HLRC | HIGHER LEARNING RESEARCH COMMUNICATIONS

*Higher Learning Research Communications*
2021, Volume 11, Issue 1, Pages 14–26. DOI: 10.18870/hlrc.v11i1.1186

Research Brief | WALDEN UNIVERSITY

# Design, Development, Implementation, and Support (DDIS): Supporting Online Nontraditional Doctoral Candidates

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## Abstract

**Objectives:** The purpose of this paper is to comprehensively describe and justify the case design of an approach for the integration of synchronous virtual meetings to support nontraditional online doctoral candidates. As more nontraditional doctoral students are completing their degree programs virtually through online universities, the nature of their degree progression and the development of critical knowledge and skills differ from traditional on-campus programs.

**Method:** The case design of an approach to integrating synchronous online interactive meetings to support these learners is identified and justified through references to research in the learning sciences including sociocultural learning, heutagogy, and constructivist instructional design methods. The instructional design process resulted in a scaled schedule of interactions linked to the development of specific cognitive processes, academic skills, and expert knowledge required by doctoral candidates for successful completion of their degree programs.

**Results:** This case design study resulted in identification of developmentally phased synchronous interactions designed to support online nontraditional doctoral candidates. The interactions identified were linked to the development of critical processes, skills, and knowledge to increase the effectiveness and efficiency of the candidate's progress.

**Conclusions:** The results identified how the integration of synchronous virtual meetings to support online nontraditional doctoral candidates throughout their programs can both increase the development of the advanced knowledge required by these learners and the collaboration needed between mentor and mentee for the online learners to be successful.

**Keywords**: *problem-based learning; supporting online doctoral students; immersive virtual learning environments*
**Submitted:** May 12, 2020 | **Accepted:** March 9, 2021 | **Published:** June 5, 2021

**Recommended Citation**

Russell, D. L. (2021). Design, development, implementation, and support (DDIS): Supporting online nontraditional doctoral candidates. *Higher Learning Research Communications, 11*(1) 14–26. https://doi.org/10.18870/hlrc.v11i1.1186

## Introduction

In this paper, I describe a case design to create an interactive online approach to support nontraditional online doctoral students. The case design describes the procedures for creating a new interactive approach to support online doctoral students throughout their dissertation process. In this case, the nontraditional online learners are doctoral candidates. They are older adults who are re-entering college after a break in their education to develop professional skills. They are working adults studying in an online university who are not full-time students (Schuetze & Slowey, 2002). These learners are in the dissertation phase of their doctoral program, where they work collaboratively with their mentors to design, develop, implement, and write their capstone document. I describe the theoretical principles that guided the design of the schedule of these interactions and the revisions of the scheduled interactions based on my experiences working with doctoral candidates.

This synchronous interactive approach is called design, development, implementation, and support (DDIS). I first describe the design principles, the theoretical and andragogical premises that were used to design the interactions, a specific three-phase model for the live virtual interactions, and the schedule for the interactions. This approach aims to describe the design, development, implementation, and support of nontraditional online doctoral students.

### Background

As more nontraditional students earn doctoral degrees online, there is a need to define guidelines for supporting them as they face the conventional procedures for designing, developing, and implementing research and obtaining a doctoral degree. Nontraditional students account for more than 71% of all students enrolled in higher education. In the for-profit sector alone, nontraditional students account for an average of 78% of those enrolled (Arbeits & Horn, 2017). Nontraditional students are generally older (more than 25 years old), attend school part-time, work full-time, may be veterans, have children, or be first-generation students (National Orientation Directors Association [NODA], 2017).

Unlike traditional doctoral programs that require students to devote full-time study to their degree programs and participate in teaching and research apprenticeships, nontraditional doctoral programs include working professionals who cannot study full time in person or on campus (Archbald, 2011). Offerman (2011) found that the nontraditional online doctoral student is likely to be a married woman with children and a career; she is often studying part time and is funding her education either through her current income or by borrowing. Programs supporting these diverse online students need to be similarly unique and responsive to meet the nontraditional students' needs.

