhat expected) that I some valuable lessons learned along the way. I now recognized some improvements I could have made to my own research methods, and I provide them as recommendations for future research.

In my Limitations section, I identified possible bias in my data collection – personal bias among my colleagues and direct-reports, and positive bias in the wording of my survey items. I have come to realize some steps which I could have taken to guard against these biases. Hypothetically, I could have made additional arrangements such that the subjects would not know that I was the primary researcher. For example, I could have placed an intermediary between myself and the subjects. An additional researcher–someone unknown to the division employees–could have been the point of contact to solicit and collect survey responses. But even as I propose this hypothetical arrangement, I question its necessity because the qualitative data, particularly from those instances where I was in direct personal contact with the stakeholders, provided some of the most critical feedback. With that perspective in mind, it appears to me that participants were honest and forthcoming in their participation. A more valid approach might have been to ask:

*How objective are the assessment criteria?*

*To what degree are the LOs aligned to appropriate learning levels?*

*To what extent does the Policy Manual provide clear guidance?*

This might have elicited more critical thought, and therefore resulted in more accurate responses from participants. In fact, the second survey may better represent the expected degree of critical thought. That is, by the time participants took the second survey, they had reviewed the survey twice, some had participated in detailed discussions about the program, and they had

had more time to consider the implications of the program. With that in mind, some may have taken a more critical look at the artifacts for the second survey, and this may be the reason for the more critical judgement.

I also identified time constraints as a significant limitation. Pool & Laubscher (2016) investigated whether design-based research was appropriate for short-term studies such as graduate dissertations. They proposed a model by which design-based research would be effective for such time-constrained projects. In their model they propose a series of what they call micro- and meso-cycles, with micro-cycles representing discrete activities and meso-cycles being groupings of two or more micro-cycles. Their study included two meso-cycles: the first being comprised of two micro-cycles, intervention design and pre-test, and the second being comprised of three micro-cycles, data analysis, intervention revision, and a post test. In this regard, their study design was not unlike mine, with cycles of design, evaluation, revision, and re-evaluation, ending in a post-test. However, for future research, I would recommend an additional cycle of implementation and re-evaluation. I would recommend that the researcher carry the program past design to the first implementation and re-evaluate the program at that point.

In my study I conducted a holistic program review using personas, or notional personal profiles. This process and its results are defined in the Data Collection Methods section of Chapter 4, and the results are described in the Phase 2 Analysis and Results section of Chapter 5. While this process served to evaluate the program's readiness, it did so under contrived, notional conditions. I believe the holistic program review would be more informative if it were carried out under more genuine conditions. To be clear, I am not proposing to eliminate the personas review. Rather, I am proposing to add an additional evaluation micro-cycle that would carry the program

review further. While the personas review provided a useful first-pass to determine that the program was ready for implementation, a second program review using actual employee assessments and assignments would provide additional useful insight.

Another, more specific recommendation for future research would be to conduct a follow-on study that tracks the implementation of this PD program over time. It would be quite informative to measure and document employees' professional development and/or to evaluate the effectiveness of this PD program. A researcher could compare the assessed knowledge and skills of program participants and non-participants, or track participants' professional development over time in a longitudinal study. A researcher could also investigate the lived experiences of program participants through a phenomenological study. As I move forward with program implementation, I will keep program records such as the number of employees who enroll, their assessment levels, assignments and training attendance. Follow-on efforts could leverage these records and collect additional data in the future.

### Conclusion

Several years ago, as I began to consider furthering my education toward a doctoral degree, I knew that I wanted to focus my effort toward becoming a scholar practitioner. I knew that whatever research I might eventually conduct it should have an applied, practical purpose. And now, at the conclusion of my research, I see my study as a bit of an amalgam—a combination of mixed-methods empirical research and a practical example of curriculum and instructional design. I am satisfied knowing that the program design was based on extant research, while my evaluation of the program design in turn yielded empirical research data. I hope that both aspects of the study—the PD program design and the mixed-methods empirical research—will each have a practical value that benefits a community of practice.

The PD program design began with the recognition of a need—the need of my colleagues for a clear path toward career development. With this need in mind, I began my research. I compiled a volume of information about curriculum design, training transfer, employee testing and credentialing, and social learning and development. I combined that knowledge with my skills as an instructional designer—skills gained in a career spanning over 25 years—to develop what I believe will be an effective system of employee assessment, training, and development.

With the program designed and the artifacts drafted, I began the empirical research study. I conducted an iterative series of evaluations and revisions, collecting both quantitative and qualitative data to support my findings. In the end, the data showed that program artifacts were well aligned to my functionality and usability specifications. Just as importantly, or perhaps more importantly, the data also showed that stakeholders were satisfied with the program design, and they were enthusiastic to see it implemented.

And so, I conclude this study with a recognition of its implications and a number of recommendations for the future. I trust the employees and managers of my stakeholder community will implement the program as intended, and I welcome the opportunity to support future research on the subject. Whether formally or informally, I intent to monitor the program as it is implemented, and I look forward to realizing the benefits of this program on behalf of my colleagues and my academic community.

## APPENDIX A: EXTRACTED KNOWLEDGE AND SKILL STATEMENTS

**Table 28.***Knowledge and Skill Statements for the Acquisition Domain*

Level	ID	Objective
Novice	K101	Exemplify (illustrate, instantiate) training data product Data Item Descriptions (DIDs).
Novice	K102	Summarize (abstract, generalize) the content of each training data product Data Item Description (DID).
Novice	K103	Summarize (abstract, generalize) the purpose of each training data product Data Item Description (DID).
Novice	K104	Summarize (abstract, generalize) the relationship between Data Item Descriptions (DIDs) and Contract Data Requirements Lists (CDRLs)
Novice	K105	Exemplify (illustrate, instantiate) how to tailor a Data Item Description (DID).
Novice	K106	Summarize (abstract, generalize) the purpose of a Statement of Work (SOW).
Novice	K107	Summarize (abstract, generalize) the purpose of a Statement of Objectives (SOO).
Novice	K108	Summarize (abstract, generalize) the format of a Statement of Work (SOW).
Novice	K109	Summarize (abstract, generalize) the format of a Statement of Objectives (SOO).
Novice	K110	Summarize (abstract, generalize) the purpose of section L of a Request for Proposal (RFP).
Novice	K111	Summarize (abstract, generalize) the purpose of section M of a Request for Proposal (RFP).
Novice	K112	Recall (retrieve) proposal evaluation terms and definitions.
Novice	K113	Summarize (abstract, generalize) market research rules.
Novice	K114	Summarize (abstract, generalize) proposal evaluation rules.
Novice	K115	Summarize (abstract, generalize) contract discussion rules.
Novice	K116	Summarize (abstract, generalize) contract negotiation rules.
Novice	K117	Summarize (abstract, generalize) market research procedures.
Novice	K118	Summarize (abstract, generalize) proposal evaluation procedures.
Novice	K119	Summarize (abstract, generalize) contract discussion procedures.
Novice	K120	Summarize (abstract, generalize) contract negotiation procedures.
Novice	S101	Conduct market research to support a new acquisition effort.
Novice	S102	Support development of (contribute to) a Statement of Work (SOW) or Statement of Objectives (SOO) for a new acquisition effort.
Novice	S103	Support development of (contribute to) sections L and M of a Request for Proposal (RFP).
Novice	S104	Tailor Data Item Descriptions (DIDs) to develop Contractor Deliverable Requirements Lists (CDRLs).
Novice	S105	Participate in source selection activities including proposal evaluations, discussions, and/or negotiations.
Novice	S106	Serve as a member of a government/contractor Integrated Product Team (IPT) on an acquisition effort.
Journeyman	K201	Exemplify (illustrate, instantiate) the components of a Work Breakdown Structure (WBS).
Journeyman	K202	Exemplify (illustrate, instantiate) the components of a Resource Cost Estimate (RCE) or an Independent Government Cost Estimate (IGCE).
Journeyman	K203	Exemplify (illustrate, instantiate) the responsibilities and authority of a Technical Point of Contact (TPOC).
Journeyman	K204	Exemplify (illustrate, instantiate) labor planning rates.
Journeyman	K205	Summarize (abstract, generalize) the characteristics of a sound technical approach.
Journeyman	S200a	Plan [the use of] the resources assigned to the [acquisition] team.
Journeyman	S200b	Direct and control the resources assigned to the [acquisition] team.
Journeyman	S200c	Review and approve [acquisition] work products developed by the team.
Journeyman	S200d	Revise [acquisition] work products developed by the team.
Journeyman	S201	Serve as a Technical Point of contact (TPOC) or Contracting Officer's Representative (COR) on an acquisition effort.
Journeyman	S202	Evaluate management (i.e., non-instructional) deliverables such as agendas, minutes, status reports, Integrated Management Plan (IMP) and Integrated Master Schedule (IMS) for compliance with CDRL requirements.



