

**HORSES IN AGRICULTURE ONLINE:
DESIGNING, DEVELOPING, AND ASSESSING SITUATIONAL
INTEREST IN AN ONLINE MUSEUM EXHIBIT USING THE SYSTEMS
APPROACH MODEL OF INSTRUCTIONAL DESIGN**

by

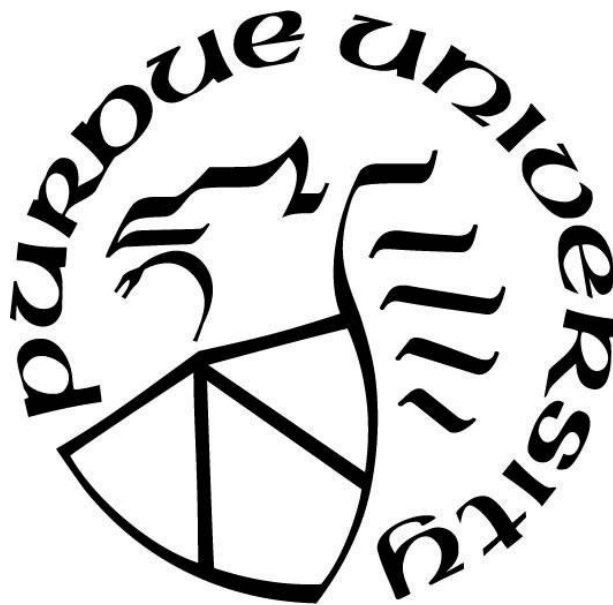
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A Dissertation

Submitted to the Faculty of Purdue University

In Partial Fulfillment of the Requirements for the degree of

Doctor of Philosophy



Department of Youth Development & Agricultural Education

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*To Michelle, who has been my champion;
and to my parents, who have never stopped believing in me.*

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TABLE OF CONTENTS

LIST OF TABLES	viii
LIST OF FIGURES	x
DEFINITION OF TERMS.....	xi
ABSTRACT	xiii
1. INTRODUCTION	1
1.1 Problem Statement.....	1
1.2 Significance.....	1
1.3 Purpose of Study	2
1.4 Research Questions.....	2
1.5 Limitations	3
1.7 Assumptions.....	3
2. REVIEW OF LITERATURE	4
2.1 Purpose of Study	4
2.2 Research Questions	4
2.3 Conceptual Framework.....	5
2.3.1. Situational Interest	5
2.3.2. Variables Influencing Situational Interest	6
2.3.3. Adaptable and Adaptive E-Learning	6
2.3.4. Free-Choice Learning	7
2.3.5. Interactivity	8
2.3.6. Audience Characteristics	8
2.3.6.a. Comparing and Contrasting Informal and Formal Learning.....	9
2.4 Theoretical Framework.....	11
2.4.1. Systems Approach	11
2.4.2. The Dick and Carey Systems Approach Model.....	13
2.4.3. Laurillard’s Interactive Levels.....	15
2.5 Need for Study	16
3. METHODOLOGY	18
3.1 Research Question	18

3.2 Initial Analysis	18
3.2.1. Front-End Analysis and Instructional Goals.....	19
3.2.2. Conduct Instructional Analysis.....	19
3.2.3. Learner and Context Analysis.....	20
3.3. Horses in Human History Initial Analysis	20
3.3.1. Methods.....	20
3.3.2. Limitations	22
3.3.3. Data Analysis	22
3.3.4. Results.....	22
3.4 Goal Task Analysis for Horses in Agriculture Online Exhibit.....	23
3.5. Learner and Context Analysis.....	24
3.5.1. Learner Analysis	25
3.5.2. Context Analysis.....	25
3.6 Discussion of Initial Analysis Results	25
3.7. Development and Design of the Online Museum Exhibit.....	26
3.7.1. Write Performance Objectives.....	27
3.7.2. Develop Assessment Instruments	33
3.7.3. Assessment Instruments and Assessment Plan.....	33
3.7.4. Design Evaluation.....	36
3.7.5. Develop Instructional Strategy	53
3.7.6. Interactive Levels.....	61
3.7.7. Develop and Select Instructional Materials	64
3.7.8. Design and Conduct Formative Evaluation of Instruction	66
3.8 Design and Conduct Summative Evaluation	68
3.8.1. Evaluating the Online Exhibit based on the Situational Interest of the Learners ...	69
3.8.2. Evaluating the Effect of Online Exhibit Characteristics on the Situational Interest of Stakeholders.....	69
3.8.3. Methods.....	70
3.8.4. Data Analysis Plan.....	72
4. RESULTS	82
4.1 Descriptive Statistics and Frequencies.....	82

4.1.1. Informal Group	82
4.1.2. Formal Group.....	94
4.2 T-Tests of Situational Interest Before and After Participation in the Online Exhibit .	105
4.2.1. Informal Group	105
4.2.1. Formal Group.....	106
4.3 Hierarchical Linear Regression Analysis.....	106
5. DISCUSSION AND CONCLUSION.....	109
5.1 Discussion.....	109
5.1.1. Research Question 1	109
5.1.2. Research Question 2	110
5.1.3. Research Question 3	112
5.2 Limitations	115
5.3 Revisions to the Online Exhibit	116
5.3.1. Technological Difficulties	116
5.3.2. Linear Pathway Format.....	117
5.3.2. Interactivity.....	117
5.3.3. Evaluation Instrument.....	118
5.4 Implications.....	118
5.5 Conclusion	120
REFERENCES.....	122
APPENDIX A. SURVEYS.....	127
APPENDIX B. FORMS.....	148
VITA	151

LIST OF TABLES

Table 1: Performance Objective Chart for Horses in Agriculture Online Exhibit	29
Table 2: Design Evaluation Chart for Horses in Agriculture Online Exhibit.....	37
Table 3: Horses in Agriculture Content Sections and Corresponding Interactive Levels	62
Table 4: Reliability Analysis of Online Exhibit Situational Interest Items	74
Table 5: Reliability Analysis of Horse Topic Situational Interest Items	75
Table 6: Reliability Analysis of Agriculture Topic Situational Interest Items	75
Table 7: Reliability Analysis of Computer Learning Situational Interest Items	76
Table 8: Reliability Analysis of all Situational Interest Dependent Variable Items	76
Table 9: Principal Component Rotated Matrix Table.....	77
Table 10: Table of Total Variance Explained by Principal Components	78
Table 11: Reliability Analysis of Online Exhibit Situational Interest Items	79
Table 12: Reliability Analysis of Free Choice Situational Interest Items	80
Table 13: Reliability Analysis of Adaptability Situational Interest Items	80
Table 14: Reliability Analysis of Interactivity Situational Interest Items	81
Table 15: Demographic Characteristics of Informal Group Participants; n= 35	83
Table 16: Topic Situational Interest of Informal Group Participants; n=35	86
Table 17: Situational Interest in Horses in Agriculture Online Exhibit of Informal Group Participants; n=35	88
Table 18: Computer Learning Situational Interest of Informal Group Participants; n=35.....	90
Table 19: Free Choice Situational Interest of Informal Group Participants; n=35.....	91
Table 20: Adaptability Situational Interest of Informal Group Participants; n=35	92
Table 21: Interactivity Situational Interest of Informal Group Participants; n=35.....	93
Table 22: Demographic Characteristics of Informal Group Participants; n= 411	94
Table 23: Topic Situational Interest of Formal Group Participants; n=411	95

Table 24: Topic Situational Interest of Formal Group Participants; n = 411	97
Table 25: Situational Interest in Horses in Agriculture Online Exhibit of Formal Group Participants; n=411	99
Table 26: Computer Learning Situational Interest of Formal Group Participants; n=411	102
Table 27: Free Choice Situational Interest of Informal Group Participants; n=35.....	102
Table 28: Adaptability Situational Interest of Formal Group Participants; n=411.....	103
Table 29: Interactivity Situational Interest of Formal Group Participants; n=411	104
Table 30: Paired Samples T- Test of Topic Interest Before and After Online Exhibit, N=28 ...	105
Table 31: Paired Samples T- Test of Topic Interest Before and After Online Exhibit, N=28 ...	106
Table 32: Hierarchical Regression Analyses Predicting Online Exhibit Situational Interest.....	108

LIST OF FIGURES

Figure 1: Mitchell's Multifaceted Model of Situational Interest.....	6
Figure 2: The Systems Test.....	12
Figure 3: Dick and Carey Systems Approach Model for Designing Instruction.....	14
Figure 4: The Dick and Carey Systems Approach Model with the Initial Analysis Highlighted	19
Figure 5: Goal Task Analysis for the Horses in Agriculture Online Exhibit.....	24
Figure 6: The Dick and Carey Systems Approach Model with Steps 4 through 9 Highlighted in Red	27
Figure 7: Mitchell's Model of Situational Interest in the Mathematics Classroom	35
Figure 8: Screenshot of Content Presentation on Facebook	54
Figure 9: Main Menu Slide from Online Exhibit.....	55
Figure 10: Screenshot of “Plants and Crops” section of “What is Agriculture?” Section.....	59
Figure 11: Screenshot of Survey Questionnaire Prompt and Link in Online Exhibit	60
Figure 12: Screenshot of Domestication Slide in Horses in Agriculture Online Exhibit	64
Figure 13: Screenshot of “Black Beauty” Slide in Horses in Agriculture Online Exhibit	65
Figure 14: The Dick and Carey Systems Approach Model with Steps 10 Highlighted in Blue...	68
Figure 15: Screenshot of Facebook Link and Recruitment Post for Informal Group.....	71

DEFINITION OF TERMS

- **Interest:** A liking and willful engagement in a cognitive activity (Schraw & Lehman, 2001).
- **Situational Interest:** An interest that people acquire by participating in an environment or context and emphasizes the importance of creating an appropriate environmental setting (Mitchell, 1993).
- **Personal Interest:** An interest that people bring to some environment or context (Mitchell, 1993)
- **System:** A set of interrelated parts, all of which work together toward a defined goal (Dick & Carey, 2015)
- **Dick and Carey Systems Approach Model for Designing Instruction:** A 10-step procedural systems approach model for the design, development, implementation, and evaluation of instruction (Dick & Carey, 2015).
- **International Museum of the Horse (IMH):** The largest and most comprehensive museum in the world dedicated to exploring the important history of all horses and their impact on human civilization (“About IMH”, n.d.).
- **E-Learning:** The delivery of a learning, training or education program by electronic means. E-learning involves the use of a computer or electronic device, e.g. a mobile phone, in some way to provide training, educational or learning material (Derekstockley, 2004).
- **Adaptable and Adaptive E-Learning:** an ‘adaptable’ e-learning experience is wherein the user has the control to alter the learning experience, wherein ‘adaptive’ refers to an elearning experience in which the system adapts to the user automatically based on the system’s assumptions of the user’s needs (Mödrischer, 2004).
- **Free-Choice Learning:** regular, entirely self-motivated learning that happens during everyday life (Falk & Dierking, 2002).
- **Learning Pathway:** The way students go through the adaptive e-learning material (Van Seters et al, 2012).

- **Interactivity:** Media [within an educational context] that responds in a limited way to what the learner does (Laurillard, 2002).
- **Self-Regulated Learning (SRL):** A process of learning wherein the learner is free to decide what, when, where, and how to learn (Weinert, 1982). There is no emphasis on a specific goal (Steffens, 2006).

ABSTRACT

Author: Lofgren, Elise, A. PhD

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Title: Horses in Agriculture Online: The Design, Development, and Assessment of Situational Interest in an Online Museum Exhibit using the Systems Approach Model of Instructional Design

Major Professor: Colleen Brady

Research on motivations of learners has been done in traditional museum environments, but the research of online museum exhibits is in its infancy. While variables such as interactivity have been explored in traditional museum exhibits, little is still known about how these variables affect visitor experiences in online applications. It is important to know if the application of technology into these programs, such as online learning experiences and corresponding characteristics such as interactivity, free-choice use, and adaptive/adaptable e-learning effects the learner experience.

This study follows a formal process of instructional design to develop an online educational resource to be used for both formal and informal learning experiences. Specifically, the design, development, and assessment of an online museum exhibit about the horse's historical and current day impact on agriculture. This process was guided by the systems approach model of instructional design. This study took place in multiple parts that are the necessary steps of the Dick and Carey systems approach model. The online museum exhibit that resulted from this process was then evaluated by looking at the facet of situational interest for both informal and formal audiences, as well as whether the specific online exhibit characteristics of free-choice, adaptability, and interactivity affect situational interest in the online museum exhibit.

This exhibit was intentionally designed, using specific online exhibit characteristic variables, to stimulate situational interest in both formal and informal learning environments and evaluated using a modified, validated situational interest survey instrument. The results indicated situational interest in both informal and formal groups and the variables of previous years of horse experience, free-choice, interactivity, and adaptability were identified as predictors of situational interest in the online exhibit of the formal group. Specifically, the variable of freechoice learning was responsible for over 40% of the explained variance in situational interest in the formal group,

which provides implications of future research in the integration of free-choice opportunities in the formal education domain.

1. INTRODUCTION

This study follows a formal process of instructional design to develop an online educational resource to be used for both formal and informal learning experiences, specifically the design, development, and assessment of an online museum exhibit about the horse's historical and current day impact on agriculture. This process was guided by the Systems Approach Model of instructional design. This study took place in multiple parts that are the necessary steps of the Dick and Carey Systems Approach model. The online museum exhibit that resulted from this process was then evaluated by looking at the facet of situational interest for both informal and formal audiences. The thesis statement for this study is that the use of the Dick and Carey systems approach model in the development of the online museum exhibit will result in a significant level of situational interest for both informal and formal educational audiences.

1.1 Problem Statement

There has been a large body of research around the various methods applied to designing and developing online educational experiences, both traditional and otherwise. However, no particular method has been identified as the singular formula for the development of online museum experiences, including those that can be used for both informal and formal purposes.

1.2 Significance

Research on these learners' motivations has been done in museum environments, but the research of online museum exhibits is in its infancy. While variables such as interactivity have been explored in traditional museum exhibits, little is still known about how these variables affect visitor experiences in online applications. It is important to know if the application of technology

into these programs, such as online learning experiences and corresponding characteristics such as interactivity, free-choice use, and adaptive/adaptable e-learning effects the learner experience.

1.3 Purpose of Study

The purpose of this study was to: 1. Design and develop an online museum exhibit for the International Museum of the Horse by utilizing Dick and Carey's system approach model for instructional design; 2. Evaluate the online museum exhibit based on situational interest of both informal and formal audience groups; 3. Identify specific characteristics of both the online museum exhibit and the learners that were most closely associated with situational interest of the learners.

1.4 Research Questions

1. What are the goals of the proposed online museum exhibit? Specifically:
 - a. What are the goals of the museum?
 - b. Who is the audience?
 - c. What are the needs of the audience?
2. Does application of a systems approach design process result in an online exhibit effective in engaging situational interest in the audience? Specifically...
 - a. Informal
 - b. Formal
3. Do audience characteristics impact how the online exhibit engages situational interest?
4. Do online exhibit characteristics affect how the online exhibit engages situational interest in the audience? Specifically:
 - a. Adaptability

- b. Free-choice
- c. Interactivity

1.5 Limitations

- Access to internet
- Access to social media (dissemination method)
- No random assignment (snowball sampling)
- Reach of audience (dependent on many factors, internet access, social media) □

Technological failure possible (browser failure)

1.7 Assumptions

- Learners are all self-motivated
- Learners have access to the internet

2. REVIEW OF LITERATURE

2.1 Purpose of Study

The purpose of this study was to: 1. Design and develop an online museum exhibit for the International Museum of the Horse by utilizing Dick and Carey's system approach model for instructional design; 2. Evaluate the online museum exhibit based on situational interest of both informal and formal audience groups.

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4. Do online exhibit characteristics affect how the online exhibit engages situational interest in the audience? Specifically:
 - a. Adaptable
 - b. Free-choice
 - c. Interactivity

2.3 Conceptual Framework

The dependent variable within this research is situational interest. Specific types of interest, such as situational interest, and various forms of stimulating interest for both formal and informal environments will be addressed and accounted for within the design of the online museum exhibit. Situational interest has been chosen as the designated variable for evaluation because of its relevance in both formal and informal learning environments. The area of situational interest will be accounted for in both formal and informal environments with the implementation of adaptive e-learning, free-choice learning, and interactivity applications.

2.3.1. Situational Interest

Interest is defined as a liking and willful engagement in a cognitive activity (Schraw & Lehman, 2001). Interest has been identified as a significant factor within motivation and has been classified into specific categories by researchers (Eccles & Wigfield, 2002). Individual or personal interest is a pre-existing intrinsic interest; and situational interest is the interest generated by specific external conditions outside of personal predisposition (Eccles & Wigfield, 2002; Schraw & Lehman, 2001). According to Eccles & Wigfield's review of research (2002), features that have been found to arouse situational interest and improve recall include personal relevance, novelty, activity level, and comprehensibility. According to Schraw and Lehman's extensive review of the literature (2001), interest affects how learners use learning strategies, how emotionally engaged they become in the task, and how deeply the learners process the experience. Situational interest can be broken down even further into catch and hold interest, which is differentiated by the ability to stimulate (catch), or stimulate and sustain (hold) (Mitchell, 1993). Mitchell (1993) proposed with his multifaceted model of situational interest that the "essence" of catch interest is a variety

of ways of stimulating learners, while hold interest is actually a way of empowering learners in the long term.

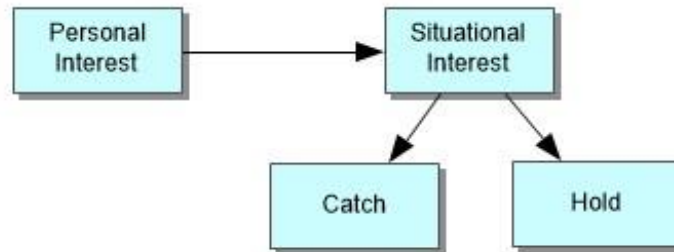


Figure 1: Mitchell's Multifaceted Model of Situational Interest

2.3.2. Variables Influencing Situational Interest

Situational Interest has been classified into specific types of interest according to the external stimuli, such as teacher interest, cultural value, humor, visual media, games, and puzzles (Bergin, 1999; Mitchell, 1993; Rotgans & Schmidt, 2011). Situational interest has also been found to be increased by the amount of choice a learner has in the educational experience (Schraw et al, 2001).