Research has found that there are specific issues for these students culturally and academically that, if not addressed, result in the student leaving the doctoral program. Protivnak and Foss (2009), in a study of doctoral counseling students, identified that personal issues, the department culture, and problems with the mentoring process and support were concerns for their nontraditional doctoral students. Hoskins and Goldberg (2005) identified a lack of student connection with the doctoral faculty members as a significant challenge for doctoral students. Erichsen et al. (2014) identified that mentors' lack of positive relationships was a difficulty for online doctoral students. After identifying these online learners' needs in doctoral programs, we must further define the design issues inherent in creating an effective interactive approach to support online nontraditional doctoral candidates.

### Literature Review

The design of the DDIS approach is based on theories of learning as well as andragogical and heutagogical parameters. Anderson (2008) argued that taking a theoretical perspective on online design and practice

enables the practitioner to gain a broader perspective to permit the development of techniques and approaches that can be transferred from one context to another. The DDIS approach is based on constructivist, sociocultural, and problem-based learning (PBL) theories.

The doctoral learning environment is inherently constructivist (Bruner, 1990; Wilson, 1996) and must be purposefully designed to develop advanced critical-thinking processes (Mezirow, 2002). Research of constructivist learning environments suggests that instructional design grounded in constructivist principles engages students in purposeful activity as they attempt to respond to a complex problem (Russell & Schneiderheinze, 2005; von Glasersfeld, 1998). Also, instructional design based on constructivist learning principles allows students to support the efficient development of the required academic skills and advanced knowledge for doctoral candidates (Brown et al., 1989).

The DDIS approach design is also informed by sociocultural learning theory (Vygotsky, 1978), which focuses on the principles of interpersonal and intrapersonal dynamics, the scaffolding of learning, and the interactions with a more knowledgeable other to advance the learner's zone of proximal development. The *zone of proximal development* defines the difference between what a learner can do without help and what they can do with guidance and encouragement from a skilled partner, defined as a more knowledgeable other. The proximal development of skills are those that the learner is close to mastering (Cole & Packer, 2019).

The intent is to create a learning environment that leverages a learner's zone of proximal development to foster the advanced cognitive abilities, requisite skills, and content knowledge needed for doctoral success (Russell, 2008). Research has shown that learners can develop higher levels of awareness and knowledge from their dialogue and interactions in an online environment (Russell, 2005). In this case design, synchronous virtual interactions develop the types and qualities of learning needed for online doctoral students to succeed in the completion of their doctoral degrees.

Heutagogy has relevance when considering how doctoral candidates are supported during the design, development, and implementation of their dissertation study. Heutagogy is a set of beliefs that considers the learner to be independent and self-motivated (Blaschke, 2012). It is based on the premises of pedagogy—the methods and practice of teaching—and andragogy—the methods and practice of adult learning. Heutagogy is focused on the development of advanced knowledge in an increasingly complex world. Heutagogy was used as a design model for adult learning in online environments for this case design. The primary consideration was a focus on independent work designed to develop advanced knowledge and abilities. The learners' engagement in each phase of the DDIS approach is critical to developing individualized levels of engagement and productivity (Narayan et al., 2019). This design consideration is included in the PBL model at the core of the DDIS.

Doctoral candidates are required to develop advanced problem-solving capabilities (Savery & Duffy, 1996) as they generate ideas and responsive research designs based on the parameters of their study (Jonassen, 2000; Russell, 2005). The DDIS approach is designed around the principles of PBL, which is a model for developing advanced cognitive processes, knowledge, and skills as learners respond to a complex, open-ended problem (Russell, 2005). Examples of cognitive processes embedded in a PBL design include (a) confronting ill-structuredness and novelty; (b) active search for information; (c) proactive immersion in the task; (d) conscious and subconscious investment of time on task; (e) motivation to solve the problem; (f) need for meaning and explanation; (g) learning goal orientation; and (h) requirement of generative thinking, analytical thinking, divergent thinking, and synthesis (Tan, 2003).

The DDIS design approach was developed to encourage growth of the advanced cognitive processes required by doctoral candidates through engagement in synchronous meetings during different phases of doctoral completion. The premise for the growth of these abilities is based on enhancing the capacities of these learners to create, design, solve problems, and think critically (Bereiter & Scardamalia, 2006; Russell, 2008,

2016). At its core, an online doctoral program is a highly immersive, independent, open-ended problem space. The three-phase design of the DDIS approach is based on the development of the advanced cognitive processes, knowledge, and skills required for online doctoral students' success.