Journeyman	S203	Document contractors' performance through the Contractor Performance Assessment Reporting System (CPARS)
Journeyman	S204	Develop a Work Execution Plan and/or Work Breakdown Structure for a new acquisition effort.
Journeyman	S205	Develop a Resource Cost Estimate (RCE) or Independent Government Cost Estimate (IGCE) for a new acquisition effort.
Journeyman	S206	Develop a Statement of Work (SOW) or Statement of Objectives (SOO) for a new acquisition effort.
Journeyman	S207	Develop sections L and M of a Request for Proposal (RFP).
Journeyman	S208	Evaluate technical proposals, work statements, and cost breakdowns submitted by commercial contractors or in-house resources.
Journeyman	S209	Represent the Instructional Systems Design functional discipline to lead or be a member of an Integrated Product Team (IPT) with an emphasis on involvement of all Stakeholders (users, customers, management, developers, contractors) in a collaborative forum.
Journeyman	S210	Function as a team leader to develop a Statement of Work (SOW) or Statement of Objectives (SOO) for a new acquisition effort.
Journeyman	S211	Function as a team leader to tailor Data Item Descriptions (DIDs) to develop Contractor Deliverable Requirements Lists (CDRLs).
Journeyman	S212	Function as a team leader to develop sections L and M of a Request for Proposal (RFP).
Journeyman	S213	Function as a team leader in source selection activities including proposal evaluations, discussions, and/or negotiations.
Expert	K301	Exemplify (illustrate, instantiate) the components of an acquisition strategy.
Expert	K302	Recall (retrieve) the sequence of proposal evaluation activities.
Expert	S301	Define technical requirements for a new acquisition effort (i.e., requirements definition).
Expert	S302	Develop an Acquisition Strategy for a new acquisition effort.
Expert	S303	Develop evaluation criteria for technical proposals, work statements, and cost breakdowns submitted by commercial contractors or in-house resources.
Expert	S304	Clarify training design ambiguities in a contractor's proposed technical approach or work plan.
Expert	S305	Highlight areas of design deficiency in a contractor's proposed technical approach or work plan.
Expert	S306	Resolve conflicting information in a contractor's proposed technical approach or work plan.
Expert	S307	Select the best technical approach submitted in response to a solicitation.
Expert	S308	Provide information to program sponsors, on which major training and budgetary decisions will be based, as measured by the commitment of personnel and financial resources within the DOD Planning, Programming, and Budgeting System (PPBS)
Expert	S309	Provide authoritative advisory and consultation services to the Project Managers (PJM) for training system/device acquisition on matters related to the interpretation of complex training requirements and the application of education and training principles to training problems.

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**Table 29.***Knowledge and Skill Statements for the Analysis Domain*

Level	ID	Objective
Novice	K101	Recall (retrieve) data inputs and outputs of a needs assessment, needs analysis, or training need analysis.
Novice	K102	Recall (retrieve) data inputs and outputs of a Training Situation Analysis (TSA).
Novice	K103	Recall (retrieve) data inputs and outputs of a Job Task Analysis (JTA) or Job Duty Task Analysis (JDTA).
Novice	K104	Recall (retrieve) data inputs and outputs of a Training Task Analysis (TTA).
Novice	K105	Recall (retrieve) data inputs and outputs of a Rating Domain Analysis (RDA) for Sailor 2025 Ready Relevant Learning (RRL).
Novice	K106	Recall (retrieve) data inputs and outputs of a media analysis, fidelity analysis, or Media/Fidelity Analysis (MFA).
Novice	K107	Recall (retrieve) data inputs and outputs of a Business Case Analysis (BCA) or Cost Benefit Analysis (CBA).
Novice	K108	Summarize (abstract, generalize) the purpose of a needs assessment, needs analysis, or training need analysis.
Novice	K109	Summarize (abstract, generalize) the purpose of a Training Situation Analysis (TSA).
Novice	K110	Summarize (abstract, generalize) the purpose of a Job Task Analysis (JTA) or Job Duty Task Analysis (JDTA).
Novice	K111	Summarize (abstract, generalize) the purpose of a Training Task Analysis (TTA).
Novice	K112	Summarize (abstract, generalize) the purpose of a Rating Domain Analysis (RDA) for Sailor 2025 Ready Relevant Learning (RRL).
Novice	K113	Summarize (abstract, generalize) the purpose of a media analysis, fidelity analysis, or Media/Fidelity Analysis (MFA).
Novice	K114	Summarize (abstract, generalize) the purpose of a Business Case Analysis (BCA) or Cost Benefit Analysis (CBA).
Novice	K115	Summarize (abstract, generalize) the purpose of data collection tools and templates.
Novice	K116	Summarize (abstract, generalize) the purpose of data analysis models.
Novice	S101	Collect data from Subject Matter Experts (SMEs) in an interview or workshop setting.
Novice	S102	Observe fleet SMEs in situ task performance in support of a task analysis.
Novice	S103	Review operational and maintenance manuals to extract task statements in support of a task analysis.
Novice	S104	Observe training facilities and training activities in support of a training situation analysis.
Novice	S105	Use existing data collection tools and templates to collect data.
Novice	S106	Apply existing data analysis models, methods, and algorithms to analyze data.
Novice	S107	Document the output of data analysis models, methods, and algorithms.
Novice	S108	Contribute to or support the development of a Training System Requirements Analysis (TSRA).
Novice	S109	Contribute to or support the development of a Training Situation Document (TSD).
Novice	S110	Contribute to or support the development of an Instructional Performance Requirements Document (IPRD).
Novice	S111	Contribute to or support the development of a Training Device Decision Coordinating Paper (TDDCP).
Novice	S112	Contribute to or support the development of a Training System Functional Description (TSFD) or Military Characteristics Document (MCD).
Journeyman	K201	Exemplify (illustrate, instantiate) existing data collection tools and templates.
Journeyman	K202	Exemplify (illustrate, instantiate) existing data analysis models.
Journeyman	K203	Summarize (abstract, generalize) the content, format, and structure of a Training System Requirements Analysis (TSRA).
Journeyman	K204	Summarize (abstract, generalize) the content, format, and structure of a Training Situation Document (TSD).
Journeyman	K205	Summarize (abstract, generalize) the content, format, and structure of an Instructional Performance Requirements Document (IPRD).
Journeyman	K206	Summarize (abstract, generalize) the content, format, and structure of a Training Device Decision Coordinating Paper (TDDCP).
Journeyman	K207	Summarize (abstract, generalize) the content, format, and structure of a Training System Functional Description (TSFD) or Military Characteristics Document (MCD).
Journeyman	K208	Summarize (abstract, generalize) techniques and methods to conduct a needs assessment, needs analysis, or training need analysis.
Journeyman	K209	Summarize (abstract, generalize) techniques and methods to conduct a Training Situation Analysis (TSA).