In the online exhibit, independent variables that were used to address situational interest in both formal and informal environments included the implementation of adaptable e-learning, free-choice learning, and interactivity applications. These features were indicated as desirable by stakeholders during the front-end analysis of the systems approach model, which can be found in Chapter 3. In order to effectively evaluate the role these variables play in the online exhibit, it is important to understand their function as related to situational interest of learners.

2.3.3. Adaptable and Adaptive E-Learning

Adaptive E-learning is a combination of two major concepts, adaptation and elearning. E-learning has been defined in many ways, but for the purpose of this study it is considered as the

delivery of a learning, training or education program by any electronic means, including but not limited to the use of a computer or electronic device to provide any kind of learning material (Derekstockley, 2004). Even though the common term is ‘adaptive e-learning’, the concept of adaptation has two different interpretations, adaptive and adaptable (Mödritscher, 2004). The term ‘adaptable’ technically describes an elearning experience in which the user has the control to alter the learning experience, wherein ‘adaptive’ refers to an e-learning experience in which the system adapts to the user automatically based on the system’s assumptions of the user’s needs (Mödritscher, 2004). Because of its adaptability to user needs and differences, adaptive programs have been integrated into the adaptive e-learning world (Chen et al, 2005). This was termed the Personalized Learning System or PEL-IRT, and utilized logistic models to provide a customized web-based e-learning service that estimated learner ability and could supply the learner with the appropriate learning pathway (Chen et al, 2005). Van Seters utilized a similar system that created customized learning pathways for a heterogeneous group of students in a Biology course (Van Seters, 2011). However, the intrinsic motivation inventory used to measure the data had low reliability (Van Seters, 2011).

2.3.4. Free-Choice Learning

The idea of free-choice learning is that it is regular, entirely self-motivated learning that happens during every-day life (Falk & Dierking, 2002). Free-choice learning according to Falk and Dierking’s extensive museum research is “what people do when they get to control what they learn, when to learn, where to learn, and with whom to learn” (Falk & Dierking, 2002). Essentially, this type of learning is motivated by an intrinsic interest.

Similar terms are also present in the atmosphere of self-motivated learning, such as self-regulated learning (SRL) (Bracey, 2001). While almost identical in every way, free-choice

learning and SRL both share the most extreme level of self-guided learning that takes place under full control of the individual (Bracey, 2001). However, there is not as much emphasis on a specific goal and process within SRL, which, because of the lack of extrinsic motivators in museum goers, is more appropriately aligned with the idea of free-choice learning and both terms practically share identical definitions (Falk & Dierking, 2002; Weinert 1982, Steffens, 2006). Therefore, for the purpose of this project, free-choice learning will be used to describe the type of design feature taking place in the online museum exhibit.

2.3.5. Interactivity

Interactivity is defined as “media that responds in a limited way to what the learner does” (Laurillard, 2002). High levels of interactivity in online learning experiences are shown to increase positive attitudes and performance amongst students (Durrington, Berryhill, & Swafford, 2006). Research has often gone as far as to suggest that online distance learning can be as effective as traditional classroom instruction when the technologies are appropriate for the instruction, instructors provide necessary support and feedback to students, and levels of student interactivity are high (Durrington, Berryhill, & Swafford, 2006).

2.3.6. Audience Characteristics

The Horses in Agriculture online museum exhibit was designed with the intention of being used for both formal and informal audiences. Because this exhibit is intended to be used for multiple purposes, the exhibit will not be evaluated based on the variable of knowledge as traditionally done, but on the variable of situational interest. Therefore, in order to effectively evaluate the role of situational interest in these environments, there must be consideration given to what differentiates informal and formal learning and an understanding of the commonalities.

2.3.6.a. Comparing and Contrasting Informal and Formal Learning

Informal learning is learning that takes place in an unstructured environment and is recognized as being more focused on process than performance. Informal learning takes place in many forms, from everyday experiences - such as museums, zoos, and youth programs - to online learning opportunities, and even just learning on-the-job (Cross, 2011; Vadeboncoeur, 2006). Formal learning takes place within a structured environment and is pre-planned by another entity, such as a school or university (Choi & Jacobs, 2011).

The commonality that exists between the various forms of informal education is the emphasis on the individual's choice and investment in the learning experience and this is often overlooked (Choi & Jacobs; Cross, 2011; Vadeboncoeur, 2006). An example of this is in work or job training, which requires both formal and informal learning participation in the form of pre-determined training completion as well as learning on the job on one's own (Choi & Jacobs, 2011).

When there are no formalized extrinsic pressures or specific performance objectives to be evaluated, the learner's experience is based in intrinsic motivations (Cross, 2011). This takes a great deal of self-discipline on behalf of the learner, which has been documented and interpreted in different ways (Cross, 2011). For example, in the context of learners in museum experiences, this concept of self-motivation in learning is referred to as free-choice learning, which as discussed in Chapter 2, has been accounted for in the design of this online museum exhibit.

It has been argued that the established dualism between informal and formal education could perhaps be harmful to the mission of education in the first place (LaBelle, 1982; Richardson & Wolfe, 2001). Formal education is scheduled, manufactured, and evaluated on a standard set by someone, somewhere. Informal education, on the other hand, operates spontaneously and at

the discretion of the learner's pace Choi & Jacobs, 2011; Richardson & Wolfe, 2001). There is indeed different needs that are being met by both styles contextually, whether it be job training or a college education, but in the words of Richardson and Wolfe (2001):

“The split between formal and informal education is part of the problem. We would all do better if we concentrated on being in the same field – education – rather than trying to convince ourselves and others of our differences. Learning involves process and product, not process or product”.

Dabbagh & Kitsantas (2012) has applied this concept to the development of a Personal Learning Environment or PLE, which encourages self-regulated, informal learning into a formal higher education environment using social media. According to Dweck (2006), those with a fixed mindset could be cultivated into a mindset more focused on growth through educational experiences designed to be mastery-oriented, not necessarily categorized by “informal” or “formal” definitions. Learning should be a growth experience across the board that is not limited by the environment in which it is taking place (Richardson & Wolfe, 2001).

It is with this perspective in mind that the online exhibit was designed, developed, and evaluated for multiple uses in different contexts. While the informal and formal learning contexts have characteristics that are clearly different, there is also a common thread that runs through both constructs – education as a growth process. With that being said, the research questions intend to address and explore what similarities and differences exist between the experiences of both the informal and formal learners in the Horses in Agriculture online exhibit as well as what specific variables within the exhibit engage situational interest.

2.4 Theoretical Framework

While there are many technologies available to use for online education, it has been argued that these approaches can only be successful if the educational experience is designed with the audience's characteristics in mind (Laurillard, 2002). Therefore, this premise supports the use of an intentional design process within the development of online learning.

The independent variable within this research is the use of the Dick and Carey systems approach design process and the thesis statement is that this process will result in an online museum exhibit effective in engaging situational interest. Therefore, the theoretical underpinning of this project is based in the Systems Approach.

2.4.1. Systems Approach

In education, there are many variables that interact with one another with the end goal being a predetermined student learning outcome. These parts include, but are not limited to, instructors, learners, content, educational materials, and delivery method (Dick

& Carey, 2015). The Systems Approach proposes that each of these parts are instrumental to all purposeful teaching and learning experiences (Dick & Carey, 2015). By viewing the instructional process as a system, or set of interrelated parts which work together towards a common goal, equal importance and detail is given to each of the variable parts involved in the instructional experience (Dick & Carey, 2015).

The theoretical grounding of the Systems Approach can be most closely associated to Systems Thinking (Arnold & Wade, 2015). Systems Thinking is a term first coined by Barry Richmond in 1987 as “the art and science of making reliable inferences about behavior by developing an increasingly deep understanding of underlying structure” (Arnold & Wade, 2015). Systems thinking has been redefined many times, but at the core is a goal-oriented system that

can be identified using the three qualifiers of the systems test: purpose, elements, and interconnection. Purpose is quite self-explanatory and simply describes the purpose or goal in a way that can be easily understood (Arnold & Wade, 2015). Elements describes the characteristics of the specific purpose or goal

(Arnold & Wade, 2015). Interconnectedness describes the way that the elements feed and relate to each other (Arnold & Wade, 2015). The System Test, shown in Figure 2, was created to test a systems thinking definition for systemic fidelity (Arnold & Wade, 2015).

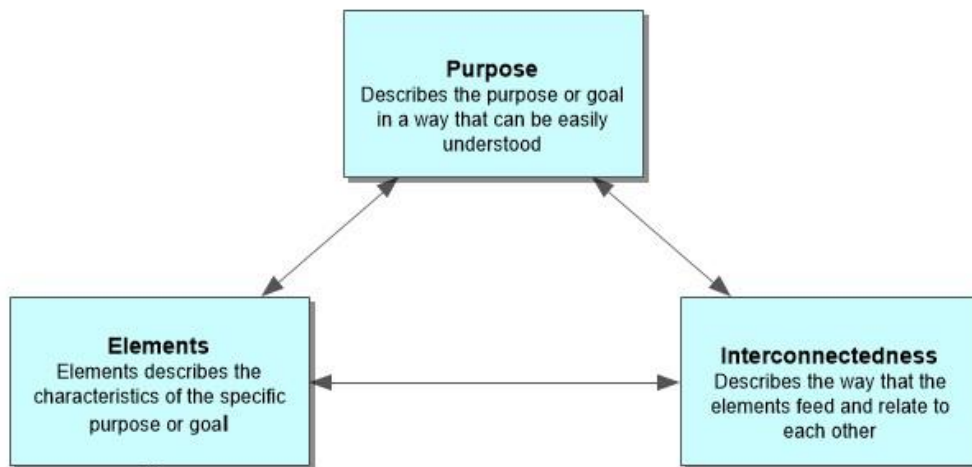


Figure 2: The Systems Test

In the case of an instructional system, whose goal is to bring about learning, parts of the system require input and output from other parts, and overall the system depends on feedback to determine whether or not the goal has been successfully achieved (Dick & Carey, 2015). There are many instructional models that utilize a systems approach, and most of them share the same components (Dick & Carey, 2015).

2.4.2. The Dick and Carey Systems Approach Model

The Systems Approach Model for Designing Instruction is a 10-step process of designing, developing and evaluating educational material (Dick & Carey, 2015). The Dick and Carey Model is an outcomes-based model approach that from the start requires a complete awareness of the final goal of the instruction and the necessary steps needed to reach that goal. While not intended for use in curriculum design without special considerations, it is very suitable for the design of various forms of instruction, including everything from corporate trainings, informal workshops, and formal educational programs (Dick & Carey, 2015). While it is referred to as a systems model, it is important to note that it is not a single system model (Dick & Carey, 2015).

The early manifestation of the Dick and Carey model was heavily influenced by Robert Gagné's *The Conditions of Learning* (1965), which focused more on the concept of cognition and internal, information-processing views of learning and less on external controls (Dick & Carey, 2015). The Dick and Carey model is grounded in the idea that learning occurs when a learner is able to incorporate the new information into their own individual memories, which in turn results in new capability (Dick & Carey, 2015). Instruction is seen as simply arranging and providing the information in a particular way that make this incorporation and cognition possible (Dick & Carey, 2015). Similarly, Constructivist influences can be seen in the grounding of this model as well, with the main theme being that learning is "constructed" by each individual learner combining the new information with their personal knowledge and experiences (Dick & Carey, 2015).

The model is intended to be used to tailor the instruction to the context and audience while staying extremely focused on the goals and outcomes (Dick & Carey, 2015). The ten components of the model include: 1. Assess Needs to Identify Goal(s); 2. Conduct Instructional Analysis; 3. Analyze Learners and Contexts; 4. Write Performance Objectives; 5. Develop Assessment

Instruments; 6. Develop Instructional Strategy; 7. Develop and Select Instructional Materials; 8. Design and Conduct the Formative Evaluation of Instruction; 9. Revise Instruction; 10. Design and Conduct Summative Evaluation.

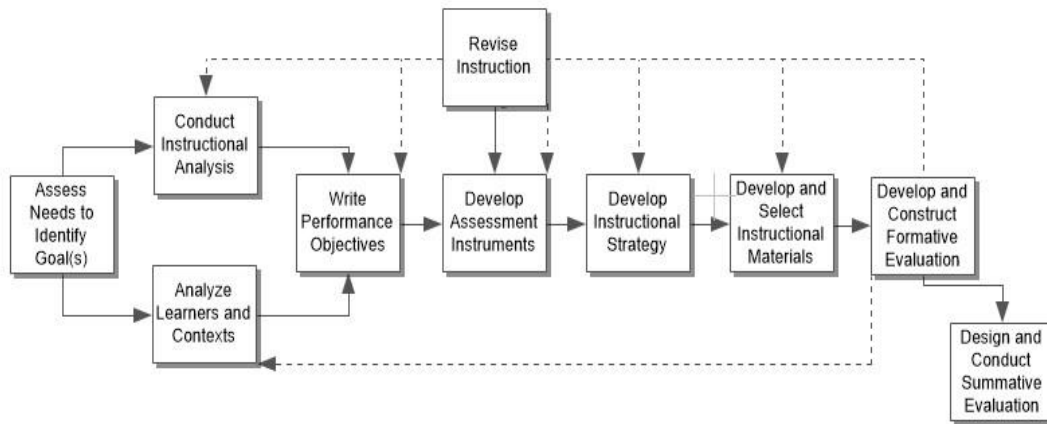


Figure 3: Dick and Carey Systems Approach Model for Designing Instruction

What makes this model unique is the instructional strategy component, which addresses how the instructional designer uses the information from analysis of the other variables of the educational experience in question (Dick & Carey, 2015). This information is used to create a plan to reach the ultimate goal of connection between the learner and the instruction (Dick & Carey, 2015). Dick and Carey (2015) refer to instruction in a broader definition that “is only limited by the imagination of teachers, designers, and students” and includes a vast array of activities but is not limited to traditional lecture, computer-based drill and practice, virtual learning, and individual discovery learning. The model is also constructed in a way that can be easily adapted for a multitude of uses and is to be used more as a “scaffold” in the creation of instruction (Dick & Carey, 2015).

2.4.3. Laurillard's Interactive Levels

As discussed in the conceptual framework, situational interest is the dependent variable and can be engaged by variables such as adaptability, free-choice, and interactivity. Integrating these features into the Systems Approach design process requires guidance from a framework that addresses design variables such as these. The theoretical grounding which guides the instructional strategy component within the

Systems Approach is Laurillard's (2002) interactive levels application to websites. Laurillard's interactive's levels have been used to evaluate the specific kinds of educational media being used in online museum websites (Saiki, 2010). Through this lens, Laurillard (2002) frames Bloom's levels of cognition in the context of online media and distinguishes five levels and types: 1. Narrative, 2. Interactive, 3. Communicative, 4. Adaptive, 5. Productive.

The narrative level of interaction involves the learner being a passive recipient of information with the media being limited to images and text (Saiki, 2010). The interactive level includes media that allows the learner to explore the website actively and have choice in what they view and when they view certain material (Saiki, 2010). The third level, communicative, includes media that allows the learner to interact with other learners through discussion boards or blogs (Saiki, 2010). The fourth level, adaptive, includes media that learners can share and discuss ideas with other views and receive feedback from an instructor (Saiki, 2010). The last level, productive, includes media that actually enables learners to show their proficiency in a skill, such as building a structure or creating a project (Saiki, 2010).

Laurillard's interactive levels framework has been used to evaluate education sections of museum websites by researchers (Saiki, 2010). Research has shown that many of the educational opportunities that museum websites offer online have trouble reaching the higher levels of interaction and cognition (Saiki, 2010). It is through this combination of the systems approach

and intentional leveraging of Laurillard's interactive levels that situational interest is directly addressed in the Horses in Agriculture online exhibit.

2.5 Need for Study

Online and technological applications have begun to be utilized by museums in various ways within the last 25 years (Feher, 1990; Nickerson, 2002; Dierking & Falk, 1998; Wang et al, 2009; de Almeida & Yokoi, 2003). From basic websites to interactive virtual tour guides, technology and internet have slowly taken the museum experience outside the museum (Dierking & Falk, 1998, de Almeida & Yokoi, 2003). Adaptive and customizable virtual museum experiences have begun to be explored, such as a virtual tour guides that adapts to the learner's interests, or mobile apps that can be used to access supplemental material while visiting a museum (Sharples et al, 2007). The importance of free-choice learning and customizability have also been stressed and applied to traditional museum experiences as well (Dierking & Falk, 1998; Bamberger & Tal, 2007; Mortenson & Smart, 2007). Free-choice learning emphasis has been implemented in traditional museum learning, such as the use of free-choice learning worksheets to encourage the learner to explore based on interest (Mortenson & Smart, 2007).

However, all of these manifestations and possibilities in education warrant a cautionary consideration – which is that the educational innovation is only as good as the overall design process and should be well-informed by the intended audience. While the Dick and Carey Systematic approach has been used for online learning, it has not been widely explored in the context of online museum exhibit development and design. In regards to situational interest in an online museum context, various techniques have been used to stimulate interest in similar contexts, but further exploration is needed in this area

(Dohn, 2011; Dohn, 2013). Therefore, little is known about the online museum learners' situational interest, and specifically, what factors influence their situational interest. It is also unknown if this particular design process (Systems Approach Model of Instructional Design) is effective in producing an online exhibit that will engage situational interest in formal and informal educational environments.

3. METHODOLOGY

3.1 Research Question

1. What are the goals of the proposed online museum exhibit? Specifically:
 - a. What are the goals of the museum?
 - b. Who is the audience?
 - c. What are the needs of the audience?