These cognitive theories emphasize how the learning environment's design impacts the cognitive development of learners through dialogic processes. The problem for online learners is designing, developing, and implementing a research study with the ability to write the proposal and final dissertation. The DDIS approach is designed to provide online doctoral students quality and timely online interactions based on the principles of a constructivist PBL environment (Lawson, 1990; Russell, 2009; Smith, 2010). The meetings are specifically designed to develop both the concepts and personal attributes needed by the doctoral candidate to complete their dissertation (Bereiter & Scardamalia, 2003; Russell, 2016). These interactions are specifically designed to encourage the development of advanced knowledge and skills in the learner's zone of proximal development (Vygotsky, 1978). Each phase of the design approach addresses learning outcomes, interactions, and the integration of technologies in support of the live online meetings.

## Purpose of the Study

A case design is like a naturalistic study or an action research study (Boling, 2010). Instructional design cases are becoming more critical as new technologies rapidly enter the educational field. The inclusion of live web-conferencing tools and new technologies that support the online doctoral candidate requires the designer of an online mentoring program to stay alert to the potential of these new technologies (Howard, 2011).

Design-based research involves the systematic review of a design based on relevant theories. This research method creates a design of a case that examines an innovative procedure. This is especially important in educational settings that are integrating new technologies as these settings are based on theories in the cognitive sciences and the pedagogical, andragogical, and technological innovations in education (Barab et al., 2005). This makes design-based research a critical aspect of the implementation of new technologies into traditional learning environments as it provides a roadmap for the design, implementation, and systemic evaluation of technology-based learning environments.

Instructional design in a complex field such as education is incredibly difficult (Smith, 2010). Instructional designers must be experts in the cognitive fields, pedagogical knowledge, content knowledge, and the assessment of learning. Increasingly, instructional designers must also understand the multiple effects of integrating advanced technologies to support their learning goals (Dondlinger, 2015; Russell, 2009). A case design methodology results in a report that provides both a thorough description of the design concepts and procedures and a basis for a future design using the guiding principles inherent in the case design (Howard, 2011).

It is critical that design-based methodologies be integrated into the design, development, and integration of technologies into educational settings. Educational settings often adopt technologies without the ongoing procedures of understanding systemic design, the relevant methods, and the mediating effects of technology (Bartolomé et al., 2018). A result of this is the ineffective and reactionary responses to new technologies and how they influence the way students learn, the role of educators, the administrative aspects of integration, and, ultimately, the paradigm shift that is needed to build an educational system that uses these technologies effectively (Bartolomé et al., 2018).

## Methods

The first step in the case design approach was to integrate a design template. I used one based on a PBL template designed in three phases (Russell, 2005). The template has been used to design learning environments for K–12, higher education, and business training programs. The design was based on 15 years'

experience in designing PBL units of study in K–12 and higher education settings. The design phases are supported by research in PBL and interactive knowledge development. The enhancement of the advanced cognitive processes for online doctoral candidates requires such a developmental guide to provide more effective support and resources in the dissertation process.

The template was based on encouraging growth of advanced problem-solving skills in the learners. Additionally, it included identifying output as a project that builds to the next phase of the template. In the DDIS approach, these interactions are in synchronous virtual meetings to support the development of requisite knowledge and skills to complete a doctoral degree. The template is shown in Table 1.

Each phase of the DDIS approach focuses on the enhancement of higher levels of knowledge and production based on Bereiter's scheme of knowledge. Bereiter (2002) contended that knowledge implies that the purposeful use, recombination, evaluation, and redistribution of information are the core abilities required of doctoral candidates. Drawing upon the work of Bereiter and Scardamalia (2006), a knowledge response includes two aspects: (a) the learner sees information as something functional or useful and (b) the learner, seeing themselves in control of the process, uses information in pursuit of a particular goal.

According to Bereiter's scheme of knowledge, the learner understands that knowledge objects are independent of their understanding, use, and value measurements. Knowledge is seen as "semi-autonomous artifacts" (Bereiter, 2002, p. 14). Thus, knowledge can be a focus on describing how the world works. This means that through the objectification of knowledge as an artifact with the purpose and function the learner has developed new understanding. The learner understands that knowledge is something outside of themselves that can be used to create and make sense of their reality.