Journeyman	K210	Summarize (abstract, generalize) techniques and methods to conduct a Job Task Analysis (JTA) or Job Duty Task Analysis (JDTA).
Journeyman	K211	Summarize (abstract, generalize) techniques and methods to conduct a Training Task Analysis (TTA).
Journeyman	K212	Summarize (abstract, generalize) techniques and methods to conduct a Rating Domain Analysis (RDA) for Sailor 2025 Ready Relevant Learning (RRL).
Journeyman	K213	Summarize (abstract, generalize) techniques and methods to conduct a media analysis, fidelity analysis, or Media/Fidelity Analysis (MFA).
Journeyman	K214	Summarize (abstract, generalize) techniques and methods to conduct a Business Case Analysis (BCA) or Cost Benefit Analysis (CBA).
Journeyman	S200a	Direct and control the resources assigned to the [analysis] team.
Journeyman	S200b	Review and approve [analysis] work products developed by the team.
Journeyman	S201	Function as an independent analyst or a team lead to conduct a needs assessment, needs analysis, or training needs analysis.
Journeyman	S202	Function as an independent analyst or a team lead to conduct a Training Situation Analysis (TSA).
Journeyman	S203	Function as an independent analyst or a team lead to conduct a Job Task Analysis (JTA) or Job Duty Task Analysis (JDTA).
Journeyman	S204	Function as an independent analyst or a team lead to conduct a Training Task Analysis (TTA).
Journeyman	S205	Function as an independent analyst or a team lead to conduct a Rating Domain Analysis (RDA) for Ready Relevant Learning (RRL).
Journeyman	S206	Function as an independent analyst or a team lead to conduct a media analysis, fidelity analysis, or Media/Fidelity Analysis (MFA).
Journeyman	S207	Function as an independent analyst or a team lead to conduct a Business Case Analysis (BCA) or a Cost Benefit Analysis (CBA).
Journeyman	S208	Function as an independent analyst or a team lead to review and approve a Training System Requirements Analysis (TSRA).
Journeyman	S209	Function as an independent analyst or a team lead to review and approve a Training Situation Document (TSD).
Journeyman	S210	Function as an independent analyst or a team lead to review and approve an Instructional Performance Requirements Document (IPRD).
Journeyman	S211	Function as an independent analyst or a team lead to review and approve a Training Device Decision Coordinating Paper (TDDCP).
Expert	K301	Exemplify (illustrate, instantiate) the construct of data collection tools and templates.
Expert	K302	Summarize (abstract, generalize) the use of data collection tools and templates.
Expert	K303	Exemplify (illustrate, instantiate) the construct of data analysis models.
Expert	K304	Summarize (abstract, generalize) the use of data analysis models.
Expert	K305	Summarize (abstract, generalize) the procedure to develop a technical approach for an analysis project.
Expert	K306	Summarize (abstract, generalize) the procedure to develop a Resource Cost Estimate (RCE) or Independent Government Cost Estimate (IGCE) for an analysis project.
Expert	K307	Summarize (abstract, generalize) the procedure to develop an Integrated Master Schedule (IMS) for an analysis project.
Expert	K308	Exemplify (illustrate, instantiate) the components of an alignment.
Expert	K309	Summarize (abstract, generalize) the purpose of alignment.
Expert	S301	Develop the technical approach (i.e., identify the type of analysis activities and steps to perform.) for three (3) separate analysis efforts. (3X)
Expert	S302	Develop a cost estimate, Resource Cost Estimate (RCE), or Independent Government Cost Estimate (IGCE) for three (3) separate analysis efforts. (3X)
Expert	S303	Develop an Integrated Master Schedule (IMS) for three (3) separate analysis efforts (3X)
Expert	S304	Modify existing data collection tools and templates for an analysis effort.
Expert	S305	Modify existing data analysis models for an analysis effort.
Expert	S306	Develop new or unique data collection tools and templates for an analysis effort.
Expert	S307	Develop new or unique data analysis models for an analysis effort.
Expert	S308	Conduct an alignment with stakeholders which includes an alignment brief/meeting and an alignment report.

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**Table 30.***Knowledge and Skill Statements for the Design Domain*

Level	ID	Objective
Novice	K101	Exemplify (illustrate, instantiate) the components of a Learning Objective (LO)
Novice	K102	Exemplify (illustrate, instantiate) learning types.
Novice	K103	Exemplify (illustrate, instantiate) learning levels.
Novice	K104	Summarize (abstract, generalize) methods to cluster Learning Objectives (LOs)
Novice	K105	Summarize (abstract, generalize) methods to sequence Learning Objectives (LOs)
Novice	K106	Compare (contrast, map, match) assessment strategies.
Novice	K107	Exemplify (illustrate, instantiate) types of assessment items.
Novice	K108	Summarize (abstract, generalize) assessment item construction.
Novice	K109	Summarize (abstract, generalize) instructional strategies.
Novice	K110	Summarize (abstract, generalize) instructional methods.
Novice	K111	Summarize (abstract, generalize) media selection models
Novice	K112	Summarize (abstract, generalize) media selection process.
Novice	K113	Summarize (abstract, generalize) the structure of a Requirements Traceability Verification Matrix (RTVM).
Novice	S101	Develop Learning Objectives (LOs) to support training requirements.
Novice	S102	Categorize learning objectives by learning type and level.
Novice	S102	Construct a learning hierarchy (i.e., cluster and sequence learning objectives).
Novice	S104	Select assessment strategies and assessment item types.
Novice	S105	Develop assessment items to match learning objectives.
Novice	S106	Select instructional strategies and methods to match the requirements of a training solution.
Novice	S107	Select instructional media to support a training solution.
Novice	S108	Design instructional content to support the learning objectives of a training solution
Novice	S109	Contribute to or support the development of an Instructional Media Requirements Document (IMRD).
Novice	S110	Contribute to or support the development of an Instructional Media Design Package (IMDP)
Journeyman	K201	Summarize (abstract, generalize) the content of a Training System Functional Description (TSFD).
Journeyman	K202	Summarize (abstract, generalize) the content of a Military Characteristics Document (MCD).
Journeyman	K203	Summarize (abstract, generalize) the content of a Functional Requirements Document (FRD).
Journeyman	K204	Exemplify (illustrate, instantiate) Systems Engineering Technical Review (SETR) events.
Journeyman	K205	Summarize (abstract, generalize) the purpose of Systems Engineering Technical Review (SETR) events.
Journeyman	S201	Develop an Instructional Media Requirements Document (IMRD).
Journeyman	S202	Develop an Instructional Media Design Package (IMDP)
Journeyman	S203	Align strategies, methods, and media to an IPRD and IMRD using a Requirements Traceability Verification Matrix (RTVM).
Journeyman	S204	Develop a Training Systems Functional Description (TSFD) or Military Characteristics Document (MCD)
Journeyman	S205	Develop a Functional Requirements Document (FRD) for S2025 Ready Relevant Learning (RRL).
Journeyman	S206	Participate in Systems Engineering Technical Review (SETR) events for the design of training devices and technologies.
Journeyman	S200a	Plan [the use of] the resources assigned to the [design] team.
Journeyman	S200b	Direct and control the resources assigned to the [design] team.
Journeyman	S200c	Review and approve [instructional design] work products developed by the team.
Journeyman	S200d	Revise [instructional design] work products developed by the team.

Journeyman	S207	Function as a team leader for training systems design to include developing Learning Objectives (LOs) to support training requirements.
Journeyman	S208	Function as a team leader for training systems design to include categorizing, clustering and sequencing learning objectives.
Journeyman	S209	Function as a team leader for training systems design to include selecting assessment strategies and assessment item types.
Journeyman	S210	Function as a team leader for training systems design to include developing assessment items to match learning objectives.
Journeyman	S211	Function as a team leader for training systems design to include selecting instructional strategies and methods to match the requirements of a training solution.
Journeyman	S212	Function as a team leader for training systems design to include selecting instructional media to support a training solution
Journeyman	S213	Function as a team leader for training systems design to include designing instructional content to support the learning objectives of a training solution.
Journeyman	S214	Function as a team leader to review and approve an Instructional Media Requirements Document (IMRD).
Journeyman	S215	Function as a team leader to review and approve an Instructional Media Design Package (IMDP).
Journeyman	S216	Function as a team leader for training systems design to include aligning strategies, methods, and media to an IPRD and IMRD using a Requirements Traceability Verification Matrix (RTVM).
Journeyman	S217	Function as a team leader for training systems design to include developing an Instructional Media Design Package (IMDP)
Journeyman	S218	Function as a team leader for training systems design to include developing a Training Systems Functional Description (TSFD) or Military Characteristics Document (MCD)
Journeyman	S219	Function as a team leader for training systems design to include developing a Functional Requirements Document (FRD) for S2025 Ready Relevant Learning (RRL).
Expert	K301	Summarize (abstract, generalize) roles and responsibilities of the technical competency throughout the Systems Engineering Technical Review (SETR) process.
Expert	K302	Summarize (abstract, generalize) roles and responsibilities of the technical competency at specific Systems Engineering Technical Review (SETR) events.
Expert	K303	Summarize (abstract, generalize) the Systems Engineering Technical Review (SETR) process.
Expert	K304	Summarize (abstract, generalize) components of a comprehensive design plan.
Expert	S301a	Function as the ultimate technical authority to develop design plans for the acquisition of full training systems that includes courseware.
Expert	S301b	Function as the ultimate technical authority to develop design plans for the acquisition of full training systems that includes courseware.
Expert	S301c	Function as the ultimate technical authority to develop design plans for the acquisition of full training systems that includes courseware.
Expert	S302a	Function as the ultimate technical authority to develop design plans for the acquisition of full training systems that includes learning aids.
Expert	S302b	Function as the ultimate technical authority to develop design plans for the acquisition of full training systems that includes learning aids.
Expert	S302c	Function as the ultimate technical authority to develop design plans for the acquisition of full training systems that includes learning aids.
Expert	S303a	Function as the ultimate technical authority to develop design plans for the acquisition of full training systems that includes training devices.
Expert	S303b	Function as the ultimate technical authority to develop design plans for the acquisition of full training systems that includes training devices.
Expert	S303c	Function as the ultimate technical authority design plans for the acquisition of full training systems that includes training devices.
Expert	S304a	Independently highlight areas of design deficiency.
Expert	S304b	Independently highlight areas of design deficiency.
Expert	S305a	Independently clarify training design ambiguities.
Expert	S305b	Independently clarify training design ambiguities.
Expert	S306	Represent the Instructional Systems technical competency in Systems Engineering Technical Review (SETR) events for the design of training devices and technologies.