3.2 Initial Analysis

The Dick and Carey Systems Approach begins with what is called the Initial Analysis (Dick & Carey, 2015). The Initial Analysis includes the first three steps of the Dick and Carey Systems Approach Model, which are 1. Assess Needs to Identify Goal(s); 2. Conduct Instructional Analysis; 3. Analyze Learners and Contexts (Dick & Carey, 2015). As previously discussed, this model is focused on desired learning outcomes, which cannot be met if there are not specific instructional goals set to meet those outcomes (Dick & Carey, 2015). These steps are necessary to assess what the needs of the intended audience are for the instruction, what the specific goals are to be met via learning, what characteristics the learners are bringing with them to the instructional experience, and in what kind of setting the instruction will be taking place (Dick & Carey, 2015). These steps have a direct impact on the following steps in the model, specifically in shaping what will be the instructional strategy (Dick & Carey, 2015).

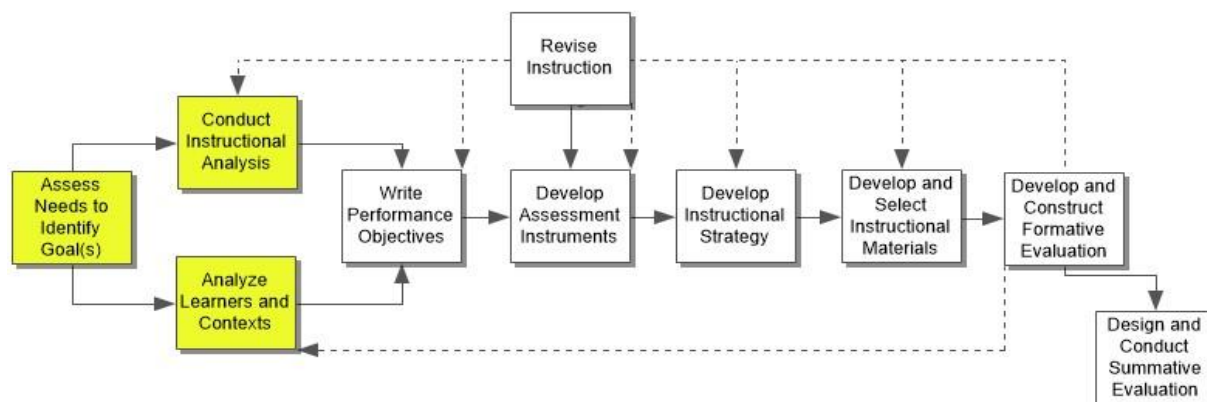


Figure 4: The Dick and Carey Systems Approach Model with the Initial Analysis Highlighted

3.2.1. Front-End Analysis and Instructional Goals

The first step of the Systems Approach Model is 1. Assess Needs to Identify Goals (Dick & Carey, 2015). This is a necessary step that is used to pinpoint the needs of the audience and identify the context in which the instruction will be taking place (Dick & Carey, 2015). If these first steps are not taken, the instructor or designer could potentially be creating instructional material for a need which does not actually exist, or does not meet the specific needs of the learners effectively (Dick & Carey, 2015). The front-end analysis is also used to identify the goals of the instruction (Dick & Carey, 2015). This analysis can be performed in a variety and combination of ways, including survey instruments, focus groups, or interviews with subject matter experts (Dick & Carey, 2015).

3.2.2. Conduct Instructional Analysis

Once the instructional goal has been identified, the next step is to analyze specifically what the learners will be doing when they perform the goal and what subordinate skills would be necessary for them to successfully meet the goal. Entry skills are also crucial to success of this

process and include the skills, knowledge, or attitudes that will be needed by learners to participate in the instruction (Dick & Carey, 2015).

3.2.3. Learner and Context Analysis

Coinciding with the instructional analysis, there must also be detailed analysis of the learners, their characteristics, and the context in which they will be learning or using the instruction. This includes relevant information such as age, grade, pre-existing knowledge, attitudes, and skills, as the environment in which the instruction is taking place. For example, if the target learners are not as comfortable with computers, it would most likely not be appropriate for the instruction to take place on a computer, unless, perhaps, if the instructional goal is for the target learners to become more confident and knowledgeable working on computers.

3.3. Horses in Human History Initial Analysis

The first three steps in the development of the online museum exhibit followed the front-end analysis of the educational stakeholders. This was done through an online questionnaire, as well as a focus group with the museum staff whom are considered subject matter experts. Analysis of learners and contexts was performed through the online questionnaire and by collecting detailed information about learner characteristics, previous knowledge, attitudes, and preferred instructional methods. From this information, an instructional analysis was performed to explicitly analyze the necessary steps to be taken by the learners to ensure successful mastery of the instructional goal.

3.3.1. Methods

A Front-End Analysis was conducted with the goal of assessing the needs and goals of the International Museum of the Horse and potential users of the online exhibit.

The Front-End Analysis was constructed into three parts: 1. Focus Group with Subject Matter Experts 2. Survey of Educators 3. Survey of Kentucky Horse Park Patrons.

A focus group was conducted with subject matter experts in October of 2015. The focus group included the Director, Education Coordinator, and Curator of the International Museum of the Horse. The focus group was semi-structured and lasted about 2 hours.

Secondly, a survey of educators was conducted based on the goals identified by the subject matter experts at the International Museum of the Horse. A 24-Item Online Questionnaire was created in the survey software Qualtrics and disseminated to various groups of equine-related educators.

Lastly, a survey of Kentucky Horse Park patrons was conducted based on the goals identified by the subject matter experts at the International Museum of the Horse. A 23-Item Online Questionnaire was created in the survey software Qualtrics and disseminated to email lists provided by the Kentucky Horse Park. It should be noted that the survey used for the patrons was identical to the educators' survey with the exception of one educator-relevant question which was removed.

The survey questionnaires were designed and informed by following Dillman's specific recommendations for web surveys (Dillman et al, 2001). These recommendations place emphasis on reducing survey error, which is a common problem in online survey distribution due to four categories of error: coverage error, sampling error, measurement error, and nonresponse error (Dillman et al, 2001). The Survey questionnaire was be designed in a way per Dillman's recommendation that does not discourage participation because of inappropriate web design, limited question response options, and low interest generation (Dillman et al, 2001). Survey

questions were offered in multiple choice, Likert-scale, and open-ended formats and coded into their respective data categories.

Survey questionnaire dissemination was performed as closely to Dillman's standard as possible, with direct emails to participants prompting them to participate every 2 weeks for 6 weeks, for a total of 3 email contacts. A link to the Qualtrics survey questionnaire was included in the recruitment email.

3.3.2. Limitations

Due to policies of some of the educator organizations that participated in the survey, the research team was unable to obtain direct email addresses for some participants. Instead, participating organizations disseminated recruitment emails with the questionnaire link on behalf of the research team.

3.3.3. Data Analysis

The data from the completed surveys was inputted into SPSS Statistics software and descriptively analyzed using frequencies and averages.

3.3.4. Results

At the conclusion of data collection, a total of 323 responses were collected. The survey collected information from 170 educators from four different educational organizations: The North American Colleges and Teachers of Agriculture (NACTA) N= 8; The American Youth Horse Council (AYHC) N=104; The National Association of Equine Affiliated Academics (NAEAA) N=5; and Extension Horses Inc. N= 52. Responses were collected from 153 Kentucky Horse Park Patrons.

Focus group results with the International Museum of the Horse staff included specific goals of having more of an online educational presence as well as a desire to have more involvement and possible collaboration with academia. Survey results revealed that educators are not familiar with the International Museum of the Horse. Overall, attitudes towards online learning were positive in both the educator and Kentucky Horse Park Patron groups. Educators indicated interest in integrating online museum exhibit into lessons and IMH and Purdue University were considered reliable sources of information. Student interest was indicated by educators to be is the most influential for educators' curricular decisions. Educators also indicated interest in integrating history with current material related to horse care and management. Educators indicated the most interest in using online exhibit as a supplement, information source, or free-choice learning opportunity for students. The most interest was indicated in video media, followed by pictures, audio, and interactive games/puzzles. The topic areas of interest ranked by overall average in usefulness and interest were: 1. Horses in Agriculture, 2. Horses in Sport, 3. Horses in Recreation, and 4. Horses in Different Cultures.

This information will be used in combination with the next steps, Goal Task Analysis and Learner/Context Analysis, to inform the foundation of the design of the online exhibit.

3.4 Goal Task Analysis for Horses in Agriculture Online Exhibit

The successful completion of an instructional goal will more than likely require subordinate skills that learners must also master in order to achieve the goal (Dick & Carey, 2015). These skills should be mapped out when planning instruction and will later be converted into subordinate learning objectives that will guide course planning (Dick & Carey, 2015). Learners may fail to perform a specific skill if they are not able to master underlying concepts to the lesson in question. This process is called a goal or task analysis (Dick & Carey, 2015).

Goal/Task Analysis

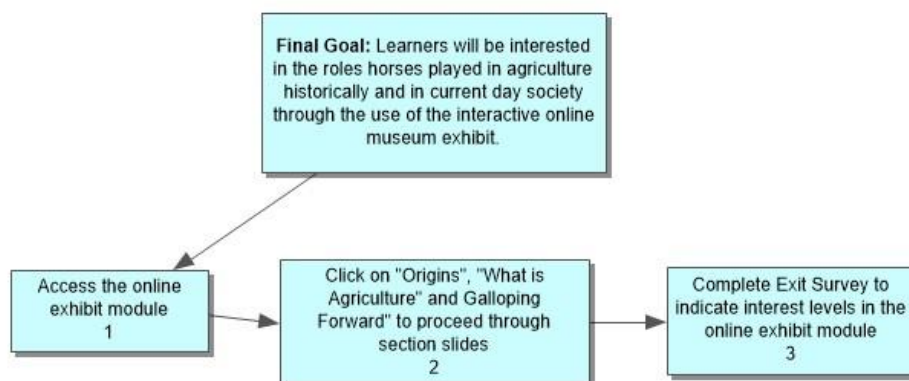


Figure 5: Goal Task Analysis for the Horses in Agriculture Online Exhibit

This process involves describing what steps need to be taken to perform a goal (Dick & Carey, 2015). These steps are then sequenced in a hierarchical format that helps to organize the steps into entry skills and subordinate skills that must be met in order for the learner to make it to the goal (Dick & Carey, 2015). A subordinate skill is a skill that must be achieved in order to learn a higher level skill, which can also be thought of as a prerequisite (Dick & Carey, 2015). An entry skill is a specific competency or skill a learner must have mastered before entering a given instructional activity (Dick & Carey, 2015). The three main goal task analysis charts can be found in Appendix 2.

3.5. Learner and Context Analysis

The third step in the Dick and Carey Systems Approach model is 3. Analyze Learners and Contexts. This includes relevant information such as age, grade, preexisting knowledge, attitudes, or skills, as the environment in which the instruction is taking place.

3.5.1. Learner Analysis

According to data from the front-end analysis, Kentucky Horse Park patrons (N=153) are the most interested in learning about horses in agriculture. They are also interested in multiple types of media (videos, pictures, audio) as well as having some interactivity and adaptability. Many of them also have pre-existing interest in horses and have already visited the International Museum of the Horse and found it to be enjoyable and informative.

From a theoretical standpoint, the learners accessing the final online exhibit could be from formal and informal environments, which have some differences and similarities. Informal learning takes place in an unstructured environment (zoo, museum, hobbies) and is often regarded as being more focused on process than performance, while formal learning takes place in a structured environment (school, university, job training) and is focused on performance and mastery of knowledge or skills (Cross, 2011; Vadeboncoeur, 2006).

3.5.2. Context Analysis

The context for the learners is a free-choice, online learning environment. The online exhibit will be in the form of an online interactive module that will be available in an internet browser. It will be freely accessible on computers, tablets, and mobile devices, but will be dependent on internet access. Because it will be available to anyone, it will be utilized in informal and formal learning environments, which could differ in their intended purpose for the online exhibit.

3.6 Discussion of Initial Analysis Results

The information gathered during the front-end analysis was consistent with the literature in regards to the way in which situational interest can be purposefully stimulated in the audience

(Bergin, 1999; Mitchell, 1993; Rotgans & Schmidt, 2011; Schraw et al, 2001). The data provides specific characteristics that will be beneficial for the audiences and for the intention for the online museum exhibit that meets the needs of stakeholders and the potential learners (Mattke, 2013).

With this information, we have answered research question 1. What are the goals of the proposed online museum exhibit? Specifically:

- a. What are the goals of the museum?
- b. Who is the audience?
- c. What are the needs of the audience?

The goals of the museum were to have a more online presence and more of a presence in academia. The audience will be students in formal classes taught by some of the stakeholders that were surveyed in the front-end analysis who indicated that this would be material that they would be interested in utilizing. Finally, the needs of the audience are both specific and broad – while both the educators and the general public who responded in the survey indicated that they unanimously were interested in the topic of agriculture and the desire for interactivity, there is still potential for major variation in the use of the online exhibit by modes of formal and informal learners.

The results of this front-end analysis will directly inform the development and design of the online exhibit. The next steps before the design phase include: 2. Conduct Instructional Analysis and 3. Analyze Learners and Context. After the online exhibit is complete, data will be collected related to situational interest and motivation of the learners.

3.7. Development and Design of the Online Museum Exhibit

The majority of the steps in the development and design of the Horses in Agriculture online exhibit take place in this next section. This section is directly influenced by the stakeholder

feedback received in the initial analysis and reported in the previous section. The next steps in the Dick and Carey Systems Approach model are 4. Write Performance Objectives; 5. Develop Assessment Instruments; 6. Develop

Instructional Strategy; 7. Develop and Select Instructional Materials; 8. Design and Conduct the Formative Evaluation of Instruction; and 9. Revise Instruction. The completion of these steps will follow the development of the learners' performance objectives, creation of the survey instrument to be used for assessment, development of the online museum exhibit's instructional strategy, and finally, the overall design and development of the Horses in Agriculture online museum exhibit itself.

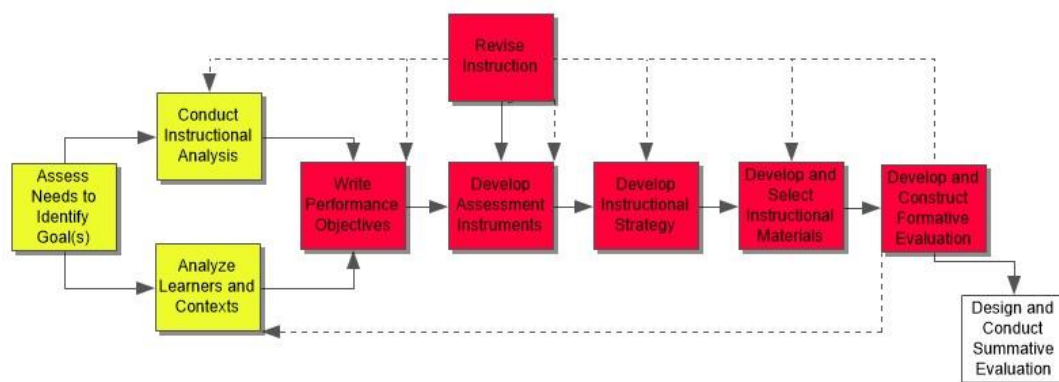


Figure 6: The Dick and Carey Systems Approach Model with Steps 4 through 9 Highlighted in Red

3.7.1. Write Performance Objectives

The next step in this process is 4. Write Performance Objectives. Performance objectives are written based on the information provided by the instructional analysis and the details of specific entry skills of the target learners. The performance objectives are written as statements that indicate what it is that the learners will be able to do when they complete the instruction program or materials (Dick & Carey, 2015). These objective statements are written with direct

reference to the skills indicated in the instructional analysis step and concretely identifies what skills will be accomplished, the conditions under which the skills will be accomplished, and how successful accomplishment will be assessed or measured (Dick & Carey, 2015). This process is usually done in the form of a table or chart (Dick & Carey, 2015).

As the dependent variable is not knowledge but situational interest, and the overall instructional goal is attitudinal, the performance objectives revolve around the main instructional goal of successful stimulation of situational interest and not necessarily the demonstration of a specific skill. It is important to note that within the writing of an objective there exists a clearly identifiable behavior, described using verbs that indicate the ability to measure such behavior (Dick & Carey, 2015). Verbs such as “know” or “understand” do not imply measurability, as opposed to words such as “identify” and “demonstrate” (Dick & Carey, 2015). The behavior verb “demonstrate” was used for the performance objectives related to situational interest as the goal is related to attitude and will be measured using a survey instrument. There are also some objectives within the main instructional goal related to accessing the online exhibit and accessing the exit survey instrument. The performance objective chart used in the development of the Horses in Agriculture online exhibit can be found in Table 1.