The doctoral learner must evaluate the efficacy of all decisions before, during, and after their study is implemented. These interactions have the potential to increase the level of critical-thinking and problem-solving skills needed by these students (Donnelly, 2017). Navigating these requirements and ensuring the development of these requisite skills can be a complex challenge for both doctoral candidates and guiding faculty members. The design of DDIS integrates synchronous virtual meetings to develop advanced knowledge as defined by Bereiter's (2002) scheme of knowledge.

**Table 1:** *Three Phases of Problem-Based Learning*

| Developmental Phase | Goal | Inquiry Processes | Overarching Question | Project |
|---|---|---|---|---|
| Phase 1: Design | Develop the parameters of the study. | Gather information on potential topics. | What is a relevant and viable topic for your study? | Complete a plan for research study. |
| Phase 2: Development | Articulate the complete vision of your study. | Develop expertise by analyzing relevant research. | How can you become an expert on this topic? | Complete a capstone report on the proposed study. |
| Phase 3: Implementation | Analyze data and justify conclusions. | Implement research and write up the results. | What are the results and how can you write up the results for your capstone report? | Complete the doctoral capstone report. |

## Results

For the DDIS design project, the steps for mentor interactions and resource integration at each phase were based on previous PBL design activities. I defined the specific interactions in each phase in the analysis of the integration of DDIS case design.

### Design, development, implementation, and support (DDIS)

For the DDIS design project, the steps for mentor interactions and resource integration at each phase were based on previous design templates and a PBL approach. I defined the specific interaction in the virtual space in the analysis of the DDIS design.

### Phase 1: Design

During the design phase, the mentor and mentee design a viable study and develop the initial overview document. This phase focuses on developing the types and qualities of cognitive processes, skills, and knowledge through synchronous interactions that provide opportunities for the mentee to oversee the design of their study (Russell, 2008). This phase focuses the candidate and mentor on the design of their study and the alignment among all aspects, including identification of the (a) problem, (b) topic, (c) conceptual framework, (d) significance, (e) gap, (f) core studies to define the problem space, and (g) methodologies and methods.

During each phase, the mentor engages in weekly design meetings. The purpose of the design phase interactions is to allow the mentee to plan their study's overview principles with the support of the mentor's expertise as a more knowledgeable other. The mentor and mentee have a series of weekly design meetings conducted live via web conferences or phone calls. Live web conferences are preferable as this allows mentor and mentee to share their screens to actively review and revise a document. This active collaboration is an effective and efficient way to proceed through the meetings and contributes to creating a shared vision. It also lays the groundwork for mentor and mentee collaboration throughout the doctoral process.

During the design phase, the mentor engages in live dialogue to engage the mentee's expertise and concepts to design their study. The mentor asks:

1. What is your area of expertise?
2. What are the issues or problems occurring in this field?
3. What are you interested in understanding about this problem?
4. What would be the context for studying this problem?
5. What are the questions you would like to understand?
6. What are the ideas inherent in this concept that are important to understand to respond to these questions?

The purpose of these questions is to draw out ideas about the potential study. These meetings are a chance to define the problem space as part of Phase 1 of the PBL design template (Russell, 2004). This is an opportunity to ensure the mentee can conceptualize the study as it might occur in the field. These discussions are essential to moving the mentee toward an orientation of the process of research.

### Phase 2: Development

This encompasses all procedures associated with the development of the study parameters. The learning outcomes associated with this phase include the ability to (a) communicate coherently and concisely based on

academic writing style; (b) justify proposed study-based concepts, including the alignment of problem, gap, and significance; and (c) synthesize ethical issues into a viable study. During this phase, the mentor provides ongoing feedback to the writing process. Discussions with mentees expand to encompass their writing process, including developing concepts of how they write updates on their progress and ideas.

These interactions are designed to develop mentee self-efficacy (Bandura, 1993; Dunlap, 2006) as they complete the challenging task of enhancing their academic writing skills. During the development phase, interactions include either weekly meetings or ad hoc meetings with the mentee. Mentors and mentees agree on schedule times with a goal to matching mentee writing style, availability, and comfort levels for this process. During live meetings, the mentor and mentee define the critical topics to understand this research topic.