**Table 31.***Knowledge and Skill Statements for the Evaluation Domain*

Level	ID	Objective
Novice	K101	Summarize (abstract, generalize) Contract Data Requirements List (CDRL) requirements
Novice	K102	Exemplify (illustrate, instantiate) ICW design characteristics to include branching and remediation strategies.
Novice	K103	Exemplify (illustrate, instantiate) ICW design characteristics to include motion/still frame and graphic screen design
Novice	K104	Exemplify (illustrate, instantiate) ISD instructional design quality.
Novice	K105	Summarize (abstract, generalize) acceptance testing procedures.
Novice	K106	Summarize (abstract, generalize) course pilot procedures.
Novice	S101	Evaluate instructional design products (deliverables) for overall quality and instructional validity.
Novice	S102	Evaluate instructional design products (deliverables) for compliance with requirements specified in a CDRL (CDRL).
Novice	S103	Recommend corrections, revisions, and modifications to instructional design products (deliverables).
Novice	S104	Evaluate Interactive Courseware (ICW) design products - audio/visual production design documents.
Novice	S105	Evaluate Interactive Courseware (ICW) design products - computer program design documents.
Novice	S106	Evaluate Interactive Courseware (ICW) design products - flowcharts.
Novice	S107	Evaluate Interactive Courseware (ICW) design products - storyboards.
Novice	S108	Evaluate Interactive Courseware (ICW) to include branching and remediation strategies.
Novice	S109	Evaluate Interactive Courseware (ICW) to include motion/still frame and graphic screen design.
Novice	S110	Conduct acceptance testing on a new course of instructions (i.e., course pilot).
Journeyman	K201	Exemplify (illustrate, instantiate) Mission-Based Capabilities
Journeyman	K202	Summarize (abstract, generalize) the purpose of Mission-Based Capabilities testing
Journeyman	K203	Summarize (abstract, generalize) the tenets of Mission-Based Capabilities testing
Journeyman	K204	Exemplify (illustrate, instantiate) Mission-Based Capabilities testing practices
Journeyman	K205	Summarize (abstract, generalize) Mission-Based Capabilities testing procedures
Journeyman	S200a	Plan [the use of] the resources assigned to the [evaluation] team.
Journeyman	S200b	Direct and control the resources assigned to the [evaluation] team.
Journeyman	S200c	Review and approve [evaluation] work products developed by the team
Journeyman	S200d	Revise [evaluation] work products developed by the team
Journeyman	S201	Evaluate an existing training device or training technology for its ability to support instructional requirements.
Journeyman	S202	Conduct acceptance testing on a new training device or training technology.
Journeyman	S203	Conduct Mission-Based Capabilities tests on a training device.
Journeyman	S204	Function as a team leader to conduct content evaluation based on contract requirements.
Journeyman	S205	Function as a team leader to conduct training device/capabilities testing.
Expert	K301	Summarize (abstract, generalize) student performance evaluation considerations.
Expert	K302	Summarize (abstract, generalize) curriculum evaluation considerations.
Expert	K303	Summarize (abstract, generalize) instructional delivery evaluation considerations.
Expert	K304	Summarize (abstract, generalize) media effectiveness evaluation considerations.
Expert	K305	Summarize (abstract, generalize) training transfer evaluation considerations.
Expert	K306	Summarize (abstract, generalize) training resource evaluation considerations.
Expert	K307	Summarize (abstract, generalize) the purpose of a Training Effectiveness Evaluation (TEE).
Expert	K308	Summarize (abstract, generalize) Training Effectiveness Evaluation (TEE) procedures.

Expert	S301	As Team Leader, provide authoritative advisory and consultation services to the Project Managers (PJM) for training system/device evaluation on matters related to the interpretation of complex training requirements and the application of education and training principles to training problems.
Expert	S302	Recommend criteria for the performance of field evaluations and effectiveness studies of training media and systems to ensure efficient utilization of training resources.
Expert	S303	Conduct a Training Effectiveness Evaluation (TEE).
Expert	S304	Conduct training program evaluation to include analysis of student performance data to determine instructional effectiveness.
Expert	S305	Conduct training program evaluation to include curriculum evaluations.
Expert	S306	Conduct training program evaluation to include development of student performance monitoring techniques.
Expert	S307	Conduct training program evaluation to include instructional delivery assessment.
Expert	S308	Conduct training program evaluation to include instructional media effectiveness assessments.
Expert	S309	Conduct training program evaluation to include transfer of training studies/assessments.
Expert	S310	Use the results of field evaluations and effectiveness studies of training media and systems to correct training deficiencies.
Expert	S311	Use the results of field evaluations and effectiveness studies of training media and systems to improve training effectiveness.
Expert	S312	Use the results of field evaluations and effectiveness studies of training media and systems to provide cost and training effective recommendations to meet new training requirements.
Expert	S313	Use the results of field evaluations and effectiveness studies of training media and systems to validate efficient utilization of training resources.

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## APPENDIX B: EXCERPTS OF PROGRAM ARTIFACTS



## Sample Proficiency Level Rubric

### Proficiency Level Rubric (PLR): Analysis - Novice

#### Proficiency Level Rubric (PLR): Analysis – Novice

**Introduction.** The purpose of this Proficiency Level Rubric (PLR) is to document that the employee named below has demonstrated proficiency at the **Novice level** in the **Analysis** domain.

\_\_\_\_\_  
*Employee Name*

\_\_\_\_\_  
*Enrollment Date*

The **Novice** level is characterized as follows:

- The employee demonstrates technical competence as a member of a project team.
- The employee contributes to the project and provides technical support as needed.
- The employee is able to apply conventional techniques and may rely on existing methods from other analysis projects and programs.
- The employee is able to apply appropriate approaches and methods to carry out work that is readily definable and limited in scope.

Items in the **KNOWLEDGE** and **SKILLS** sections of this PLR may be signed by any colleague who is certified at or above the **Novice** level in the **Analysis** domain, or by any member of the GT53 Leadership Team (i.e., Technical Leads, Branch Heads, or Division Head).

Items in the **SKILLS** section may also be signed by the GT53 Team Lead, Integrated Product Team (IPT) Lead, or Project Manager (PJM) for whom the employee provides support in completion of each **SKILL** item, if the Team Lead, IPT Lead, or PJM directly observes the employee's satisfactory performance of that **SKILL** item.

The employee may complete the **Endorsement and Certification** section of this PLR only upon completion of all **KNOWLEDGE** and **SKILL** items.

## Proficiency Level Rubric (PLR): Analysis - Novice

### Analysis Novice – KNOWLEDGE

*The employee shall demonstrate fundamental knowledge through discussion of these topics with an authorized signee. The verb in each knowledge item shall define the scope and depth of discussion required:*

- **Summarize:** Generalize, construct a focused representation of a broad or general theme.
- **Describe:** Illustrate, instantiate, provide a specific example or an instance of a general concept or rule.
- **Recall:** Retrieve relevant information from memory in response to a prompt or cue.

K101 Summarize the purpose of data collection tools and templates.