Table 1: Performance Objective Chart for Horses in Agriculture Online Exhibit

Main Instructional Goal	Terminal Objective
Learners will be interested in the roles horses played in agriculture historically and in current day society through the use of the interactive online museum exhibit.	After experiencing the interactive online Horses in Agriculture module, learners will be able to demonstrate situational interest in the 3 sections of the online museum exhibit through the use of freechoice access in the module, adaptable learning pathways, and interactive components. A survey questionnaire related to overall interest at the conclusion of the module and smaller questionnaire checkpoints about catch and hold situational interest will be used to assess achievement of this goal.
Main Step in Instructional Goal	Objective
1. Access the online module	Learners should be able to successfully open the online module from the link.
Subordinate Skills	Objective
1.1 Access link	Learners should be able to successfully access the online exhibit link on the Facebook post or within the Learning Management System provided.
Main Step in Instructional Goal	Objective
2. Proceed to navigate main menu and select a pathway on which to begin	After viewing the main menu page and experiencing choice, learners will demonstrate a level of situational interest
Subordinate Skills	Objective
2.1 Click on “Origins: History of Horses in Agriculture”; “What is Agriculture?”; or “Gallop Forward: Horses in Current Day Agriculture”	After experiencing choice and accessing one of the three learning pathways, learners will demonstrate a level of situational interest
Main Step in Instructional Goal	Objective
3. Access “Origins: History of Horses in Agriculture”	Learners will successfully click and access “Origins: History of Horses in Agriculture” Learning Pathway
3.1.a. Read text and view image about “Early Man and Horse Interaction”	After reading the content about “Early Man and Horse Interaction”, learners will demonstrate a level of situational interest

Table 1 Continued

3.1.b. Interact with “Did You Know” button and read revealed text about “Early Hunting Tools”	After successfully clicking on “Did You Know” button and reading text about “Early Hunting Tools”, learners will demonstrate a level of situational interest
3.2.a. Read text and view image about “Horses as a Food Source”	After reading content about “Horses as Food Source”, learners will demonstrate a level of situational interest
3.2.b. Read instructions and interact with clickable image	Learners will read instructions and successfully click on pottery image
3.2.c. Read revealed text about “The Botai People”	After reading and interacting with the content about “The Botai People”, learners will demonstrate a level of situational interest
3.3.a. Read text and view image about “Domestication”	After reading content about “Domestication”, learners will demonstrate a level of situational interest
3.3.b. Interact with Domestication Timeline	After interacting with the content by revealing locations of horse domestication by dragging their mouse arrow across the timeline, learners will demonstrate a level of situational interest
3.4.a. Read “Horses in Agriculture Around the World” instructions and click on learning pathways of countries	Learners will read instructions and successfully click on an image of a labeled country
3.4.b. Read text and view image about “North America” and click “United States” button or “Mexico” button to access more information	After reading content about “North America” and successfully interacting with text buttons to read more about “United States” and “Mexico”, learners will demonstrate a level of situational interest
3.4.c. Read text and view image about “South America”	After reading content about “South America”, learners will demonstrate a level of situational interest
3.4.d. Read text and view image about “Antarctica”	After reading content about “Antarctica”, learners will demonstrate a level of situational interest
3.4.e. Read text and view image about “Europe” and click “Great Britain” button or “France” button to access more information	After reading content about “Europe” and successfully interacting with text buttons to read more about “Great Britain” and “France”, learners will demonstrate a level of situational interest

Table 1 Continued

3.6.a. Read text and view image about “Industrial Revolution”	After reading content about “Industrial Revolution”, learners will demonstrate a level of situational interest
3.7.a. Read text about “Home on the Range” and interact with “Trail Drive to Market”, “The Round-Up”, and “The First Rodeo” buttons to reveal more information	After reading content about “Home on the Range” and successfully interacting with “Trail Drive to Market”, “The RoundUp”, and “The First Rodeo” buttons, learners will demonstrate a level of situational interest
3.7.b. Read text and view image about “Trail Drive to Market”	After reading content about “Trail Drive to Market”, learners will demonstrate a level of situational interest
3.7.c. Read text and view image about “The Round-Up”	After reading content about “The RoundUp”, learners will demonstrate a level of situational interest
3.7.d. Read text and view image about “The First Rodeo”	After reading content about “The First Rodeo”, learners will demonstrate a level of situational interest
Main Step in Instructional Goal	Objective
4. Access “What is Agriculture?”	After experiencing choice and successfully clicking and accessing “What is Agriculture” Learning Pathway, learners will demonstrate a level of situational interest
Subordinate Skills	Objective
4.1.a. Read text and click on “Plants and Crops”, “Food”, “Human Needs”, and “Economic Gain” buttons	After reading content, experiencing choice, and interacting with the “Plants and Crops”, “Food”, “Human Needs”, and “Economic Gain” buttons, learners will demonstrate a level of situational interest
4.1.b. Read text and click on “Clydesdale”, “Belgian”, “Percheron”, “Suffolk Punch”, and “Shire” text buttons	After reading content, experiencing choice, and interacting with “Clydesdale”, “Belgian”, “Percheron”, “Suffolk Punch”, and “Shire” text buttons, learners will demonstrate a level of situational interest
4.2.a. Read text and click on “Did You Know? Human Needs” button	After reading content and interacting with the “Did You Know? Human Needs” button, learners will demonstrate a level of situational interest

Table 1 Continued

4.2.b. View images and click on horse and cart button to reveal new images	After viewing and interacting with the content, learners will demonstrate a level of situational interest
4.3.a. Read text and view images about "Food"	After reading content, learners will demonstrate a level of situational interest
5. Access "Gallop Forward: Horses in Current Day Agriculture"	After experiencing choice and successfully clicking and accessing "Gallop Forward: Horses in Current Day Agriculture" Learning Pathway, learners will demonstrate a level of situational interest
Subordinate Skills	Objective
5.1.a. Read Text about "Horses in Current Day Agriculture" and click on video link to "Introduction to Draft Animal Power"	After reading and interacting with content, learners will demonstrate a level of situational interest
5.1.b. Watch YouTube video on "Introduction to Draft Animal Power"	After viewing content, learners will demonstrate a level of situational interest
5.2.a. Read text about "Milking a Mare" and click on the "Did You Know? History of Horse Milk" button	After reading and interacting with content, learners will demonstrate a level of situational interest
5.2.b. Read text on revealed page about "History of Horse Milk"	After reading content, learners will demonstrate a level of situational interest
5.3.a. Read text and view image about "Horse Milk Products Today"	After reading content, learners will demonstrate a level of situational interest
5.3.b. Click link to "www.chevalait.com" to view additional content in a new window	After viewing and interacting with content, learners will demonstrate a level of situational interest
5.4.a. Read text and view image about "21 st Century Cowboy"	After reading content, learners will demonstrate a level of situational interest
5.5.a. Read text and view image about "Agritourism"	After reading content, learners will demonstrate a level of situational interest
5.5.b. Click link to "Purdue Extension: Agritourism" to view additional content in a new window	After viewing and interacting with content, learners will demonstrate a level of situational interest
Main Step in Instructional Goal	Objective
6. Access "Thank You and Exit Survey"	Learners should be able to successfully click the "Thank You and Exit Survey" button
Subordinate Skills	Objective
6.1.a. Read text and click on "Exit" Survey button	Learners should be able to successfully access the survey questionnaire

The performance objective chart above clearly and specifically organizes each main step in the instructional goal as well as the subordinate skills and performance objectives that must be completed in order to achieve that step. These specific steps and objectives guided the further design of the online exhibit as well as the assessment instrument. As mentioned earlier, the use of verbs within the performance objectives, such as “demonstrate”, indicate an identifiable and assessable behavior that can now guide the next step, developing the assessment instruments.

3.7.2. Develop Assessment Instruments

The next step in this process is 5. Develop Assessment Instruments. For this step, assessments are developed that correspond with the performance objectives indicated in the previous step. There should be an assessment for each performance objective in the instruction, but there are no specific kinds of assessments that are required.

For the online museum exhibit, all assessments involved situational interest and whether or not it was achieved during the online module and were not necessarily as specific as an assessment of knowledge or a physical task. As this online exhibit is intended for both formal and informal audiences, there are not individual assessment items for each objective listed as to not be obtrusive to informal learners.

3.7.3. Assessment Instruments and Assessment Plan

The four types of assessments to be taken into consideration in this part of the process are entry skills assessment, pre-test, practice tests, and post-test (Dick & Carey, 2015). The online exhibit only has one true form of these assessments – the post-test, in the form of a survey questionnaire. A self-report questionnaire instrument was selected and designed for the online exhibit’s assessment in two parts – a questionnaire about personal and situational interest in

relation to certain characteristics of the online exhibit and smaller surveys related to catch and hold interest in specific sections of the online exhibit.

3.7.3.1 Entry Skills Assessment

There will be no formal entry skills assessment for learners prior to participating in the online exhibit module. There are no prerequisites for accessing the online exhibit besides the entry skills already identified and addressed in Chapter 3 in the goal/task analysis.

3.7.3.2 Pre-Tests

There was no form of pre-test for learners to participate in before the start of the online exhibit as there are no prerequisites for accessing the online exhibit besides the entry skills already identified and addressed in Chapter 3 in the goal/task analysis. It is also important to remember that knowledge was not the dependent variable, but situational interest, therefore no knowledge tests took place in the evaluation of the exhibit.

3.7.3.3 Practice Tests

There are no practice tests in the online museum exhibit as the goal of the instruction is to stimulate situational interest, not to increase knowledge. However, there were multiple small survey questionnaires at the end of each of the three learning pathways that asked questions related to catch and hold situational interest. Questions about which sections of the learning pathway were found the most exciting, memorable, important, and interesting were located at the conclusion of each of the learning pathways. These questions were worded with intentional language cited by Mitchell (1993) and Knogler (2015) as being indicative descriptions of catch or hold situational interest.

3.7.3.4 Post-Test

While there was no knowledge post-test for the online exhibit, there was an online survey questionnaire for learners to complete at the end of the module. This survey questionnaire is what was used as an assessment of situational interest of the learners after experiencing the online exhibit. The development of the assessment instruments was guided directly by the literature around situational interest. Situational interest has been primarily assessed using self-report techniques via survey questionnaires (Mitchell, 1993; Knogler et al, 2015; Schunk, Meece, & Pintrich, 2012). Mitchell (1993) developed and implemented a self-report survey questionnaire based around his multifaceted model of situational interest.

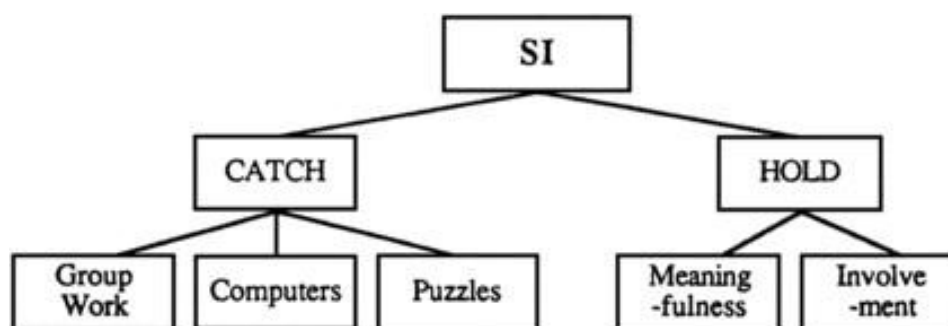


Figure 7: Mitchell's Model of Situational Interest in the Mathematics Classroom

The instrument selected was a validated instrument used in Mitchell's (1993) study regarding situational interest of students in a high school mathematics course that was modified to match the content of the online exhibit. Questions included 7-point Likert scale questions about personal and situational interest in relation to horses, agriculture, museums, online learning, free-choice learning, adaptability, and interactivity. Outside of the scope of situational interest, there were also questions about learners' familiarity with the International Museum of the Horse, Purdue University, and some basic demographics. The survey instrument was a total of 41 items

and was created in Qualtrics online survey software. The survey is designed to be taken at the learner's individual pace.

3.7.3.5 Variable Measures

The situational interest dependent variable measures were as follows: online exhibit situational interest, 9 item scale; horse topic situational interest, 3 item scale; agriculture topic situational interest, 3 item scale; and computer learning situational interest, 3 item scale. The situational interest independent variable measures were as follows: free-choice situational interest, 2 item scale; adaptability situational interest, 6 item scale; interactivity interest, 2 item scale.

3.7.4. Design Evaluation

The next sub-step in developing assessment instruments is design evaluation (Dick & Carey, 2015). This step is crucial to the review process of materials developed up to this point of the process and organizing the materials in relationship to the instructional goals, performance objectives, and assessment items (Dick & Carey, 2015).

All of these details are included together in a design evaluation chart, as seen in Table 2. Test items included all corresponding questionnaire items and directional prompts related to certain performance objectives. The design evaluation chart is meant to be critically evaluated by reviewers based on the congruence with the instructional goal, learners, context, and assessment considerations (Dick & Carey, 2015).

Table 2: Design Evaluation Chart for Horses in Agriculture Online Exhibit

Main Instructional Goal	Terminal Objective	Test Item
Learners will be interested in the roles horses played in agriculture historically and in current day society through the use of the interactive online museum exhibit.	After experiencing the interactive online Horses in Agriculture module, learners will be able to demonstrate situational interest in the 3 sections of the online museum exhibit through the use of free-choice access in the module, adaptable learning pathways, and interactive components. A survey questionnaire related to overall interest at the conclusion of the module and smaller questionnaire checkpoints about catch and hold situational interest will be used to assess achievement of this goal.	<ol style="list-style-type: none"> 1. How interested were you in the subject of horses and their role in agriculture before you went through the online exhibit? 2. How interested were you in the subject of horses and their role in agriculture now? 3. Because of this online museum exhibit, I would be interested in seeing what other online museum exhibits have to offer. 4. Because of this online museum exhibit, I am more interested in horses. 5. I see the concepts I learned in the online museum exhibit as important.
Main Step in Instructional Goal	Objective	Test Item
1. Access the online module	Learners should be able to successfully open the online module from the link.	In order to continue to meet the expectations of visitors like you, we need your feedback. Please click on the link below to the Exit Survey, which will help us with future online educational resources.

Table 2 Continued

Subordinate Skills	Objective	Test Item
1.1 Access link	Learners should be able to successfully access the online exhibit link on the Facebook post or within the Learning Management System provided.	Check out Horses in Human History: Horses in Agriculture, an online museum exhibit developed in collaboration with the International Museum of the Horse! Explore at your own pace, learn more about the role of the horse in agriculture in the past and present, and don't forget to take the survey - your feedback is very important to us!
Main Step in Instructional Goal	Objective	Test Item
2. Proceed to navigate main menu and select a pathway on which to begin	After viewing the main menu page and experiencing choice, learners will experience a level of situational interest	<ol style="list-style-type: none"> 1. When learning online, I like having a choice in what order I progress through the material. 2. Having different options in the online museum exhibit is confusing. 3. I like having different options within the online museum exhibit. 4. Having different options in the online museum exhibit makes the material more interesting.

Table 2 Continued

	Objective	Test Item
2.1 Click on “Origins: History of Horses in Agriculture”; “What is Agriculture?”; or “Gallop Forward: Horses in Current Day Agriculture”	After experiencing choice and accessing one of the three learning pathways, learners will experience a level of situational interest	<ol style="list-style-type: none"> 1. When learning online, I like having a choice in what order I progress through the material. 2. Having different options in the online museum exhibit is confusing. 3. I like having different options within the online museum exhibit. 4. Having different options in the online museum exhibit makes the material more interesting.
Main Step in Instructional Goal	Objective	Test Item
3. Access “Origins: History of Horses in Agriculture”	Learners will successfully click and access “Origins: History of Horses in Agriculture” Learning Pathway	<ol style="list-style-type: none"> 1. When learning online, I like having a choice in what order I progress through the material. 2. Having different options in the online museum exhibit is confusing. 3. I like having different options within the online museum exhibit. 4. Having different options in the online museum exhibit makes the material more interesting.

Table 2 Continued

Subordinate Skills	Objective	Test Item
3.1.a. Read text and view image about “Early Man and Horse Interaction”	After reading the content about “Early Man and Horse Interaction”, learners will demonstrate a level of situational interest	<ol style="list-style-type: none"> 1. What was the most memorable topic from this section, Origins: History of Horses in Agriculture? 2. Which topic did you find the most exciting in this section? 3. Which topic did you find the most interesting in this section? 4. Which topic did you find the most important in this section?
3.1.b. Interact with “Did You Know” button and read revealed text about “Early Hunting Tools”	After reading and interacting with content on “Did You Know” “Early Hunting Tools”, learners will demonstrate a level of situational interest	<ol style="list-style-type: none"> 1. The interactivity and videos within the online museum exhibit caught my attention. 2. The interactivity and videos within the online museum exhibit held my attention longer than text and a picture.
3.2.a. Read text and view image about “Horses as a Food Source”	After reading content about “Horses as Food Source”, learners will demonstrate a level of situational interest	<ol style="list-style-type: none"> 1. What was the most memorable topic from this section, Origins: History of Horses in Agriculture? 2. Which topic did you find the most exciting in this section? 3. Which topic did you find the most interesting in this section? 4. Which topic did you find the most important in this section?

Table 2 Continued

3.2.b. Read instructions and interact with clickable image	Learners will read instructions and successfully click on pottery image	<ol style="list-style-type: none"> 1. The interactivity and videos within the online museum exhibit caught my attention. 2. The interactivity and videos within the online museum exhibit held my attention longer than text and a picture.
3.2.c. Read revealed text about “The Botai People”	After reading and interacting with the content about “The Botai People”, learners will demonstrate a level of situational interest	<ol style="list-style-type: none"> 1. The interactivity and videos within the online museum exhibit caught my attention. 2. The interactivity and videos within the online museum exhibit held my attention longer than text and a picture.
3.3.a. Read text and view image about “Domestication”	After reading content about “Domestication”, learners will demonstrate a level of situational interest	<ol style="list-style-type: none"> 1. What was the most memorable topic from this section, Origins: History of Horses in Agriculture? 2. Which topic did you find the most exciting in this section? 3. Which topic did you find the most interesting in this section? 4. Which topic did you find the most important in this section?
3.3.b. Interact with Domestication Timeline	After interacting with the content by revealing locations of horse domestication by dragging their mouse arrow across the timeline, learners will demonstrate a level of situational interest	<ol style="list-style-type: none"> 1. The interactivity and videos within the online museum exhibit caught my attention. 2. The interactivity and videos within the online museum exhibit held my attention longer than text and a picture.

Table 2 Continued

3.4.a. Read “Horses in Agriculture Around the World” instructions and click on learning pathways of countries	Learners will read instructions and successfully click on an image of a labeled country	<ol style="list-style-type: none"> 1. What was the most memorable topic from this section, Origins: History of Horses in Agriculture? 2. Which topic did you find the most exciting in this section? 3. Which topic did you find the most interesting in this section? 4. Which topic did you find the most important in this section?
3.4.b. Read text and view image about “North America” and click “United States” button or “Mexico” button to access more information	After reading content about “North America” and successfully interacting with text buttons to read more about “United States” and “Mexico”, learners will demonstrate a level of situational interest	<ol style="list-style-type: none"> 1. The interactivity and videos within the online museum exhibit caught my attention. 2. The interactivity and videos within the online museum exhibit held my attention longer than text and a picture.
3.4.c. Read text and view image about “South America”	After reading content about “South America”, learners will demonstrate a level of situational interest	<ol style="list-style-type: none"> 1. The interactivity and videos within the online museum exhibit caught my attention. 2. The interactivity and videos within the online museum exhibit held my attention longer than text and a picture.
3.4.d. Read text and view image about “Antarctica”	After reading content about “Antarctica”, learners will demonstrate a level of situational interest	<ol style="list-style-type: none"> 1. The interactivity and videos within the online museum exhibit caught my attention. 2. The interactivity and videos within the online museum exhibit held my attention longer than text and a picture.