Often, it is necessary to provide mentees with suggestions for resources and technical support as they write. Technologies for supporting online doctoral students include online data management tools, writing technologies, citation management apps, and APA formatting technologies. In each case, actively demonstrating the technology online in videoconferencing meetings and providing support helps mentees understand how to navigate each new tool and see its potential.

**Phase 3: Implementation**

The final phase of the DDIS design is the implementation of the study and writing the results. During this phase, the interactions are guided by specific support needed by the learner to essential research implementation issues. For example, during implementation, live meetings to discuss data collection, for instance, provide timely feedback for the online doctoral candidate. In this phase, the mentor discusses each procedural step of implementation of the novice researcher's study and provides feedback on each step of the study. Additionally, these meetings are designed to support the reconceptualization of the learner from student to researcher. These live meetings are designed to ask the doctoral candidate to discuss their research results and their analysis to develop advanced critical-thinking and evaluative skills.

The interactions at this phase focus on asking the doctoral candidate to discuss their findings, analyses, and thoughts on the results. The mentor asks questions and takes notes on the discussions. The mentor requests the doctoral candidate to talk through their analysis as a means of developing the analytical skills needed to complete the capstone document. This think-aloud process is used to develop the cognitive process of expert decision making and critical thinking (Aitken & Mardegan, 2000; Greene et al., 2011; Siddiq & Scherer, 2017).

**Support**

The final aspect of this case design project involves the supporting tools for the mentee. The purpose is to identify and integrate guided access to the most useful resources and technologies to support the mentee during each phase. In the case of online doctoral students, the integration of online technologies to support participant recruitment, data collection, qualitative data transcription, data management technologies, and writing can make a critical difference in the mentee's ability to complete their study promptly. Rogers' (1995) concept of inclusion of technologies describes the attributes that technologies must have, including usability, functionality, dependability, and accessibility. In reviewing and recommending technologies, these critical criteria are included:

1. Will this technology provide consistent support for specific procedures (usability/dependability)?
2. Does the technology provide the type and quality of results that support the mentee's research design (functionality)?
3. What is this technology's cost to the mentee and the review features for mentor and committee members (accessibility)?

Table 2 provides the final schedule for the implementation of the DDIS case design approach. It includes (a) learning outcomes, (b) mentor activities, (c) mentee activities, (d) assessments, and (e) the projects that end each phase. The DDIS approach is designed as a guide for mentor and mentee engagement to enhance the advanced cognitive processes, the conceptual knowledge, and the academic skills needed for the successful graduation of nontraditional online doctoral students. The purpose of the synchronous meetings and the interactions in the DDIS approach is to create the potential for nontraditional doctoral candidates to successfully graduate in a timely manner.

**Table 2:** *DDIS Design Approach*

| **Outcomes for each Phase** | **Mentor Activities** | **Mentee Activities** | **Interactions** |
|---|---|---|---|
| PHASE 1: Design | | | |
| • Design an actionable research study plan.<br>• Communicate coherently and concisely based on academic writing style.<br>• Justify design based on concepts, problem, gap, significant issues.<br>• Evaluate ethical issues. | • Participate in weekly design meetings.<br>• Develop individual plans of action for mentor response. | • Participate in design meetings.<br>• Identify design parameters. | • Review checklist of weekly activities.<br>• Weekly review of writing and revision. |
| PHASE 2: Development | | | |
| • Develop specific aspects of the doctoral capstone.<br>• Communicate coherently and concisely based on academic writing style.<br>• Justify the study design based on theoretical concepts, problem, gap, and significant issues.<br>• Synthesis of the ethical issues into a viable study. | • Participate in weekly or ad hoc development meetings.<br>• Develop individual plans of action for mentor response. | • Participate in development meetings.<br>• Respond to mentor's guides for writing capstone. | • Weekly or ad hoc web conferences.<br>• Weekly review of writing and revision. |
| PHASE 3: Implementation | | | |
| • Complete research study and capstone document.<br>• Communicate coherently and concisely based on academic writing style.<br>• Justify the results of the study based on theoretical concepts, problem, gap, and significant issues.<br>• Analysis of data using deductive and inductive logic.<br>• Synthesis of ethical issues to justify study procedures. | • Participate in weekly or ad hoc implementation of study meetings.<br>• Develop individual plans of action for mentor response. | • Participate in weekly or ad hoc meetings to implement study.<br>• Respond to mentor's guide for writing capstone. | • Weekly or ad hoc web conferences.<br>• Weekly review of study progress.<br>• Review data collection. |