_____	_____	_____
Name (print)	Signature	Date

K102 Summarize the purpose of data analysis models.

_____	_____	_____
Name (print)	Signature	Date

K103 Describe examples of data collection tools and templates.

_____	_____	_____
Name (print)	Signature	Date

K104 Describe examples of data analysis models.

_____	_____	_____
Name (print)	Signature	Date

K105 Summarize the use of data collection tools and templates.

_____	_____	_____
Name (print)	Signature	Date

K106 Summarize the use of data analysis models.

_____	_____	_____
Name (print)	Signature	Date

K107 Summarize the purpose of a needs assessment, needs analysis, or training need analysis.

_____	_____	_____
Name (print)	Signature	Date

K108 Summarize the purpose of a Training Situation Analysis (TSA).

_____	_____	_____
Name (print)	Signature	Date

### Proficiency Level Rubric (PLR): Analysis - Novice

K109 Summarize the purpose of a Job Task Analysis (JTA) or Job Duty Task Analysis (JDTA).

\_\_\_\_\_  
Name (print) Signature Date

K110 Summarize the purpose of a Training Task Analysis (TTA).

\_\_\_\_\_  
Name (print) Signature Date

K111 Summarize the purpose of a Rating Domain Analysis (RDA).

\_\_\_\_\_  
Name (print) Signature Date

K112 Summarize the purpose of a Training System Requirements Analysis (TSRA).

\_\_\_\_\_  
Name (print) Signature Date

K113 Summarize the purpose of a media analysis, fidelity analysis, or Media/Fidelity Analysis (MFA).

\_\_\_\_\_  
Name (print) Signature Date

K114 Summarize the purpose of a Business Case Analysis (BCA) or Cost Benefit Analysis (CBA).

\_\_\_\_\_  
Name (print) Signature Date

K115 Summarize the purpose of a Training Device Decision Coordinating Paper (TDDCP).

\_\_\_\_\_  
Name (print) Signature Date

K116 Recall the data inputs and outputs of a needs assessment, needs analysis, or training need analysis.

\_\_\_\_\_  
Name (print) Signature Date

K117 Recall the data inputs and outputs of a Training Situation Analysis (TSA).

\_\_\_\_\_  
Name (print) Signature Date

### Proficiency Level Rubric (PLR): Analysis - Novice

K118 Recall the data inputs and outputs of a Job Task Analysis (JTA) or Job Duty Task Analysis (JDTA).

\_\_\_\_\_  
Name (print) Signature Date

K119 Recall the data inputs and outputs of a Training Task Analysis (TTA).

\_\_\_\_\_  
Name (print) Signature Date

K120 Recall the data inputs and outputs of a Rating Domain Analysis (RDA).

\_\_\_\_\_  
Name (print) Signature Date

K121 Recall the data inputs and outputs of a Training System Requirements Analysis (TSRA).

\_\_\_\_\_  
Name (print) Signature Date

K122 Recall the data inputs and outputs of a media analysis, fidelity analysis, or Media/Fidelity Analysis (MFA).

\_\_\_\_\_  
Name (print) Signature Date

K123 Recall the data inputs and outputs of a Business Case Analysis (BCA) or Cost Benefit Analysis (CBA).

\_\_\_\_\_  
Name (print) Signature Date

K124 Recall the data inputs and outputs of a Training Device Decision Coordinating Paper (TDDCP).

\_\_\_\_\_  
Name (print) Signature Date

## Proficiency Level Rubric (PLR): Analysis - Novice

### Analysis Novice - SKILLS

The employee shall demonstrate **technical competence** while relying on **conventional techniques** and **applying appropriate approaches and methods** to complete the following tasks as a member of a project team:

- S101 Collect data from Subject Matter Experts (SMEs) in an interview or workshop setting.

Project

Name (print)

Signature

Date

- S102 Observe fleet Subject Matter Experts (SMEs) performing or demonstrating task performance in support of a task analysis.

Project

Name (print)

Signature

Date

- S103 Review operational and maintenance manuals to extract task statements in support of a task analysis.

Project

Name (print)

Signature

Date

- S104 Observe training facilities and training activities in support of a training situation analysis.

Project

Name (print)

Signature

Date

- S105 Use existing data collection tools and templates to collect data.

Project

Name (print)

Signature

Date

- S106 Apply an existing data analysis model, method, and algorithm to analyze data.

Project

Name (print)

Signature

Date

### Proficiency Level Rubric (PLR): Analysis - Novice

S107 Document the output of data analysis models, methods, and algorithms.

\_\_\_\_\_  
*Project*

\_\_\_\_\_  
*Name (print)*

\_\_\_\_\_  
*Signature*

\_\_\_\_\_  
*Date*

S108 Contribute to the development of a Training System Requirements Analysis (TSRA) report.

\_\_\_\_\_  
*Project*

\_\_\_\_\_  
*Name (print)*

\_\_\_\_\_  
*Signature*

\_\_\_\_\_  
*Date*

S109 Contribute to the development of a Training Situation Document (TSD).

\_\_\_\_\_  
*Project*

\_\_\_\_\_  
*Name (print)*

\_\_\_\_\_  
*Signature*

\_\_\_\_\_  
*Date*

S110 Contribute to the development of an Instructional Performance Requirements Document (IPRD).

\_\_\_\_\_  
*Project*

\_\_\_\_\_  
*Name (print)*

\_\_\_\_\_  
*Signature*

\_\_\_\_\_  
*Date*

S111 Contribute to the development of a Training Device Decision Coordinating Paper (TDDCP).

\_\_\_\_\_  
*Project*

\_\_\_\_\_  
*Name (print)*

\_\_\_\_\_  
*Signature*

\_\_\_\_\_  
*Date*

## Proficiency Level Rubric (PLR): Analysis - Novice

### Endorsement and Certification: Analysis - Novice

Endorsement and certification confirm that the employee has demonstrated proficiency at the **Novice** level in the **Analysis** domain. The **Novice** level is characterized as follows:

- The employee demonstrates technical competence as a member of a project team.
- The employee contributes to the project and provides technical support as needed.
- The employee is able to apply conventional techniques and may rely on existing methods from other analysis projects and programs.
- The employee is able to apply appropriate approaches and methods to carry out work that is readily definable and limited in scope.

Endorsement for certification at the **Novice** level shall be provided by employees who are certified *at or above the Journeyman level* in the **Analysis** domain or by members of the GT53 Leadership Team. The employee's Branch Head shall approve final certification.

**Endorsement 1:** I endorse \_\_\_\_\_ for certification  
at the **Novice** level in the **Analysis** domain.

\_\_\_\_\_  
*Name (Print)*

\_\_\_\_\_  
*Signature*

\_\_\_\_\_  
*Date*

**Endorsement 2:** I endorse \_\_\_\_\_ for certification  
at the **Novice** level in the **Analysis** domain.

\_\_\_\_\_  
*Name (Print)*

\_\_\_\_\_  
*Signature*

\_\_\_\_\_  
*Date*

**Final Certification:** I certify that \_\_\_\_\_ has  
demonstrated proficiency at the **Novice** level in the **Analysis** domain.  
*To be completed by the employee's Branch Head.*

\_\_\_\_\_  
*Name (Print), Branch Head*

\_\_\_\_\_  
*Signature*

\_\_\_\_\_  
*Date*

Curriculum Design Plan Excerpt

CURRICULUM DESIGN PLAN (CDP)  
ASSESSMENT-TRAINING-PROFICIENCY PROFESSIONAL DEVELOPMENT PROGRAM

**Introduction:** This document presents a high-level plan for a training curriculum to be developed for (and by) the employees of NAWCTSD GT53 division in support of the Assessment-Training-Proficiency (ATP) Professional Development program.