Table 2 Continued

3.4.e. Read text and view image about “Europe” and click “Great Britain” button or “France” button to access more information	After reading content about “Europe” and successfully interacting with text buttons to read more about “Great Britain” and “France”, learners will demonstrate a level of situational interest	1. The interactivity and videos within the online museum exhibit caught my attention. 2. The interactivity and videos within the online museum exhibit held my attention longer than text and a picture.
3.4.f. Read text about “Africa” and click “Preston Dyer” button to access more information	After reading content about “Africa” and successfully interacting with a text button to read more about “Preston Dyer”, learners will demonstrate a level of situational interest	1. The interactivity and videos within the online museum exhibit caught my attention. 2. The interactivity and videos within the online museum exhibit held my attention longer than text and a picture.
3.4.g. Read text about “Asia” and click “Japan” button or “China” button to access more information	After reading content about “Asia” and successfully interacting with text buttons to read more about “Japan” and “China”, learners will demonstrate a level of situational interest	1. The interactivity and videos within the online museum exhibit caught my attention. 2. The interactivity and videos within the online museum exhibit held my attention longer than text and a picture.
3.4.h. Read text about “Australia”	After reading content about “Australia”, learners will demonstrate a level of situational interest	1. The interactivity and videos within the online museum exhibit caught my attention. 2. The interactivity and videos within the online museum exhibit held my attention longer than text and a picture.

Table 2 Continued

3.5.a. Read text and view image about “Beginning of Animal Welfare”	After reading content about “Beginning of Animal Welfare”, learners will demonstrate a level of situational interest	<ol style="list-style-type: none"> 1. What was the most memorable topic from this section, Origins: History of Horses in Agriculture? 2. Which topic did you find the most exciting in this section? 3. Which topic did you find the most interesting in this section? 4. Which topic did you find the most important in this section?
3.5.b. Interact with “Did You Know” button about “Black Beauty” to reveal additional information	Learners will successfully click on “Did You Know” button	<ol style="list-style-type: none"> 1. The interactivity and videos within the online museum exhibit caught my attention. 2. The interactivity and videos within the online museum exhibit held my attention longer than text and a picture.
3.5.c. Read text, view images, and click on text buttons to reveal more information about “Black Beauty”	After reading content about “Black Beauty” and successfully interacting with text buttons to view more information, learners will demonstrate a level of situational interest	<ol style="list-style-type: none"> 1. The interactivity and videos within the online museum exhibit caught my attention. 2. The interactivity and videos within the online museum exhibit held my attention longer than text and a picture.

Table 2 Continued

3.6.a. Read text and view image about “Industrial Revolution”	After reading content about “Industrial Revolution”, learners will demonstrate a level of situational interest	<ol style="list-style-type: none"> 1. What was the most memorable topic from this section, Origins: History of Horses in Agriculture? 2. Which topic did you find the most exciting in this section? 3. Which topic did you find the most interesting in this section? 4. Which topic did you find the most important in this section?
3.7.a. Read text about “Home on the Range” and interact with “Trail Drive to Market”, “The Round-Up”, and “The First Rodeo” buttons to reveal more information	After reading content about “Home on the Range” and successfully interacting with “Trail Drive to Market”, “The Round-Up”, and “The First Rodeo” buttons, learners will demonstrate a level of situational interest	<ol style="list-style-type: none"> 1. The interactivity and videos within the online museum exhibit caught my attention. 2. The interactivity and videos within the online museum exhibit held my attention longer than text and a picture.
3.7.b. Read text and view image about “Trail Drive to Market”	After reading content about “Trail Drive to Market”, learners will demonstrate a level of situational interest	<ol style="list-style-type: none"> 1. What was the most memorable topic from this section, Origins: History of Horses in Agriculture? 2. Which topic did you find the most exciting in this section? 3. Which topic did you find the most interesting in this section? 4. Which topic did you find the most important in this section?

Table 2 Continued

3.7.c. Read text and view image about “The Round-Up”	After reading content about “The Round-Up”, learners will demonstrate a level of situational interest	1. The interactivity and videos within the online museum exhibit caught my attention. 2. The interactivity and videos within the online museum exhibit held my attention longer than text and a picture.
3.7.d. Read text and view image about “The First Rodeo”	After reading content about “The First Rodeo”, learners will demonstrate a level of situational interest	1. The interactivity and videos within the online museum exhibit caught my attention. 2. The interactivity and videos within the online museum exhibit held my attention longer than text and a picture.
Main Step in Instructional Goal	Objective	Test Item
4. Access “What is Agriculture?”	After experiencing choice and successfully clicking and accessing “What is Agriculture” Learning Pathway, learners will demonstrate a level of situational interest	1. When learning online, I like having a choice in what order I progress through the material. 2. Having different options in the online museum exhibit is confusing. 3. I like having different options within the online museum exhibit. 4. Having different options in the online museum exhibit makes the material more interesting.

Table 2 Continued

Subordinate Skills	Objective	Test Item
4.1.a. Read text and click on “Plants and Crops”, “Food”, “Human Needs”, and “Economic Gain” buttons	After reading content, experiencing choice, and interacting with the “Plants and Crops”, “Food”, “Human Needs”, and “Economic Gain” buttons, learners will demonstrate a level of situational interest	1. When learning online, I like having a choice in what order I progress through the material.
4.1.b. Read text about “Plants and Crops” and click on “Clydesdale”, “Belgian”, “Percheron”, “Suffolk Punch”, and “Shire” text buttons	After reading content, experiencing choice about “Plants and Crops”, and interacting with “Clydesdale”, “Belgian”, “Percheron”, “Suffolk Punch”, and “Shire” text buttons, learners will demonstrate a level of situational interest	<ol style="list-style-type: none"> 1. What was the most memorable topic from this section, What is Agriculture? 2. Which topic did you find the most exciting in this section? 3. Which topic did you find the most interesting in this section? 4. Which topic did you find the most important in this section?
4.2.a. Read text and click on “Did You Know? Human Needs” button	After reading content and interacting with the “Did You Know? Human Needs” button, learners will demonstrate a level of situational interest	<ol style="list-style-type: none"> 1. What was the most memorable topic from this section, What is Agriculture? 2. Which topic did you find the most exciting in this section? 3. Which topic did you find the most interesting in this section? 4. Which topic did you find the most important in this section?

Table 2 Continued

4.2.b. View images and click on horse and cart button to reveal new images	After viewing and interacting with the content, learners will demonstrate a level of situational interest	<ol style="list-style-type: none"> 1. The interactivity and videos within the online museum exhibit caught my attention. 2. The interactivity and videos within the online museum exhibit held my attention longer than text and a picture.
4.3.a. Read text and view images about "Food"	After reading content, learners will demonstrate a level of situational interest	<ol style="list-style-type: none"> 1. What was the most memorable topic from this section, What is Agriculture? 2. Which topic did you find the most exciting in this section? 3. Which topic did you find the most interesting in this section? 4. Which topic did you find the most important in this section?
4.4.a. Read text and instructions about "Economic Gain"	After reading content, learners will demonstrate a level of situational interest	<ol style="list-style-type: none"> 1. The interactivity and videos within the online museum exhibit caught my attention. 2. The interactivity and videos within the online museum exhibit held my attention longer than text and a picture.
4.4.b. Read text revealed after clicking and dragging coin images	After reading and interacting with content, learners will demonstrate a level of situational interest	<ol style="list-style-type: none"> 1. The interactivity and videos within the online museum exhibit caught my attention. 2. The interactivity and videos within the online museum exhibit held my attention longer than text and a picture.

Table 2 Continued

Main Step in Instructional Goal	Objective	Test Item
5. Access “Gallop Forward: Horses in Current Day Agriculture”	After experiencing choice and successfully clicking and accessing “Gallop Forward: Horses in Current Day Agriculture” Learning Pathway, learners will demonstrate a level of situational interest	1. When learning online, I like having a choice in what order I progress through the material.
Subordinate Skills	Objective	
5.1.a. Read Text about “Horses in Current Day Agriculture” and click on video link to “Introduction to Draft Animal Power”	After reading and interacting with content, learners will demonstrate a level of situational interest	1. What was the most memorable topic from this section, Gallop Forward: Horses in Current Day Agriculture? 2. Which topic did you find the most exciting in this section? 3. Which topic did you find the most interesting in this section? 4. Which topic did you find the most important in this section?
5.1.b. Watch YouTube video on “Introduction to Draft Animal Power”	After viewing content, learners will demonstrate a level of situational interest	1. The interactivity and videos within the online museum exhibit caught my attention. 2. The interactivity and videos within the online museum exhibit held my attention longer than text and a picture.

Table 2 Continued

5.2.a. Read text about “Milking a Mare” and click on the “Did You Know? History of Horse Milk” button	After reading and interacting with content, learners will demonstrate a level of situational interest	<ol style="list-style-type: none"> 1. What was the most memorable topic from this section, Galloping Forward: Horses in Current Day Agriculture? 2. Which topic did you find the most exciting in this section? 3. Which topic did you find the most interesting in this section? 4. Which topic did you find the most important in this section?
5.2.b. Read text on revealed page about “History of Horse Milk”	After reading content, learners will demonstrate a level of situational interest	<ol style="list-style-type: none"> 1. The interactivity and videos within the online museum exhibit caught my attention. 2. The interactivity and videos within the online museum exhibit held my attention longer than text and a picture.
5.3.a. Read text and view image about “Horse Milk Products Today”	After reading content, learners will demonstrate a level of situational interest	<ol style="list-style-type: none"> 1. What was the most memorable topic from this section, Galloping Forward: Horses in Current Day Agriculture? 2. Which topic did you find the most exciting in this section? 3. Which topic did you find the most interesting in this section? 4. Which topic did you find the most important in this section?

Table 2 Continued

5.3.b. Click link to “www.chevalait.com” to view additional content in a new window	After viewing and interacting with content, learners will demonstrate a level of situational interest	<ol style="list-style-type: none"> 1. The interactivity and videos within the online museum exhibit caught my attention. 2. The interactivity and videos within the online museum exhibit held my attention longer than text and a picture.
5.4.a. Read text and view image about “21 st Century Cowboy”	After reading content, learners will demonstrate a level of situational interest	<ol style="list-style-type: none"> 1. What was the most memorable topic from this section, Galloping Forward: Horses in Current Day Agriculture? 2. Which topic did you find the most exciting in this section? 3. Which topic did you find the most interesting in this section? 4. Which topic did you find the most important in this section?
5.5.a. Read text and view image about “Agritourism”	After reading content, learners will demonstrate a level of situational interest	<ol style="list-style-type: none"> 1. What was the most memorable topic from this section, Galloping Forward: Horses in Current Day Agriculture? 2. Which topic did you find the most exciting in this section? 3. Which topic did you find the most interesting in this section? 4. Which topic did you find the most important in this section?

Table 2 Continued

5.5.b. Click link to “Purdue Extension: Agritourism” to view additional content in a new window	After viewing and interacting with content, learners will demonstrate a level of situational interest	1. The interactivity and videos within the online museum exhibit caught my attention. 2. The interactivity and videos within the online museum exhibit held my attention longer than text and a picture.
Main Step in Instructional Goal	Objective	Test Item
6. Access “Thank You and Exit Survey”	Learners should be able to successfully click the “Thank You and Exit Survey” button	In order to continue to meet the expectations of visitors like you, we need your feedback. Please click on the link below to the Exit Survey, which will help us with future online educational resources.
Subordinate Skills	Objective	Test Item
6.1.a. Read text and click on “Exit” Survey button	Learners should be able to successfully access the survey questionnaire	In order to continue to meet the expectations of visitors like you, we need your feedback. Please click on the link below to the Exit Survey, which will help us with future online educational resources
6.1.b. Complete online survey questionnaire in separate window	After clicking “Exit survey” button, learners should be able to successfully complete the survey questionnaire	In order to continue to meet the expectations of visitors like you, we need your feedback. Please click on the link below to the Exit Survey, which will help us with future online educational resources

3.7.5. Develop Instructional Strategy

The next step in the process is 6. Develop Instructional Strategy. Using all of the information from the previous steps, this step involves utilizing a theoretically based strategy to meet the goal while also enhancing student learning (Dick & Carey, 2015). In alignment with the goal of increasing situational interest of the learners, research has shown that characteristics such as adaptability, free-choice, and interactivity within online learning environments have a positive effect on interest (Van Seters et al, 2012). According to Dick and Carey (2015), an instructional strategy is the combination of “general components of a set of instructional materials and procedure used with those materials to enable student mastery of learning outcomes”. The instructional strategy is clustered into the main sections of the overall instruction and includes the performance objectives, content presentation considerations, delivery methods, and learner details (Dick & Carey, 2015). It is far more detailed than a simple outline of the material, but is grounded in a specific learning theory (Dick and Carey, 2015). The following detailed outline is the instructional strategy for the Horses in Agriculture online exhibit.

3.7.5.1 Cluster 1

- **Objectives**

- 1. Learners should be able to successfully open the online module from the link.
 - 1.1 Learners should be able to successfully access the online exhibit link on the Facebook post or within the Learning Management System provided

- **Content Presentation**

- Content
 - Announcement posted in Facebook for informal learners with directions for use of the module. Announcement posted in Blackboard Learning Management System for formal learners

- Example



Figure 8: Screenshot of Content Presentation on Facebook

- **Learner Participation**

- Practice Items and Activities
 - Actively opening the module
- Feedback
 - Participation tracked in formal learner group
- Learner Grouping
 - Learners are all participating on their own time separately

3.7.5.2. Cluster 2

- **Objectives**

- 2. After viewing the main menu page and experiencing choice, learners will demonstrate a level of situational interest
 - 2.1 After experiencing choice and accessing one of the three learning pathways, learners will demonstrate a level of situational interest

- **Content Presentation**

- Content

- Menu page will have three choices of learning pathways for learners to access
 - Example

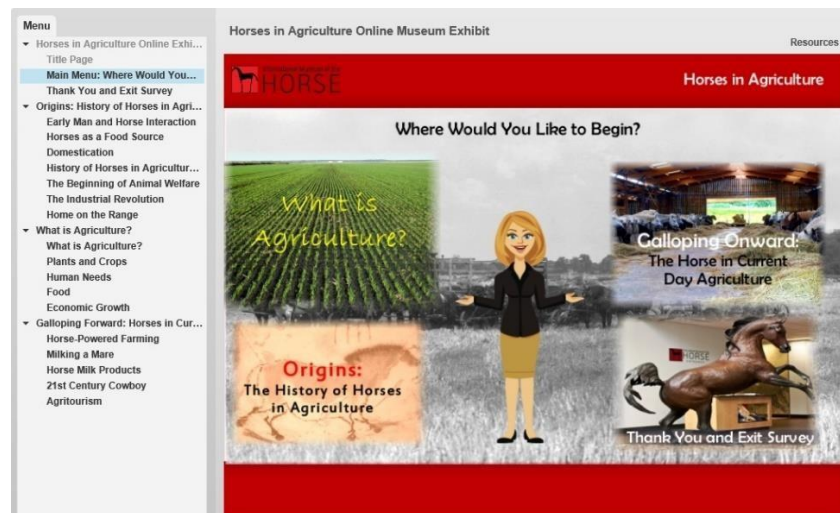


Figure 9: Main Menu Slide from Online Exhibit

- Learner Grouping

- Learners are all participating on their own time separately

- **Learner Participation**

- Activities

- Learners will be able to choose the path in which they proceed through the content in the online exhibit

- Feedback

- None

- Learner Grouping

- Learners are all participating on their own time separately

3.7.5.3 Cluster 3

- **Objectives**

- 3. Learners will successfully click and access “Origins: History of Horses in Agriculture” Learning Pathway
 - 3.1.a. After reading the content about “Early Man and Horse Interaction”, learners will demonstrate a level of situational interest
 - 3.1.b. After successfully clicking on “Did You Know” button and reading text about “Early Hunting Tools”, learners will demonstrate a level of situational interest
 - 3.2.a. After reading content about “Horses as Food Source”, learners will demonstrate a level of situational interest
 - 3.2.b. Learners will read instructions and successfully click on pottery image
 - 3.2.c. After reading and interacting with the content about “The Botai People”, learners will demonstrate a level of situational interest
 - 3.3.a. After reading content about “Domestication”, learners will demonstrate a level of situational interest
 - 3.3.b. After interacting with the content by revealing locations of horse domestication by dragging their mouse arrow across the timeline, learners will demonstrate a level of situational interest
 - 3.4.a. Learners will read instructions and successfully click on an image of a labeled country
 - 3.4.b. After reading content about “North America” and successfully interacting with text buttons to read more about “United States” and “Mexico”, learners will demonstrate a level of situational interest
 - 3.4.c. After reading content about “South America”, learners will demonstrate a level of situational interest
 - 3.4.d. After reading content about “Antarctica”, learners will demonstrate a level of situational interest
 - 3.4.e. After reading content about “Europe” and successfully interacting with text buttons to read more about “Great Britain” and “France”, learners will demonstrate a level of situational interest