## Discussion

In the process of designing and implementing the DDIS approach, I responded to feedback from mentees. The meetings were redesigned, as a result, to focus on specific interactions with aligned output. An example is the redesign of the meetings during the third phase, implementation. These interactions are designed to develop higher levels of critical thinking through a series of discussions where the mentor asks the doctoral candidate to describe and justify the concepts in their results. This process is critical to the switch from passive learner to researcher and academic.

The focus of the DDIS is to separate out the complexities of the research phase of a doctoral program into finite, actionable procedures. Additionally, these interactions are designed to require doctoral candidates to reconceptualize their role as passive learners to become more proactive learners and be able to respond successfully to the myriad issues and problems that arise throughout the dissertation phase to completion. This shift to active, engaged learner is critical to developing independent learning skills. This aspect of the ongoing interactions is designed around the concept of building agency. Agency describes prosocial mechanisms for decision making and interacting in the learning environment (Bandura, 2006). The aspects of agency that are included in the DDIS approach are (a) decision making, (b) intentionality, (c) forethought, (d) self-reactiveness, and (e) self-reflectiveness (Swann & Jetten, 2017). For a doctoral candidate, perhaps the most critical learning process is the ability to rethink their own role in the learning environment and to become proactive and agentic in their learning responses. These interactions are designed to help them achieve this.

## Implications for Theory and Practice

The integration of synchronous online meetings designed to encourage the development of specific cognitive processes, academic skills, and advanced knowledge provides a new perspective to collaborating with online nontraditional doctoral candidates. This design approach is aligned with PBL programs designed for the growth of advanced skills and knowledge used in the medical field (Ju & Choi, 2018), engineering (Kumar & Radcliffe, 2017), and architecture (Bregger, 2017). These fields require the development of specific types of cognitive processes, skills, and expert knowledge for students to be successful. The integration of PBL design into programs facilitates the development of these critical abilities. In the same manner, the DDIS approach argues for the use of PBL to develop the critical cognitive processes, skills, and knowledge needed for doctoral candidates.

The DDIS is also based on the theory of heutagogy, which defines characteristics of the education of adults using advanced technologies focusing on developing self-directed adult learners (Blaschke, 2012). Additionally, collaborating online with doctoral students through live online meetings develops a community of inquiry between the mentor and mentee that increases the development of cognitive processes (Hsu & Shiue, 2017). These live interactions are also designed to promote individual agency for the nontraditional doctoral candidate (Bandura, 2006). Incorporating live interaction with defined cognitive, heutagogical, and technological purposes supports the development of the advanced skills, cognitive processes, and knowledge required by nontraditional online doctoral candidates.

The DDIS interactions are designed to develop the advanced knowledge and skills required of doctoral candidates by parsing the growth of needed cognitive processes, knowledge, and skills in phases. Additionally, by engaging the learner in meaningful and authentic responses through live online interactions, the doctoral candidate develops the proactive problem-solving skills crucial for success during and after the dissertation process. Online nontraditional doctoral students differ from traditional doctoral students, and online doctoral programs supporting them should be similarly adapted and responsive. Including these developmentally

sequenced live interactions facilitates the dissertation process for online nontraditional doctoral candidates through to completion.

The DDIS design was created to improve the advanced knowledge and skills required of doctoral candidates by parsing the development of needed cognitive processes, knowledge, and skills into phases. Additionally, by engaging the learner in meaningful and authentic responses through live online interactions, the doctoral candidate develops the proactive problem-solving skills so crucial for success during and after the dissertation process. While the end product of a practical design, implementation, and writing of a viable research study is the same, nontraditional online doctoral students require different levels and quality of support to create, engage, problem solve, and synthesize their concepts into a viable study that can be designed, developed, and implemented successfully.

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