This CDP has three sections:

Section 1: Module-Topic Outline ..... 2

Section 2: Detailed Learning Objective Outline..... 4

Appendix: Instructional Design Prescription..... 69



CURRICULUM DESIGN PLAN (CDP)  
ASSESSMENT-TRAINING-PROFICIENCY PROFESSIONAL DEVELOPMENT PROGRAM

**Section 1: Module-Topic Outline**

**1. Analysis Planning**

- 1.1. Analysis Technical Approach
- 1.2. Integrated Milestone Schedule (IMS)
- 1.3. Resource Cost Estimate (RCE)/Independent Government Cost Estimate (IGCE)
- 1.4. Alignment

**2. Requirements Analysis**

- 2.1. Needs Assessment/Training Needs Analysis
- 2.2. Training Situation Analysis (TSA)
- 2.3. Training Situation Document (TSD)
- 2.4. Job Task Analysis (JTA)/Job-Duty Task Analysis (JDTA)
- 2.5. Training Task Analysis (TTA)
- 2.6. Business Case Analysis (BCA)/Cost-Benefit Analysis (CBA)
- 2.7. Rating Domain Analysis (RDA)
- 2.8. Media/Fidelity Analysis (MFA)
- 2.9. Data Collection Tools and Templates
- 2.10. Data Analysis Models
- 2.11. Data Collection Activity
- 2.12. Instructional Performance Requirements Document (IPRD)
- 2.13. Training System Requirements Analysis (TSRA) Report
- 2.14. Training Device Decision Coordinating Paper (TDDCP)

**3. Content Design**

- 3.1. Learning Objectives (LOs)
- 3.2. Learning Types and Levels
- 3.3. Clustering and Sequencing Learning Objectives
- 3.4. Assessment Strategies and Items
- 3.5. Instructional Strategies and Methods
- 3.6. Instructional Media
- 3.7. Instructional Media Requirements Document (IMRD)
- 3.8. Requirements Traceability Verification Matrix (RTVM)
- 3.9. Instructional Media Design
- 3.10. Instructional Media Design Package (IMDP)
- 3.11. Functional Requirements Document (FRD)
- 3.12. Instructional System Design (ISD) Activity

**4. Device Design**

- 4.1. Training System Functional Description (TSFD)/Military Characteristics Document (MCD)
- 4.2. Systems Engineering Technical Review (SETR) Process

CURRICULUM DESIGN PLAN (CDP)  
ASSESSMENT-TRAINING-PROFICIENCY PROFESSIONAL DEVELOPMENT PROGRAM

**Section 1: Module-Topic Outline (continued)**

**5. Content Evaluation**

- 5.1. Interactive Courseware (ICW) Evaluation
- 5.2. Contract Deliverable Requirements List (CDRL) Evaluation
- 5.3. Instructional System Design (ISD) Quality
- 5.4. Acceptance Testing and Course Pilot

**6. Device Evaluation**

- 6.1. Mission-Based Capabilities
- 6.2. Capabilities and Acceptance Testing

**7. Effectiveness Evaluation**

- 7.1. Curriculum Evaluation
- 7.2. Media Evaluation
- 7.3. Instructional Delivery Evaluation
- 7.4. Student Performance Evaluation
- 7.5. Resource Evaluation
- 7.6. Training Transfer Evaluation
- 7.7. Evaluation Findings and Recommendations
- 7.8. Training Effectiveness Evaluation (TEE)

**8. Instructional Systems Acquisition**

- 8.1. Statement of Work (SOW)/Statement of Objectives (SOO)
- 8.2. Data Item Descriptions (DIDs) and Contract Deliverable Requirements Lists (CDRLs)
- 8.3. Acquisition Planning
- 8.4. Technical Point of Contact (TPOC) Role and Responsibilities

**9. Acquisition Source Selection**

- 9.1. Acquisition Strategy
- 9.2. Market Research
- 9.3. Sections L & M of a Request for Proposal (RFP)
- 9.4. Contractor's Proposals
- 9.5. Proposal Evaluation
- 9.6. Discussions and Negotiations

Note: Module and topic numbers are intended to facilitate organization, traceability, and records-keeping. They do not necessarily indicate a required sequence. For example, a student may complete **Module 9. Acquisition Source Selection** before completing **Module 6. Device Evaluation**.

CURRICULUM DESIGN PLAN (CDP)  
ASSESSMENT-TRAINING-PROFICIENCY PROFESSIONAL DEVELOPMENT PROGRAM

**Section 2: Detailed Learning Objective Outline**

<b>1. Analysis Planning</b>	
<b>Established Goal:</b> Employees will be able to develop a comprehensive plan to conduct an instructional system analysis.	
<b>Critical Understandings</b>	<b>Essential Questions</b>
There is no single 'right' way to conduct training system analyses, but there are several references that provide guidance.  Analyses should be systematic, defensible, and unbiased, and they should result in actionable recommendations and a valid set of training requirements.	What do we mean by "training requirements?"  What information can we use, and how can we use it, to establish "training requirements?"  How do we produce systematic, defensible, and unbiased analyses that result in a valid set of training requirements?
<b>Terminal Learning Objective (TLO)</b>	
Given a notional project scenario with supporting data and applicable supporting references, students will develop a Plan of Action and Milestones (POAM) that includes a proposed technical approach, schedule, and labor estimate for an analysis effort, meeting minimum standards on a product rubric as evaluated by the workshop facilitator.	
<b>Topic Listing</b>	
1.1 Analysis Technical Approach 1.2 Integrated Milestone Schedule (IMS) 1.3 Resource Cost Estimate (RCE)/Independent Government Cost Estimate (IGCE) 1.4 Alignment	

Template adapted from *Understanding by Design: Professional Development Workbook* by Jay McTighe and Grant Wiggins.

CURRICULUM DESIGN PLAN (CDP)  
ASSESSMENT-TRAINING-PROFICIENCY PROFESSIONAL DEVELOPMENT PROGRAM

**MODULE 1: ANALYSIS PLANNING**

---

**Topic 1.1. Analysis Technical Approach**

ELO\_01.01.01: After reviewing applicable references, summarize the procedure to develop a technical approach for an analysis project, satisfying the minimum requirements on a written or verbal exam.

*Instructional Treatment:* Demonstration with worked examples

*Assessment Type:* Selected or constructed themes or summaries

ELO\_01.01.02: Given a notional project scenario, supporting project data, and applicable references, develop the technical approach (i.e., identify the type of analysis activities and steps to perform) for an analysis effort, satisfying the minimum requirements on a product checklist or rubric.

*Instructional Treatment:* Exhibit with examples and non-examples

*Assessment Type:* Constructed response - product (worked solutions)

CURRICULUM DESIGN PLAN (CDP)  
ASSESSMENT-TRAINING-PROFICIENCY PROFESSIONAL DEVELOPMENT PROGRAM

**MODULE 1: ANALYSIS PLANNING**

---

**Topic 1.2. Integrated Milestone Schedule (IMS)**

ELO\_01.02.01: After reviewing applicable references, summarize the procedure to develop an Integrated Master Schedule (IMS) for an analysis project, satisfying the minimum requirements on a written or verbal exam.

*Instructional Treatment:* Demonstration with worked examples

*Assessment Type:* Selected or constructed themes or summaries

ELO\_01.02.02: Given a notional project scenario, supporting project data, and applicable references, develop an Integrated Master Schedule (IMS) for an analysis effort, satisfying the minimum requirements on a product checklist or rubric.

*Instructional Treatment:* Exhibit with examples and non-examples

*Assessment Type:* Constructed response - product (worked solutions)

CURRICULUM DESIGN PLAN (CDP)  
ASSESSMENT-TRAINING-PROFICIENCY PROFESSIONAL DEVELOPMENT PROGRAM

**MODULE 1: ANALYSIS PLANNING**

---

**Topic 1.3. Resource Cost Estimate (RCE)/Independent Government Cost Estimate (IGCE)**

ELO\_01.03.01: After reviewing applicable references, summarize the procedure to develop a Resource Cost Estimate (RCE) or Independent Government Cost Estimate (IGCE) for an analysis project, satisfying the minimum requirements on a written or verbal exam.

*Instructional Treatment:* Demonstration with worked examples

*Assessment Type:* Selected or constructed themes or summaries

ELO\_01.03.02: Given a notional project scenario, supporting project data, and applicable references, develop a cost estimate, Resource Cost Estimate (RCE), or Independent Government Cost Estimate (IGCE) for an analysis effort, satisfying the minimum requirements on a product checklist or rubric.

*Instructional Treatment:* Exhibit with examples and non-examples

*Assessment Type:* Constructed response - product (worked solutions)

CURRICULUM DESIGN PLAN (CDP)  
ASSESSMENT-TRAINING-PROFICIENCY PROFESSIONAL DEVELOPMENT PROGRAM

**MODULE 1: ANALYSIS PLANNING**

---

**Topic 1.4. Alignment**

ELO\_01.04.01: From memory and without references, provide examples of the components of an alignment, satisfying the minimum requirements on a written or verbal exam.