- 3.4.f. After reading content about “Africa” and successfully interacting with a text button to read more about “Preston Dyer”, learners will demonstrate a level of situational interest
- 3.4.g. After reading content about “Asia” and successfully interacting with text buttons to read more about “Japan” and “China”, learners will demonstrate a level of situational interest
- 3.4.h. After reading content about “Australia”, learners will demonstrate a level of situational interest
- 3.5.a. After reading content about “Beginning of Animal Welfare”, learners will demonstrate a level of situational interest
- 3.5.b. Learners will successfully click on “Did You Know” button
- 3.6.a. After reading content about “Black Beauty” and successfully interacting with text buttons to view more information, learners will demonstrate a level of situational interest
- 3.7.a. After reading content about “Home on the Range” and successfully interacting with “Trail Drive to Market”, “The RoundUp”, and “The First Rodeo” buttons, learners will demonstrate a level of situational interest
- 3.7.b. After reading content about “Trail Drive to Market”, learners will demonstrate a level of situational interest
- 3.7.c. After reading content about “The Round-Up”, learners will demonstrate a level of situational interest
- 3.7.d. After reading content about “The First Rodeo”, learners will demonstrate a level of situational interest
- 4. After experiencing choice and successfully clicking and accessing “What is Agriculture” Learning Pathway, learners will demonstrate a level of situational interest
 - 4.1.a. After reading content, experiencing choice, and interacting with the “Plants and Crops”, “Food”, “Human Needs”, and “Economic Gain” buttons, learners will demonstrate a level of situational interest
 - 4.1.b. After reading content, experiencing choice, and interacting with “Clydesdale”, “Belgian”, “Percheron”, “Suffolk Punch”, and “Shire” text buttons, learners will demonstrate a level of situational interest
 - 4.2.a. After reading content and interacting with the “Did You Know? Human Needs” button, learners will demonstrate a level of situational interest

- 4.2.b. After viewing and interacting with the content about “Human Needs”, learners will demonstrate a level of situational interest
- 4.3.a. After reading content about “Food”, learners will demonstrate a level of situational interest
- 4.4.a. After reading content about “Economic Gain” learners will demonstrate a level of situational interest
- 4.4.b. After reading and interacting with content about “Economic Gain”, learners will demonstrate a level of situational interest
- 5. After experiencing choice and successfully clicking and accessing “Gallop Forward: Horses in Current Day Agriculture” Learning Pathway, learners will demonstrate a level of situational interest
 - 5.1.a. After reading and interacting with content about “Horses in Current Day Agriculture”, learners will demonstrate a level of situational interest
 - 5.1.b. After viewing video content about “Introduction to Draft Animal Power”, learners will demonstrate a level of situational interest
 - 5.2.a. After reading and interacting with content about “Milking a Mare”, learners will demonstrate a level of situational interest
 - 5.2.b. After reading content about “History of Horse Milk”, learners will demonstrate a level of situational interest
 - 5.3.a. After reading content about “Horse Milk Products Today”, learners will demonstrate a level of situational interest
 - 5.3.b. After viewing and interacting with content at Chevalait Horse Dairy’s website, learners will demonstrate a level of situational interest
 - 5.4.a. After reading content about “21st Century Cowboy”, learners will demonstrate a level of situational interest
 - 5.5.a. After reading content about “Agritourism”, learners will demonstrate a level of situational interest
 - 5.5.b. After viewing and interacting with content at Purdue Extension: Agritourism’s website, learners will demonstrate a level of situational interest

- **Content Presentation**

- Content

- Content will be presented in a slide format with a variety of text, images, sound effects, clickable activities, and external links to videos
- Example



Figure 10: Screenshot of “Plants and Crops” section of “What is Agriculture?” Section

- Learner Grouping
 - Learners are all participating on their own time separately
- Learner Participation
 - Activities
 - Learners will experience clickable, interactive components, as well as videos, hyperlinks to external content, and sound effects
 - Learners will be able to choose the path in which they proceed through the content in the online exhibit
 - Feedback
 - Learners will be given feedback on their performance in the interactive materials
 - Learner Grouping
 - Learners are all participating on their own time separately

3.7.5.4 Cluster 4

- **Objectives**

- 6. Learners should be able to successfully click the “Thank You and Exit Survey” button
 - 6.1.a. Learners should be able to successfully access the survey questionnaire
 - 6.1.b. After clicking “Exit survey” button, learners should be able to successfully complete the survey questionnaire

- **Content Presentation**

- Content
 - Survey prompt and link will be presented in slide format and have a link on the Main Menu of the online exhibit
- Example

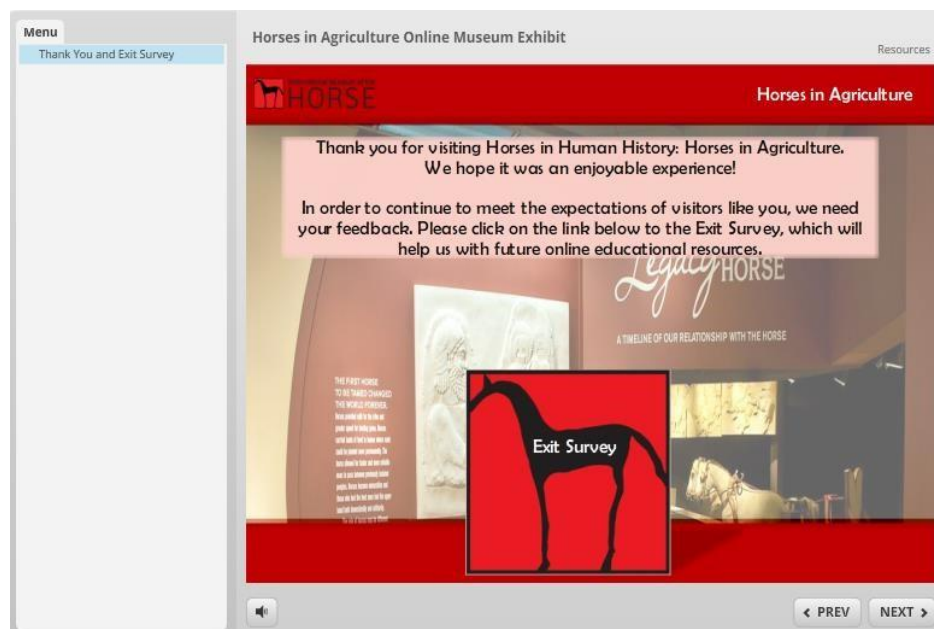


Figure 11: Screenshot of Survey Questionnaire Prompt and Link in Online Exhibit

- Learners Grouping
 - Learners are all participating on their own time separately.

- **Learner Participation**
 - Practice Items and Activities
 - Accessing the Exit Survey link and participating in the online survey.
 - Feedback
 - Participation tracked
 - Learner Grouping
 - Learners are all participating on their own time separately.

3.7.6. Interactive Levels

For the purpose of the development of this online museum exhibit, the instructional strategy can also be thought of as the theoretical framework within the theoretical framework, which in this case, is the Systems Approach. The theoretical grounding within the instructional strategy step of the Systems Approach is Laurillard's (2002) interactive levels application to museum websites.

The development of the instructional strategy for the Horses in Agriculture online exhibit was guided by Laurillard's (2002) interactive levels because of the instructional goal surrounding situational interest. As discussed earlier, the narrative level of interaction involves the media being limited to images and text (Saiki, 2010). The interactive level includes media that allows the learner to explore the website actively and have choice in what they view and when they view certain material (Saiki, 2010). The third level, communicative, includes media that allows the learner to interact with other viewers through discussion boards or blogs (Saiki, 2010). The adaptive level includes media that learners can share and discuss ideas and/or receive feedback from an instructor (Saiki, 2010). The productive level includes media that enables learners to show their proficiency in a skill, such as creating a project (Saiki, 2010).

Each section of the online exhibit was intentionally populated with a certain interactive level in order to give variety, but also to provide the opportunity to gather feedback about

situational interest related to the amount of interactivity. Because the final product of the online exhibit was intended to be able to be accessed without the direct interaction of an instructor, the design was limited to interactive levels one and two, narrative and interactive. The content slides and the corresponding assigned interactive levels can be found in Table 3.

Table 3: Horses in Agriculture Content Sections and Corresponding Interactive Levels

Main Instructional Goal	Terminal Objective	Laurillard's Interactive Level
Learners will be interested in the roles horses played in agriculture historically and in current day society through the use of the interactive online museum exhibit.	The interactive online horses in agriculture module will be able to stimulate and retain learner interest in the 3 sections of the online museum exhibit.	<ol style="list-style-type: none"> 1. Narrative 2. Interactive 3. Communicative 4. Adaptive 5. Productive
Section	Specific Topics	
2 Origins: History of Horses in Agriculture	2.1 Early Man and Horse Interactions	Narrative Interactive 1.
	2.2 Horses as a Food Source	Narrative Interactive
	2.3 Domestication	Narrative Interactive
	2.4 History of Horses in Agriculture Around the World	Narrative Interactive

Table 3 Continued

	2.5 The Beginning of Animal Welfare	Narrative Interactive
	2.6 The Industrial Revolution	Narrative
	2.7 Home on the Range	Narrative
3 What is Agriculture?	3.1 What is Agriculture?	Narrative Interactive
	3.2 Plants and Crops	Narrative Interactive
	3.3 Food	Narrative
	3.4 Human Needs	Narrative Interactive
	3.5 Economic Growth	Narrative Interactive
4 Galloping Forward: Horses in Current Day Agriculture	4.1 Horses in Current Day Agriculture	Narrative Interactive
	4.2 Milking a Mare	Narrative Interactive
	4.3 Horse Milk Products	Narrative Interactive
	4.4 21 st Century Cowboy	Narrative
	4.5 Agritourism	Narrative

The previous steps resulted in a heavily detailed, but clear layout and design plan for the Horses in Agriculture online exhibit. This all culminated a very streamlined final development of the instructional materials themselves.

3.7.7. Develop and Select Instructional Materials

The next step is 7. Develop and Select Instructional Materials. This step involves the selection of the actual content, necessary materials, and construction of the online museum exhibit.

The content material for the online exhibit was selected and reviewed by Subject Matter Experts from the International Museum of the Horse and Purdue University. All of the images and text used in the online exhibit was provided directly from the International Museum of the Horse or Purdue University educational resources. The online museum exhibit was built using Articulate Storyline 2 software.

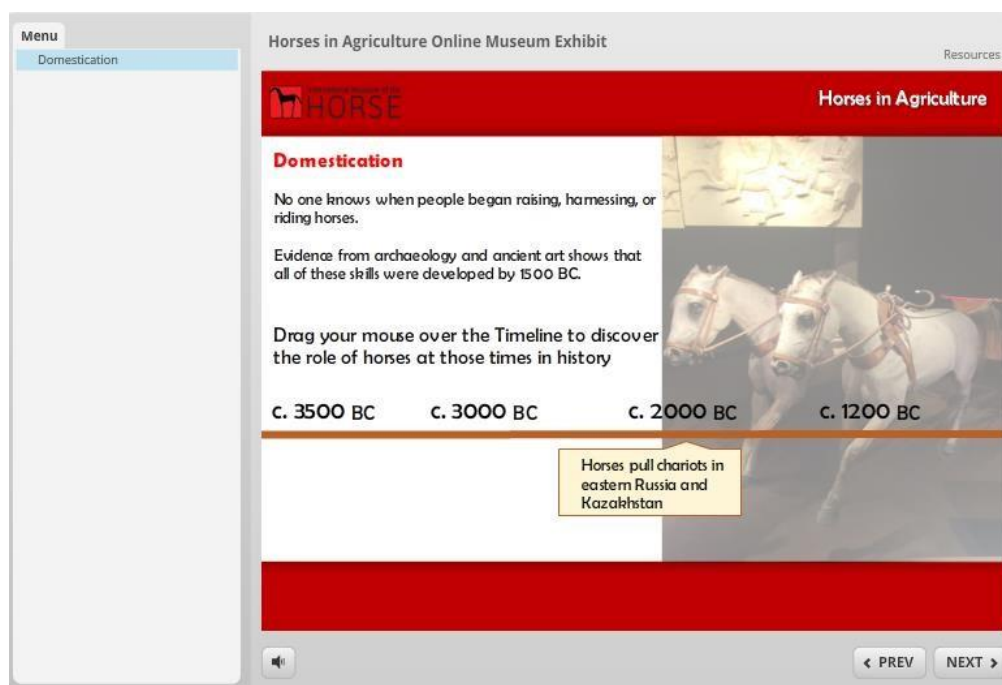


Figure 12: Screenshot of Domestication Slide in Horses in Agriculture Online Exhibit

Using the design features within Articulate Storyline 2, interactivity was built in using triggers and hotspot locations. Features included buttons and images that reveal information or images when clicked on, sound effects, and links to further information on external websites. Resulting interactivity examples include a book that flips pages when clicked, an interactive map

that reveals information about horses in different countries, and clickable cattle that would reveal information and images about life on the range as a cowhand. Slides that were predetermined to be narrative only on the interactive levels included only text and images. Learning pathways were also created using clickable buttons and images which allowed learners to navigate the online exhibit based on choice.

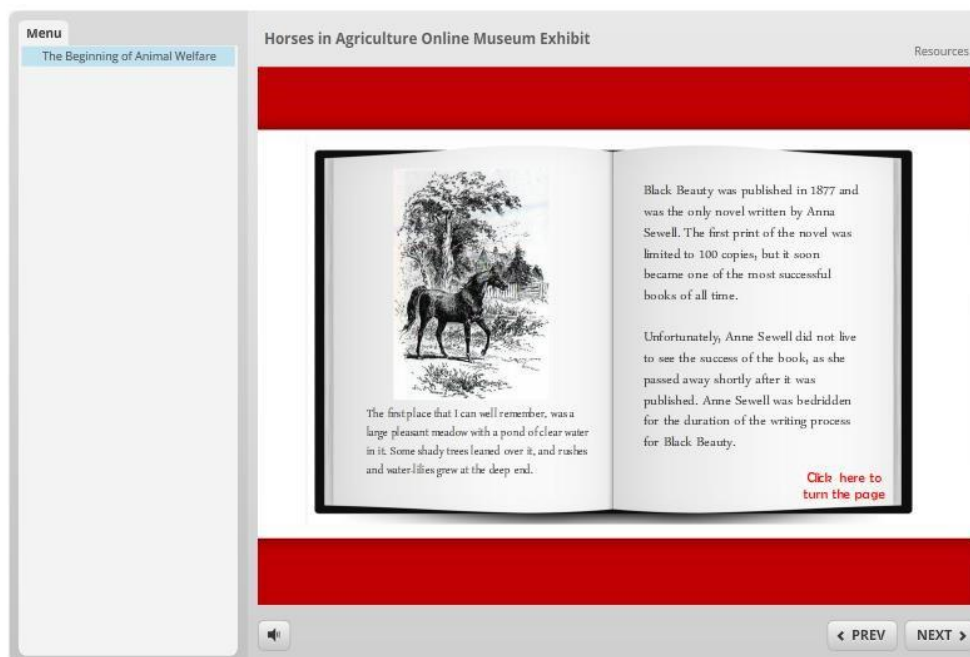


Figure 13: Screenshot of “Black Beauty” Slide in Horses in Agriculture Online Exhibit

The online module was available through a SCORM file and uploaded onto Blackboard learning management system or was published to a standalone URL and opened in a browser window. Another feature of the Articulate Storyline module format was that it also has the ability to keep track of a learner’s progress, which allows for a continuation of the lesson at any point after exiting.

The final online exhibit was reviewed by Subject Matter Experts and was determined to be ready for the next step, formative evaluation.

3.7.8. Design and Conduct Formative Evaluation of Instruction

This step, 8. Design and Conduct Formative Evaluation of Instruction, involves the design and implementation of an appropriate form of evaluation for the instruction in development (Dick & Carey, 2015). This is the first form of evaluation used in the systems approach and is formative in nature, meaning that it is meant to assess the instruction during the development process with the intent being to identify problem areas and guide early revisions (Dick & Carey, 2015). The formative evaluation for the Horses in Agriculture online exhibit took place in the form of a pilot study with a convenience sample of learners at Purdue University as well as a review panel by Subject Matter Experts.

3.7.8.1 Pilot Study

In May of 2017, a pilot study was conducted with the online exhibit and assessment instruments. This pilot study took place with high school students (N=28) that were taking part in a 4-H Science Academy summer program at Purdue University. Students were able to access the online exhibit in a computer lab and were able to complete the online exhibit at their own pace. Students were asked to complete the Qualtrics survey at the conclusion of their time in the online exhibit. The survey questionnaire was examined for content and face validity by a panel of Subject Matter Experts.

3.7.8.2. Results and Revise Instruction

The results of the formative evaluation directly affect the next step in the process, 9. Revise Instruction. The feedback from the review panel and the pilot study were directly used to reevaluate parts of the instruction and to guide necessary changes in the Horses in Agriculture online exhibit.

The review panel of Subject Matter Experts did not have any major changes in the instruction content, but instead experienced technical difficulties with some of the interactive buttons as well as certain internet browsers. It was reported that the online module did not function properly in the Google Chrome internet browser and that the URL link worked for some learners, but not others.

Results from the survey revealed that 75% of the pilot study group have some level of prior personal interest in horses in agriculture, which grew to 96% after the completion of the Horses in Agriculture online exhibit. It is interesting to note that only 28% of respondents describe themselves primarily as horse enthusiasts, 46% responded that they own horses, and over 50% responded that they strongly agree that the subject of horses is enjoyable and exciting- indicating some pre-existing personal interest in the pilot study group.

Responses showed that over 70% of respondents disagreed on some level with the statement “The Horses in Agriculture online exhibit is dull”. Over 70% of respondents agreed on some level with the statement “Because of this online exhibit, I am more interested in horses”. Over 80% of respondents indicated that they liked the learning pathways and having choice in how to progress through the material. Responses also revealed that 89% indicated that the interactive components caught their attention and 71% indicated that the interactive components held their interest more effectively than just text and an image.

Overall, the pilot study was highly informative and was also used to test the reliability of the survey instrument. The Cronbach’s alpha value for the instrument was 0.526, however, upon further examination it was found that the questions related to catch and hold situational interest were highly unreliable, with a separate Cronbach’s alpha value of 0.238. It was decided that these

questions would be removed from the final survey instrument with the final Cronbach's alpha value at 0.708, which is considered reliable (Nunnally, 1978).

The information from the pilot study in combination with the feedback of the panel of Subject Matter Experts provided direction in the revision of the instruction that will be implemented in the final step of the systems approach process, 10. Conduct Summative Evaluation.

3.8 Design and Conduct Summative Evaluation

The final step of the Dick and Carey Systems Approach model is 10. Design and Conduct Summative Evaluation.

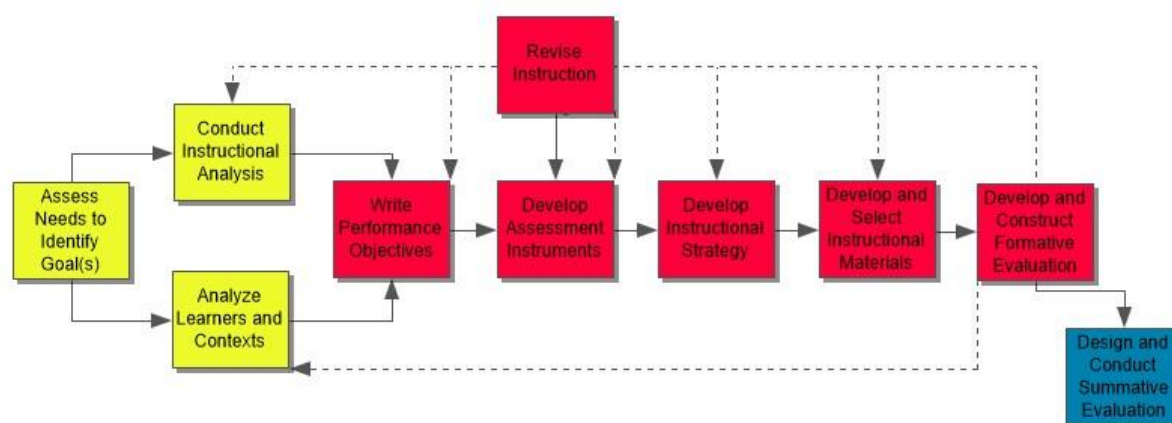


Figure 14: The Dick and Carey Systems Approach Model with Steps 10 Highlighted in Blue

This step of the process was performed by evaluating the online museum exhibit using a self-report survey instrument that was completed by the learners and validated and tested for reliability during step 8. Design and Conduct Formative Evaluation of Instruction. This evaluation process took place in the form of data analysis of the selfreport survey instrument provided at the end of the online museum exhibit. This summative evaluation took place in two separate parts: 1.

Evaluating the online exhibit based on the situational interest of the learners using descriptive statistics and t-tests; and 2. Evaluating the effect of online exhibit characteristics on the situational interest of learners using principle components analysis and regression analysis.

3.8.1. Evaluating the Online Exhibit based on the Situational Interest of the Learners

The following research questions were addressed in this stage of the evaluation:

2. Does application of a systems approach design process result in an online exhibit effective in engaging situational interest in the audience? Specifically:
 - a. Informal
 - b. Formal
3. Do audience characteristics impact how the online exhibit engages situational interest?

3.8.2. Evaluating the Effect of Online Exhibit Characteristics on the Situational Interest of Stakeholders

This final phase of the evaluation process addressed the following research questions:

3. Do audience characteristics impact how the online exhibit engages situational interest?
4. Do online exhibit characteristics affect how the online exhibit engages situational interest in the audience? Specifically:
 - a. Adaptable
 - b. Free-choice
 - c. Interactivity

3.8.3. Methods

As the research questions involve the evaluation of the Horses in Agriculture online exhibit in regards to both informal and formal learners, a group each of informal and formal learners were necessary for this step. The instrument used for data collection is the same instrument developed and pilot tested in Chapter 4 during Step 8. Design and Conduct Formative Evaluation of Instruction. The survey instrument included demographic questions and questions related to situational interest in different aspects of the online module. These situational interest aspects included topic interest, computer learning interest, interactivity interest, free-choice interest, and adaptability interest. Questions related to catch and hold interest were also included, which asked about how fun or valuable the participant perceived the online exhibit to be. The full version of the survey instrument can be found in the Appendices. The online exhibit was published to two different file types for the informal and formal groups and both groups' online exhibits included a link to the survey questionnaire to be completed at the end of the learner's experience in the online exhibit.

The informal group accessed the online exhibit through an internet browser URL link that would open the online exhibit in a new browser window. The informal group was targeted using social media snowball sampling, specifically through shared posts with a link and a recruitment message on Facebook. The link and recruitment post was posted a total of 12 times – nine times by the researcher, one time by Purdue Horse

Extension, one time by the Kentucky Horse Park, and one time by the International Museum of the Horse. The link and recruitment message was posted by the researcher on the researcher's personal page, as well as horse and history related groups on Facebook. The link and recruitment post was subsequently shared 27 times by Facebook users.



Figure 15: Screenshot of Facebook Link and Recruitment Post for Informal Group

The formal group was comprised of 3 undergraduate courses at Purdue University: two introduction to animal science courses and one horse management course. The formal group accessed the online exhibit using a link within a learning management system in which the exhibit was uploaded as a SCORM zip file. Students were assigned to complete the online exhibit as a part of a class assignment by the instructors but were not given extra incentive, such as extra credit, to do so.

This research project, survey instrument, and data collection was approved by IRB at Purdue University. Data collection began on August 8th, 2017 and concluded on December 1st, 2017. Data was analyzed using SPSS statistical software. At the conclusion of data collection, a total of 35 responses were collected for the informal group and 411 responses were collected for the formal group. The data was analyzed using SPSS statistical software.

3.8.4. Data Analysis Plan

Analysis included the use of descriptive statistics, t-tests, and regression analysis.

3.8.4.1 Descriptive Statistics

Items reported in this section included demographic information and situational interest questions. Demographic information such as age, gender, primary and secondary identity-related characteristics, and country of residence were analyzed and reported in frequency tables. Situational interest questions in the survey questionnaire were placed into pre-determined sections such as horse topic interest, agriculture topic interest, computer learning interest, online exhibit interest, free-choice interest, interactivity interest, and adaptability interest. All items included in the descriptive statistics section were reported in the form of frequencies in a table format.

3.8.4.2 T-tests

The survey instrument included two self-report questions which asked respondents to indicate interest in the topic of horses in agriculture on a Likert scale both before and after participating in the online museum exhibit. The means of these values were compared within the informal and formal groups for statistical significant difference using a paired t-test.

3.8.4.3 Regression Analysis

Regression analysis was used to determine whether certain independent variables which were intentionally implemented within the online exhibit are predictors of situational interest in the Horses in Agriculture online museum exhibit. Specifically, the demographic characteristics of gender and years of horse experience and the online exhibit characteristics of free-choice, interactivity, and adaptability. Regression analysis was performed only with the formal group (N = 411) because of the small population size of the informal group (N = 35). Other demographic

independent variables were left out of this analysis because of the lack of variation in those variables within the formal group, as all participants were undergraduate animal science students at Purdue University.

Before proceeding with the regression analysis, certain assumptions had to be considered. Assumptions include parameters regarding the number of cases, accuracy of data, missing data, outliers, and normality (www.dss.princeton.edu/online_help/analysis/regression_intro.htm). Ideally, the number of cases-to-independent variable ratio should be 20:1, or 20 cases for each independent variable. There are five independent variables being tested in this model and 361 cases (50 cases thrown out due to missing data), which is well within the parameters of this assumption. The accuracy of the data was also checked and the values for each variable were considered valid, which covers the assumption of accurate data. Any missing data was automatically excluded from analysis by the SPSS statistical software which resulted in 50 cases being excluded. The data was also examined for outliers and none were found in the variables of interest. Finally, normal distribution of the data was examined and it was found that the data does not fit normal distribution. However, it was considered acceptable practice to continue with the regression analysis with non-normal data as it has been found that parametric tests can be used with Likert data and are robust enough to stand up to the violations of such assumptions of normality (Norman, 2010).

3.8.4.4 Variable Entry

Gender and years of prior horse experience were entered into the regression model using the enter method in SPSS. The three online exhibit characteristic variables were entered into the model using a stepwise entry method. The forward stepwise entry method allowed the researcher to determine the amount of variance explained by each online exhibit characteristic variable in the

model. In the stepwise regression procedure, variables are entered into the model according to the amount of explained variance. The procedure stops entering variables when no additional variance is explained.

3.8.4.5 Principal Components Analysis

In preparation for the regression analysis, Principal Component Analysis was used as a data reduction technique to develop composite variables suitable for subsequent multivariate regression analysis. The first step in this phase required specific identification of the variables of interest. The dependent variable of interest was the overall situational interest (SI) in the Horses in Agriculture online museum exhibit. This variable was accounted for in the survey instrument with a total of 9 items focused on online exhibit situational interest.

Additional situational interest items measured in the instrument included horse topic interest (3 items), agriculture topic interest (3 items), and computer learning interest (2 items).

An Item Analysis was performed with the variable groups of online exhibit SI, horse topic SI, agriculture topic SI, and computer learning SI. All variable groupings and the overall grouping of all of the dependent variables (17 items) were found to have a Cronbach's alpha greater than 0.70, which is considered acceptable (Nunnally, 1978).

Table 4: Reliability Analysis of Online Exhibit Situational Interest Items

Cronbach's Alpha	Number of Items*
0.892	9

*Items included:

- a. The Horses in Agriculture online exhibit was fun.
- b. I could see myself going back to the Horses in Agriculture online exhibit

- c. The Horses in Agriculture online museum exhibit was dull.
- d. Because of this online museum exhibit, I am more interested in horses.
- e. The Horses in Agriculture online museum exhibit is a valuable resource.
- f. I didn't find anything interesting about the history of horses in agriculture.
- g. Because of this online museum exhibit, I would be interested in seeing what other online exhibits have to offer.
- h. I will never use the information from this online exhibit again in my life.
- i. I see the concepts I learned in the online museum exhibit as important.

Table 5: Reliability Analysis of Horse Topic Situational Interest Items

Cronbach's Alpha	Number of Items*
0.955	3

*Items included:

- a. The subject of horses is enjoyable to me.
- b. The topic of horses is exciting to me.
- c. The topic of horses is important to me.

Table 6: Reliability Analysis of Agriculture Topic Situational Interest Items

Cronbach's Alpha	Number of Items*
0.934	3

*Items included:

- a. The topic of agriculture is enjoyable to me.
- b. The topic of agriculture is exciting to me.
- c. The topic of agriculture is important to me.

Table 7: Reliability Analysis of Computer Learning Situational Interest Items

Cronbach's Alpha	Number of Items*
0.786	2

*Items included:

- a. I enjoy working on computers more than in a book.
- b. Using a computer for learning is fun.

Table 8: Reliability Analysis of all Situational Interest Dependent Variable Items

Cronbach's Alpha	Number of Items
0.881	17

Following the item analysis, a Principal Components Analysis was performed to examine the structure of the relationship of the 17 items (Norman & Streiner, 2008). This was done by inputting all of the items that were just tested for reliability (N=17). Orthogonal (Varimax) rotation was used to minimize intercorrelation among latent variables, or factors (Norman & Streiner, 2008). Rotation is a technique used to ease interpretation of the factors (Norman & Streiner, 2008).

Using the conventional criterion in the literature, four factors for which Eigenvalues were greater than one were extracted in the current analysis. Analysis of the scree plot confirmed the presence of four factors and the dominance of factor one as revealed by its steep slope and break within the plot. A procedure was developed for interpreting the factors. According to this scheme, items were considered to load on a factor if they exhibited a minimal loading of 0.6 on one factor and no higher than 0.4 on any other factor. Results from these procedures are displayed in Table 9. Results show that the four factors extracted through Principal Components Analysis basically replicated the measurement scales developed through item analysis. As shown in Table 9, Factor

1 tapped situational interest in the Horses in Agriculture online exhibit; Factor 2 tapped horse topic situational interest; Factor 3 tapped agriculture topic situational interest; and Factor 4 tapped computer learning situational interest. Factor 1, or situational interest in the online exhibit, accounted for the most explained variance of the four factors, at 27.8%. The five items exhibiting the highest loadings on Factor 1 were combined to form the dependent variable used in this study.

Table 9: Principal Component Rotated Matrix Table

Item	Factor 1	Factor 2	Factor 3	Factor 4
The subject of horses is enjoyable to me.	0.291	0.917 ²	-0.005	0.025
The topic of horses is exciting to me.	0.285	0.929 ²	0.014	0.004
The topic of horses is important to me.	0.321	0.873 ²	0.088	-0.018
The topic of agriculture is enjoyable to me.	0.061	0.046	0.953 ³	-0.012
The topic of agriculture is exciting to me.	0.065	-0.006	0.951 ³	-0.012
The topic of agriculture is important to me.	0.063	0.050	0.914 ³	-0.032
The Horses in Agriculture online museum exhibit was fun.	0.758	0.265	0.129	0.162
I could see myself going back to the Horses in Agriculture online museum exhibit.	0.729	0.212	0.025	0.171
The Horses in Agriculture online museum exhibit is dull.	0.743 ¹	0.091	0.029	-0.017
Because of this online museum exhibit, I am more interested in horses.	0.554	0.286	-0.070	0.284

Table 9 Continued

The Horses in Agriculture online museum exhibit is a valuable resource.	0.750 ¹	0.211	0.040	0.104
I didn't find anything interesting about the history of horses in agriculture.	0.739 ¹	0.186	0.026	-0.076
Because of this online museum exhibit, I would be interested in seeing what other online museum exhibits have to offer.	0.662 ¹	0.054	0.117	0.380
I see the concepts I learned in the online museum exhibit as important.	0.622	0.407	0.119	0.186
I will never use the information from this online exhibit again in my life.	0.694 ¹	0.153	0.024	-0.011
I enjoy working on computers more than in a book.	0.028	0.026	-0.067	0.896 ⁴
Using a computer for learning is fun.	0.256	-0.021	0.004	0.854 ⁴

1. Items comprising online exhibit situational interest variable
2. Items comprising horse topic situational interest variable
3. Items comprising agriculture topic situational interest variable
4. Items comprising computer learning situational interest variable

Table 10: Table of Total Variance Explained by Principal Components

Factor	Percent of Variance (%)	Cumulative Variance (%)
1	27.80	27.80
2	17.34	45.15
3	15.96	61.11
4	10.97	72.09

This analysis assisted in data reduction for the dependent variable of interest, situational interest in the Horses in Agriculture online exhibit to 7 items. This data reduction was used to create accurate composite variables in preparation for regression analysis. To reduce the data further, the top five items that loaded the highest amounts of variance in the Principal Components

Analysis were selected for the composite dependent variable. The group of five variables had a Cronbach's alpha greater than 0.70, which is considered acceptable (Nunnally, 1978).

Table 11: Reliability Analysis of Online Exhibit Situational Interest Items

Cronbach's Alpha	Number of Items*
0.848	9

*Items included:

- a. The Horses in Agriculture online exhibit was fun.
- b. I could see myself going back to the Horses in Agriculture online exhibit
- c. The Horses in Agriculture online museum exhibit was dull.
- d. The Horses in Agriculture online museum exhibit is a valuable resource.
- e. I didn't find anything interesting about the history of horses in agriculture.

The final step in preparing for regression analysis was item analysis, intercorrelation analysis, and the creation of composite variables for the three online exhibit characteristic independent variables of interest: free-choice situational interest (2 items), interactivity situational interest (2 items), and adaptability situational interest (5 items). Each of the groupings for these three variables had a Cronbach's alpha value greater than 0.70, which is considered acceptable and justified creating a composite variable for each (Nunnally, 1978). The variables were also checked for multicollinearity, or intercorrelation between the predictor variables and it was found that there were weak to moderate intercorrelations between variables, but none exceed 0.4, which is considered acceptable (Pedhazur, 1973).

Table 12: Reliability Analysis of Free Choice Situational Interest Items

Cronbach's Alpha	Number of Items*
0.782	2

*Items included:

- a. Having this material available online is helpful to me.
- b. I enjoyed the exhibit being online because I can access it anytime and from anywhere

Table 13: Reliability Analysis of Adaptability Situational Interest Items

Cronbach's Alpha	Number of Items*
0.735	5

*Items included:

- a. When learning online, I like the material to be straight forward and to tell me what I learn first.
- b. When learning online, I like having a choice in what order I progress through the material.
- c. Having different options in the online museum exhibit is confusing.
- d. I like having different options within the online museum exhibit.
- e. Having different options in the online museum exhibit makes the material more interesting.

Table 14: Reliability Analysis of Interactivity Situational Interest Items

Cronbach's Alpha	Number of Items*
0.842	2

*Items included:

- a. The interactivity and videos within the online museum exhibit caught my attention
- b. The interactivity and videos within the online museum exhibit held my attention longer than text and a picture.

4. RESULTS

4.1 Descriptive Statistics and Frequencies

At the conclusion of data collection, a total of 35 responses were collected for the informal group and 411 responses were collected for the formal group. The data for each of groups are reported separately in the form of descriptive statistics and frequencies. The results of the descriptive analysis of the informal and formal groups are represented in tables 15 through 27 and reported by group.

4.1.1. Informal Group

Demographic characteristics of the informal group ($n = 35$) are reported in Table 15. The age of respondents ranged from 19 to 69 with a mean of 47.34 and a mode of 50.

Respondents were overwhelmingly female (85.7%) and residents of the United States (92.9%). The two respondents who indicated residence outside the United States were from Australia and Canada. Thirteen states were represented by respondents, with the most frequent being residents of Indiana (20.3%). A majority of the respondents had previous horse experience, with 82.1% having over five years of experience, 10.7% having one year of less of experience, and 7.1% having no experience. Respondents indicated that 66.7% identified themselves as horse owners. When asked how respondents would primarily describe themselves, 39.3% identified as educators looking for resources, 28.6% as horse enthusiasts, 10.7% as working in the horse industry, 3.6% having no prior horse knowledge but interested in agriculture, 10.7% as interested in history, and 3.6% as students using the module for a course. When asked how respondents would secondarily describe themselves, 3.8% identified as educators looking for resources, 26.9% as horse enthusiasts, 26.9% as working in the horse industry, 3.8% having no prior horse knowledge

but interested in agriculture, 30.8% as interested in history, and 3.8% as students using the module for a course.