*Instructional Treatment:* Lecture and assigned readings

*Assessment Type:* Selected response, constructed response (\*Using NEW content)

ELO\_01.04.02: After reviewing applicable references, summarize the purpose of alignment, satisfying the minimum requirements on a written or verbal exam.

*Instructional Treatment:* Lecture and assigned readings

*Assessment Type:* Selected or constructed themes or summaries

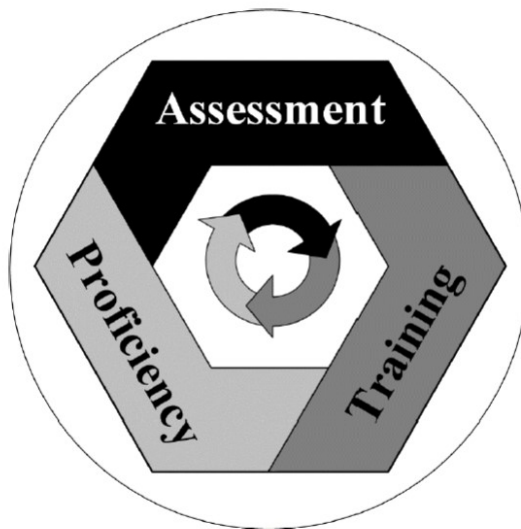
ELO\_01.04.03: Given a role-play scenario and supporting project data, conduct an alignment with stakeholders which includes an alignment brief/meeting and an alignment report, satisfying the minimum requirements on a combined product/process checklist or rubric.

*Instructional Treatment:* Demonstration with worked examples

*Assessment Type:* Provide unfamiliar problem - evaluate process, product, or both

POLICY AND GUIDANCE MANUAL

ASSESSMENT-TRAINING-PROFICIENCY (ATP)  
PROFESSIONAL DEVELOPMENT PROGRAM



Naval Air Warfare Center, Training Systems Division (NAWCTSD)  
Training Systems Analysis, Design, and Evaluation Division (GT53)



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## ASSESSMENT-TRAINING-PROFICIENCY PROFESSIONAL DEVELOPMENT PROGRAM

### 1. INTRODUCTION

The purpose of this manual is to describe the features of the Assessment-Training-Proficiency (ATP) Professional Development Program, while providing policy and guidance for the implementation of the program.

#### 1.1. Background

Employees of NAWCTSD's Training Systems Analysis, Design, and Evaluation Division (GT53) are expected to progress throughout their careers from working-level positions, through team leadership positions, to ultimately become technical experts in the division's core competencies. The ATP program aims to provide a systematic method by which employees can proactively develop the specialized knowledge and applied skills required for this career progression. Accordingly, the ATP program is designed to achieve four program goals:

- 1) To provide managers and employees a toolset to standardize employee skills assessment.
- 2) To provide specialized training to support job-specific knowledge and skills.
- 3) To provide rotational assignment opportunities to allow employees to apply their skills.
- 4) To provide mentorship opportunities to foster skills development.

#### 1.2. Program Overview

Based on the program goals – and supported by academic research<sup>1</sup> – the ATP program is designed with three distinct components as shown in Figure 1.

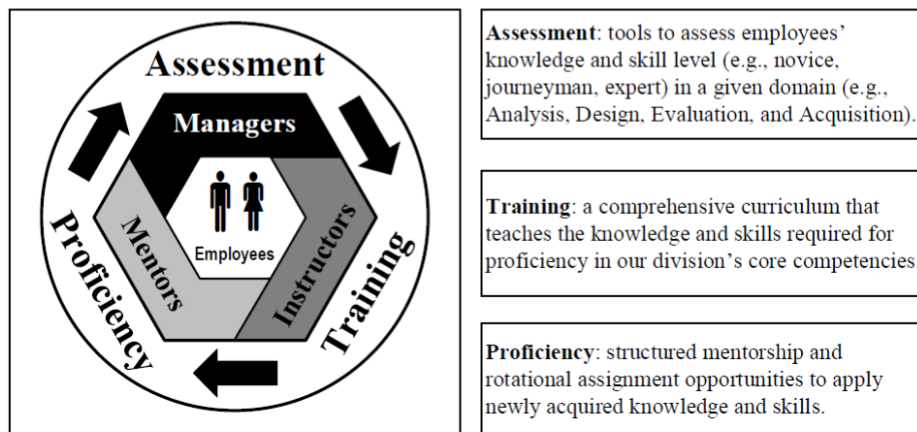


Figure 1. Program Design

<sup>1</sup> Note: The design of the ATP program is based on a rich body of academic research. This manual makes informal reference to supporting research where applicable, but it does not include a detailed reference list or formal citations. For a complete list of supporting references and citations, please see [TBD - link to dissertation.]

## ASSESSMENT-TRAINING-PROFICIENCY PROFESSIONAL DEVELOPMENT PROGRAM

### 1.3. Program Sequence

As shown in the infographic on the left side of Figure 1, employees progress through the ATP program in a cycle of assessment, training, and proficiency activities.

1. To begin, managers and employees assess an employee's current knowledge and skill level in one or more of the division's core competencies. (**Assessment**)
2. Depending on the employee's goals, he or she can enroll in targeted training modules where instructors teach the knowledge and skills required for proficiency in the division's core competencies. (**Training**)
3. After training, the employee is assigned to a rotational assignment where a mentor helps the employee to develop skills in the chosen domain. (**Proficiency**)
4. At the completion of the rotational assignment, the employee may be assessed on the newly acquired knowledge and skills. (**Assessment**)

Employees may choose to develop expertise in one domain at a time, or they may pursue proficiency in several domains concurrently. These activities are further described with supporting policy and guidance throughout this manual.

### 1.4. Program Timing and Duration

There is no prescribed time limit or expectation for the completion of the ATP program. In fact, participants should consider this program to be a career-spanning pursuit. It may take months, even years, to complete a given certification, and it may take decades to reach the expert level in multiple domains. (This should not deter mid-career employees from participating in the program, as section 2.3.2.1 describes a policy for assigning credit for previous experience.) Once implemented, participants and supervisors are encouraged to meet regularly to ensure each participant makes measured progress.

### 1.5. Program Benefits

The program intends to offer the most valuable, yet intangible, benefit to employees of developing the knowledge and skills required to see the employee progress to positions of leadership in the division. However, program participation is not tied directly to competitive promotion activities. That is, an employee's certification status will not be a direct measure in selecting employees for promotion. Rather, the knowledge, skills, and experiences gained through program participation will make the candidate inherently more competitive for promotion. Similarly, the ATP program will not be directly referenced in the employees' performance objectives. But the knowledge, skills, and experience gained through the program will support the employee's technical, teamwork, and communication objectives.

In addition to these intangible benefits, the program will also offer minor, tangible benefits in the form of public recognition and token rewards. Participants will receive a printed certificate for each domain and level attained, as shown in Figure 2. In addition, participants will receive a

## ASSESSMENT-TRAINING-PROFICIENCY PROFESSIONAL DEVELOPMENT PROGRAM

lapel pin in recognition of their first certification, with additional embellishments presented for Expert-level certification, as depicted in Figure 2.



**Figure 2. Completion Certificate and Lapel Pins**

### 1.6. Program Enrollment

Enrollment in the ATP program is voluntary and open to all employees of the GT53 Division. Although the ATP program focuses on the knowledge and skills required of the Instructional System Specialist (GS-1750) and Research Psychologist (GS-0180) job series, employees of other job series are welcome to enroll - with Branch Head concurrence. Future iterations of the ATP program may incorporate knowledge and skills from other job series supporting GT53.

Enrollment shall be documented on an employee Individual Development Plan (IDP) using NAVAIR Form 12400/1, using the following information:

- Block 9. Special Programs: Select “Other” and specify ATP Professional Development
- Block 10. Short term: List the domain(s) and level in which the employee is enrolled.
- Block 11. Long term: List all of domain(s) and level the employee intends to complete.
- On page 2, complete blocks 15-18 as applicable. Blocks 19-24 are not required.

### 1.7. Program Participation

While employee enrollment in the ATP program is voluntary, the success of the program depends on division-wide collaboration at all levels – from the newest employee to the most experienced leaders. Even if an employee does not choose to enroll in the program, he or she may be called on to act as a mentor, instructor, or a curriculum developer in support of the program. Peer and supervisor support are critical to the success of the ATP program.

The remainder of this manual lays out policy and guidance for the implementation of the program within the GT53 Division.

## APPENDIX C: SURVEY INSTRUMENTS

You are being invited to take part in a research study. The purpose of this research is twofold: there is a practical purpose, and there is a research purpose. The practical purpose is to design a Professional Development program for the employees of the GT53 division, while the research purpose is to evaluate and refine that program based on your feedback.

You are being asked to evaluate drafts of three program documents:

- the compiled Proficiency Level Rubrics (PLRs),
- a Curriculum Design Plan (CDP), and
- a Policy Manual.

Please review these documents thoroughly before you take the survey. In the survey, you will be asked to rate the design and content of the documents and to provide recommendations for improvement. The survey will take approximately 15 minutes to complete.

Your participation in this study is completely voluntary, and your decision to participate or not participate in this study will in no way affect your position as an employee of NAWCTSD. If you choose to participate, you are free to withdraw your consent and discontinue participation in this study at any time without prejudice or penalty.

Do you wish to continue with the survey?

☐ Yes (1)

☐ No (2)

*Skip To: End of Survey If Q = No*

Please answer the following group of questions with specific reference to the Proficiency Level Rubrics (PLRs). These documents attempt to describe the knowledge and skills required within our division and are divided in three specific levels of competency. Rate your level of agreement for the draft PLRs globally. If you have specific comments and suggestion, please insert them in the following open-ended text box.

	Completely Agree (1)	Strongly Agree (2)	Somewhat Agree (3)	Somewhat Disagree (4)	Strongly Disagree (5)	Completely Disagree (6)	Unknown, Cannot Determine (7)
The domain categories documented in the PLRs (i.e., Analysis, Design, Evaluation, and Acquisition) accurately reflect the GT53 Division's core competencies.							
The proficiency levels documented in the PLRs (i.e., Novice, Journeyman, Expert) are accurately aligned to the expectations for employees in the GT53 Division.							
The Knowledge items listed in the PLRs accurately reflect the scope of domain-level knowledge required for GT53 employees.							
The Skill items listed in the PLRs accurately reflect the scope of domain-level skills required for GT53 employees.							
The assessment criteria listed in the PLRs are objective, i.e., they are not subject to opinion or personal bias.							
Proficiency assessment criteria appear to be reliable, i.e., an employee would likely be assessed consistently by several independent assessors.							
Using the PLRs, employees can independently conduct a self-assessment of their domain-level proficiency.							
Using the PLRs, Division Leadership can accurately assess an employee's domain-level proficiency.							



What feedback or recommendations can you offer to improve the Proficiency Level Rubrics (PLRs)? In particular, please provide constructive feedback for any of the above items for which you marked less than "Completely Agree." That feedback will be used to make improvements to the PLRs.

---



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Please rate how much you agree with each statement related to the Curriculum Design Plan (CDP). This document describes the Modules, Topics, Learning Objectives, assessment strategies and instructional strategies for the proposed curriculum.

	Completely Agree (1)	Strongly Agree (2)	Somewhat Agree (3)	Somewhat Disagree (4)	Strongly Disagree (5)	Completely Disagree (6)	Unknown, Cannot Determine (7)
The Learning Objectives (LOs) listed in the CDP are comprehensive, i.e., they encompass all of the applicable domain-level Knowledge, Skills, and Attitudes (KSAs).							
The LOs are aligned to appropriate learning levels.							
The assessment strategies prescribed in the CDP will be effective at assessing the content of each LO at the appropriate learning level.							
The instructional methods prescribed in the CDP will be effective at teaching the content of each LO at the appropriate level.							
Instructional Designers and Subject Matter Experts will be able to design effective training based on the guidance provided in the CDP.							

What feedback or recommendations can you offer to improve the Curriculum Design Plan (CDP)? In particular, please provide constructive feedback for any of the above items for which you marked less than "Completely Agree." That feedback will be used to make improvements to the design of the program.

---



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Please rate how much you agree with each of the following statements based on the information provided by the Policy Manual.

	Completely Agree (1)	Strongly Agree (2)	Somewhat Agree (3)	Somewhat Disagree (4)	Strongly Disagree (5)	Completely Disagree (6)	Unknown, Cannot Determine (7)
The Policy Manual provides clear guidance for how the Assessment portion of the Assessment-Training-Proficiency program will be implemented.							
The Policy Manual provides clear guidance for how the Training portion of the Assessment-Training-Proficiency program will be implemented.							
The Policy Manual provides clear guidance for how the Proficiency portion of the Assessment-Training-Proficiency program will be implemented.							
The proposed mentorship agreements, as described in the Policy Manual, will be effective in helping the employee develop their skills.							
The proposed rotational assignments, as described in the Policy Manual, will allow employees to apply their newly learned skills.							

What feedback can you offer to improve the Policy Manual? In particular, please provide constructive feedback for any of the above items for which you marked less than "Completely Agree." That feedback will be used to make improvements to the design of the program.

---

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Would you like to provide any additional feedback about the overall design of the program as presented so far?

---

---

APPENDIX D: INSTITUTIONAL REVIEW BOARD (IRB)  
CORRESPONDANCE



UNIVERSITY OF CENTRAL FLORIDA

**Institutional Review Board**  
FWA00000351  
IRB00001138Office of Research  
12201 Research Parkway  
Orlando, FL 32826-3246

ACKNOWLEDGEMENT OF RELIANCE ON AN EXTERNAL IRB

December 11, 2020

Dear Karl Miehl:

On 12/11/2020, the UCF IRB reviewed your request for external IRB review for the following study:

Type of Review:	Initial Study
Title:	Design-Based Research Toward a Professional Development Program
Investigator:	Karl Miehl
Local IRB ID:	STUDY00002586
External ID:	TSD-262
Funding:	None
Grant ID:	None

This notification serves to acknowledge your request to rely on Naval Air Wrfr Ctr Trng Sys Div(NAWCTSD) as the IRB of record for the above listed study and does not constitute an approval to conduct the research. Naval Air Wrfr Ctr Trng Sys Div(NAWCTSD) review and approval of the study is required prior to study initiation.

Promptly notify the UCF IRB Office upon:

1. Closure of the study

Sincerely,

Designated Reviewer



## Naval Air Warfare Center Training Systems Division

Institutional Review Board, Human Research Protection Program  
12211 Science Drive, Orlando Florida, 32826-3275  
(407)380-4509

3900

Ser GT50 HRPP 262 IR

From: Chair, Institutional Review Board, Human Research Protection Program, Naval Air Warfare Center Training Systems Division

To: Karl Miehl, Head, GT536 Ready Relevant Learning Content Conversion Branch

Subj: NOT HUMAN SUBJECTS RESEARCH CERTIFICATION FOR  
NAWCTSD.2020.0016 (TSD 262), PROTOCOL TSD 262, "DESIGN-BASED RESEARCH  
TOWARD THE DESIGN OF A PROFESSIONAL DEVELOPMENT PROGRAM"

Ref: (a) 32 Code of Federal Regulation 219

1. Your request for Advisory Approval to Protocol NAWCTSD.2020.0016 (TSD 262), "DESIGN-BASED RESEARCH TOWARD THE DESIGN OF A PROFESSIONAL DEVELOPMENT PROGRAM" is determined NOT to be Human Subjects Research under the authority of Department of Defense Navy Assurance Number DoD N-40037, and in accordance with reference (a).
2. On 24 NOVEMBER 2020 the NAWCTSD IRB Chair reviewed your advisory request and determined that your study does not meet the "generalizable" criterion for Human Subjects Research as defined in 32 CFR 219.102(l). As such, NAWCTSD IRB review and approval for the study described in your research protocol application is not required. Should your research protocol change with respect to your intent to "develop or contribute to generalizable knowledge," please submit a Request for Advisory to the NAWCTSD IRB for review.
3. Should you have any questions, please contact Kristin Timpson, the HRPP Administrator at (407) 380-4509 or Dr. James Pharmer, the NAWCTSD IRB Chair at (407) 380-4771.

Signature: PHARMER.JAMES.A LLEN.1072264580  
Digitally signed by PHARMER.JAMES.A LLEN.1072264580  
Date: 2020.11.25 10:43:37 -05'00'

James Pharmer, Ph.D., NAWCTSD IRB Chair

## REFERENCES

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