Table 15: Demographic Characteristics of Informal Group Participants; n= 35

Question	Response Options	Frequency	Valid Percent	Mode/Mean (SD)
What is your age?	19	1	2.9%	50/47.34 (14.36)
	23	1	2.9%	
	25	1	2.9%	
	31	1	2.9%	
	34	1	2.9%	
	35	1	2.9%	
	36	1	2.9%	
	42	2	5.7%	
	43	1	2.9%	
	45	1	2.9%	
	49	1	2.9%	
	50	3	8.6%	
	51	1	2.9%	
	53	2	5.7%	
	54	1	2.9%	
	57	1	2.9%	
	60	1	2.9%	
	63	1	2.9%	
64	2	5.7%		
69	2	5.7%		
What is your gender?	Male	13	15.3%	
	Female I	72	84.7%	
	would rather not disclose	0	0.0%	
Do you live in the United States?	Yes	26	92.9%	
	No	2	7.1%	

Table 15 Continued

In what state do you live?	Arizona	1	2.9%
	California	1	2.9%
	Florida	1	2.9%
	Illinois	3	8.7%
	Indiana	7	20.3%
	Kentucky	1	2.9%
	Louisiana	1	2.9%
	Maine	1	2.9%
	Maryland	1	2.9%
	Michigan	1	2.9%
	Oklahoma	1	2.9%
	Oregon	1	2.9%
	Virginia	1	2.9%
How many years of prior horse experience do you have?	None	2	7.1%
	One year or less	3	10.7%
	Over 5 years	23	82.1%
Do you own a horse?	Yes	18	66.7%
	No	9	33.3%
How would you describe yourself primarily?	I am an educator looking for resources to use	11	39.3%
	I am a horse enthusiast	8	28.6%
	I work in the horse industry	3	10.7%
	I have no prior knowledge about horses, but I am interested in agriculture	1	3.6%
	I am interested in history	3	10.7%
	I am a student using this for a course	1	3.6%

Table 15 Continued

How would you describe yourself secondarily?			
I am an educator looking for resources to use	1		3.8%
I am a horse enthusiast	7		26.9%
I work in the horse industry	7		26.9%
I have no prior knowledge about horses, but I am interested in agriculture	1		3.8%
I am interested in history	8		30.8%
I am a student using this for a course	1		3.8%

When asked about prior interest in the subject of horses in agriculture before participating in the online exhibit, 85.7% of respondents indicated some degree of preexisting interest – specifically, 42.9% indicated being “very interested”, 21.4% indicated being “interested”, and 21.4% indicated being “fairly interested”. Respondents were also asked how interested about interest in the same subject after participating in the exhibit, for which 89.3% of respondents indicated some degree of interest - specifically, 57.1% indicated being “very interested”, 14.3% indicated being “interested”, and 17.9% indicated being “fairly interested”.

Table 16: Topic Situational Interest of Informal Group Participants; n=35

Question/Statement	Response Options	Frequency	Valid Percent
How interested were you in the subject of horses and their role in agriculture before you went through the online exhibit?	Very Interested	12	42.9%
	Interested	6	21.4%
	Fairly Interested	6	21.4%
	Neither Interested nor Uninterested	2	7.1%
	Fairly Uninterested	2	7.1%
	Uninterested	0	0.0%
	Very Uninterested	0	0.0%
How interested are you in the subject of horses and their role in agriculture now?	Very Interested	16	57.1%
	Interested	4	14.3%
	Fairly Interested	5	17.9%
	Neither Interested nor Uninterested	2	7.1%
	Fairly Uninterested	1	3.6%
	Uninterested	0	0.0%
	Very Uninterested	0	0.0%
The topic of horses is enjoyable to me.	Strongly Agree	18	78.3%
	Agree	5	21.7%
	Slightly Agree	0	0.0%
	Neither Agree nor Disagree	0	0.0%
	Slightly Disagree	0	0.0%
	Disagree	0	0.0%
	Strongly Disagree	0	0.0%
The topic of horses in exciting to me.	Strongly Agree	17	73.9%
	Agree	3	13.0%
	Slightly Agree	3	13.0%
	Neither Agree nor Disagree	0	0.0%
	Slightly Disagree	0	0.0%
	Disagree	0	0.0%
	Strongly Disagree	0	0.0%

Table 16 Continued

The topic of horses is important to me.	Strongly Agree	19	82.6%
	Agree	2	8.7%
	Slightly Agree	1	4.3%
	Neither Agree nor Disagree	1	4.3%
	Slightly Disagree	0	0.0%
	Disagree	0	0.0%
	Strongly Disagree	0	0.0%
The topic of agriculture is enjoyable to me.	Strongly Agree	13	56.5%
	Agree	8	34.8%
	Slightly Agree	2	8.7%
	Neither Agree nor Disagree	0	0.0%
	Slightly Disagree	0	0.0%
	Disagree	0	0.0%
	Strongly Disagree	0	0.0%
The topic of agriculture is exciting to me.	Strongly Agree	12	52.2%
	Agree	8	34.8%
	Slightly Agree	2	8.7%
	Neither Agree nor Disagree	1	4.3%
	Slightly Disagree	0	0.0%
	Disagree	0	0.0%
	Strongly Disagree	0	0.0%
The topic of agriculture is important to me.	Strongly Agree	16	69.6%
	Agree	5	21.7%
	Slightly Agree	2	8.7%
	Neither Agree nor Disagree	0	0.0%
	Slightly Disagree	0	0.0%
	Disagree	0	0.0%
	Strongly Disagree	0	0.0%

When asked about situational interest in the online exhibit, 100% of respondents indicated some level of agreement regarding the online exhibit being fun. Overall, the respondents indicated

high levels of agreement with the online exhibit being interesting and valuable. The respondents also indicated a high preexisting interest in horses.

Table 17: Situational Interest in Horses in Agriculture Online Exhibit of Informal Group Participants; n=35

Question/Statement	Response Options	Frequency	Valid Percent
The Horses in Agriculture online museum exhibit was fun.	Strongly Agree	7	30.4%
	Agree	12	52.2%
	Slightly Agree	4	17.4%
	Neither Agree nor Disagree	0	0.0%
	Slightly Disagree	0	0.0%
	Disagree	0	0.0%
	Strongly Disagree	0	0.0%
The Horse in Agriculture online museum exhibit is dull.	Strongly Agree	0	0.0%
	Agree	0	0.0%
	Slightly Agree	1	4.3%
	Neither Agree nor Disagree	1	4.3%
	Disagree		
	Slightly Disagree	3	13.0%
	Disagree	13	56.5%
Strongly Disagree	5	21.7%	
I could see myself going back to the Horses in Agriculture online museum exhibit.	Strongly Agree	8	34.8%
	Agree	9	39.1%
	Slightly Agree	2	8.7%
	Neither Agree nor Disagree	3	13.0%
	Slightly Disagree	1	4.3%
	Disagree	0	0.0%
	Strongly Disagree	0	0.0%

Table 17 Continued

Because of this online exhibit, I am more interested in horses.	Strongly Agree	1	4.3%
	Agree	5	21.7%
	Slightly Agree	3	13.0%
	Neither Agree nor Disagree	12	52.2%
	Slightly Disagree	0	8.7%
	Disagree	2	0.0%
	Strongly Disagree	0	0.0%
The Horses in Agriculture online museum exhibit is a valuable resource.	Strongly Agree	8	34.8%
	Agree	10	43.5%
	Slightly Agree	3	13.0%
	Neither Agree nor Disagree	1	4.3%
	Slightly Disagree	1	4.3%
	Disagree	0	0.0%
	Strongly Disagree	0	0.0%
Because of this online museum exhibit, I would be interested in seeing what other online museum exhibits have to offer.	Strongly Agree	5	21.7%
	Agree	10	43.5%
	Slightly Agree	3	13.0%
	Neither Agree nor Disagree	3	13.0%
	Slightly Disagree	1	4.3%
	Disagree	1	4.3%
	Strongly Disagree	0	0.0%
I see the concepts I learned in the online museum exhibit as important.	Strongly Agree	7	30.4%
	Agree	8	34.8%
	Slightly Agree	3	13.0%
	Neither Agree nor Disagree	4	17.4%
	Slightly Disagree	1	4.3%
	Disagree	0	0.0%
	Strongly Disagree	0	0.0%

Table 17 Continued

I will never use the information from this online exhibit again in my life.	Strongly Agree	0	0.0%
	Agree	0	0.0%
	Slightly Agree	0	0.0%
	Neither Agree nor Disagree	2	8.7%
	Slightly Disagree	1	4.3%
	Disagree	11	47.8%
	Strongly Disagree	9	39.1%
I didn't find anything interesting about the history of horses in agriculture.	Strongly Agree	0	0.0%
	Agree	0	0.0%
	Slightly Agree	0	0.0%
	Neither Agree nor Disagree	1	4.3%
	Slightly Disagree	3	17.4%
	Disagree	11	47.8%
	Strongly Disagree	7	30.4%

Table 18: Computer Learning Situational Interest of Informal Group Participants; n=35

Question/Statement	Response Options	Frequency	Valid Percent
I enjoy working on computers more than in a book.	Strongly Agree	0	0.0%
	Agree	5	21.7%
	Slightly Agree	5	21.7%
	Neither Agree nor Disagree	3	13.0%
	Slightly Disagree	6	26.1%
	Disagree	3	13.0%
	Strongly Disagree	1	4.3%

Table 18 Continued

Using a computer for learning is fun.	Strongly Agree	2	8.7%
	Agree	10	43.5%
	Slightly Agree	5	21.7%
	Neither Agree nor Disagree	3	13.0%
	Slightly Disagree	1	4.3%
	Disagree	1	4.3%
	Strongly Disagree	1	4.3%

Table 19: Free Choice Situational Interest of Informal Group Participants; n=35

Question/Statement	Response Options	Frequency	Valid Percent
Having this material available online is helpful to me.	Strongly Agree	8	34.8%
	Agree	10	43.5%
	Slightly Agree	2	8.7%
	Neither Agree nor Disagree	3	13.0%
	Slightly Disagree	0	0.0%
	Disagree	0	0.0%
	Strongly Disagree	0	0.0%
I enjoyed the exhibit being online because I can access it anytime and from anywhere.	Strongly Agree	10	43.5%
	Agree	10	43.5%
	Slightly Agree	1	4.3%
	Neither Agree nor Disagree	2	8.7%
	Slightly Disagree	0	0.0%
	Disagree	0	0.0%
	Strongly Disagree	0	0.0%

Table 20: Adaptability Situational Interest of Informal Group Participants; n=35

Question/Statement	Response Options	Frequency	Valid Percent
When learning online, I like the material to be straight forward and to tell me what I learn first.	Strongly Agree	2	8.7%
	Agree	9	39.1%
	Slightly Agree	5	21.7%
	Neither Agree nor Disagree	3	13.0%
	Slightly Disagree	3	13.0%
	Disagree	1	4.3%
	Strongly Disagree	0	0.0%
When learning online, I like having a choice in what order I progress through the material.	Strongly Agree	4	17.4%
	Agree	10	43.5%
	Slightly Agree	7	30.4%
	Neither Agree nor Disagree	1	4.3%
	Slightly Disagree	1	4.3%
	Disagree	0	0.0%
	Strongly Disagree	0	0.0%
Having different options in the online museum exhibit is confusing.	Strongly Agree	0	0.0%
	Agree	0	0.0%
	Slightly Agree	6	26.1%
	Neither Agree nor Disagree	4	17.4%
	Slightly Disagree	4	17.4%
	Disagree	6	26.2%
	Strongly Disagree	3	13.0%
I like having different options within the online museum exhibit.	Strongly Agree	2	8.7%
	Agree	16	69.5%
	Slightly Agree	2	8.7%
	Neither Agree nor Disagree	3	13.0%
	Slightly Disagree	0	0.0%
	Disagree	0	0.0%
	Strongly Disagree	0	0.0%

Table 20 Continued

Having different options in the online museum exhibit makes the material more interesting.	Strongly Agree	2	8.7%
	Agree	12	52.2%
	Slightly Agree	1	4.3%
	Neither Agree nor Disagree	7	30.4%
	Slightly Disagree	1	4.3%
	Disagree	0	0.0%
	Strongly Disagree	0	0.0%

Table 21: Interactivity Situational Interest of Informal Group Participants; n=35

Question/Statement	Response Options	Frequency	Valid Percent
The interactivity and videos within the online museum exhibit caught my attention.	Strongly Agree	6	26.1%
	Agree	11	47.8%
	Slightly Agree	3	13.0%
	Neither Agree nor Disagree	2	8.7%
	Slightly Disagree	1	4.3%
	Disagree	0	0.0%
	Strongly Disagree	0	0.0%
The interactivity and videos within the online museum exhibit held my attention longer than text and a picture.	Strongly Agree	5	21.7%
	Agree	10	43.5%
	Slightly Agree	6	26.1%
	Neither Agree nor Disagree	2	8.7%
	Slightly Disagree	0	0.0%
	Disagree	0	0.0%
	Strongly Disagree	0	0.0%

4.1.2. Formal Group

Demographic characteristics of the informal group (n = 411) are reported in Table 15. The age of respondents ranged from 17 to 28 with a mean of 19.42 and a mode of 18. Respondents were also overwhelmingly female (80.9%) and residents of the United States (18.2%). A majority of the respondents had little previous horse experience, with 48.8% having no experience.

Table 22: Demographic Characteristics of Informal Group Participants; n= 411

Question	Response Options	Frequency	Valid Percent	Mode/Mean
What is your age?	17	1	2.9%	18/19.42
	18	154	2.9%	
	19	67	16.3%	
	20	44	10.7%	
	21	60	14.6%	
	22	15	3.6%	
	23	14	3.4%	
	24	1	0.2%	
	25	1	0.2%	
	26	2	0.5%	
	28	1	0.2%	
	1000	1	0.2%	
What is your gender?	Male	66	18.2%	
	Female	293	80.9%	
	I would rather not disclose	3	0.80%	
Do you live in the United States?	Yes	358	98.6%	
	No	5	1.4%	
How many years of prior horse experience do you have?	None	177	48.8%	
	One year or less	63	17.4%	
	2 to 5 years	38	10.5%	
	Over 5 years	85	23.4%	
Do you own a horse?	Yes	80	22.1%	
	No	282	77.9%	

When asked about prior interest in the subject of horses in agriculture before participating in the online exhibit, 60.4% of respondents indicated some degree of preexisting interest – specifically, 13% indicated being “very interested”, 15.8% indicated being “interested”, and 31.6% indicated being “fairly interested”. Respondents were also asked how interested about interest in the same subject after participating in the exhibit, for which 76% of respondents indicated some degree of interest - specifically, 19% indicated being “very interested”, 27.6% indicated being “interested”, and 29.3% indicated being “fairly interested”.

Table 23: Topic Situational Interest of Formal Group Participants; n=411

Question/Statement	Response Options	Frequency	Valid Percent
How interested were you in the subject of horses and their role in agriculture before you went through the online exhibit?	Very Interested	47	13.0%
	Interested	57	15.8%
	Fairly Interested	114	31.6%
	Neither Interested nor Uninterested	88	24.4%
	Fairly Uninterested	25	6.9%
	Uninterested	23	6.4%
	Very Uninterested	7	1.9%
How interested are you in the subject of horses and their role in agriculture now?	Very Interested	69	19.1%
	Interested	100	27.6%
	Fairly Interested	106	29.3%
	Neither Interested nor Uninterested	55	15.2%
	Fairly Uninterested	22	6.1%
	Uninterested	6	1.7%
	Very Uninterested	4	1.1%

Table 23 Continued

The topic of horses is enjoyable to me.	Strongly Agree	115	31.7%
	Agree	118	32.5%
	Slightly Agree	60	16.5%
	Neither Agree nor Disagree	46	12.7%
	Slightly Disagree	11	3.0%
	Disagree	10	2.8%
	Strongly Disagree	3	0.8%
The topic of horses is exciting to me.	Strongly Agree	110	30.3%
	Agree	103	28.4%
	Slightly Agree	53	14.6%
	Neither Agree nor Disagree	67	18.5%
	Slightly Disagree	16	4.4%
	Disagree	11	3.0%
	Strongly Disagree	3	0.8%
The topic of horses is important to me.	Strongly Agree	89	24.6%
	Agree	84	23.2%
	Slightly Agree	66	18.2%
	Neither Agree nor Disagree	88	24.3%
	Slightly Disagree	21	5.8%
	Disagree	10	2.8%
	Strongly Disagree	4	1.1%
The topic of agriculture is enjoyable to me.	Strongly Agree	127	35.1%
	Agree	126	34.8%
	Slightly Agree	66	18.2%
	Neither Agree nor Disagree	27	7.5%
	Slightly Disagree	14	3.9%
	Disagree	2	0.6%
	Strongly Disagree	0	0.0%

Table 23 Continued

The topic of agriculture is exciting to me.	Strongly Agree	122	33.6%
	Agree	115	31.7%
	Slightly Agree	69	19.0%
	Neither Agree nor Disagree	35	9.6%
	Slightly Disagree	17	4.7%
	Disagree	5	1.4%
	Strongly Disagree	0	0.0%
The topic of agriculture is important to me.	Strongly Agree	155	42.7%
	Agree	127	35.0%
	Slightly Agree	46	12.7%
	Neither Agree nor Disagree	29	8.0%
	Slightly Disagree	5	1.4%
	Disagree	1	0.3%
	Strongly Disagree	0	0.0%

In regards to situational interest in the online exhibit, 70.4% of respondents indicated some level of agreement with the online exhibit being fun. When asked about interest in the topic of horses in agriculture before and after participating in the online exhibit, 13.0% indicated being very interested and 15.8% indicated being interested. After participating in the online exhibit, 19.0% indicated and 27.65 indicated being very interested in the topic of horses in agriculture.

Table 24: Topic Situational Interest of Formal Group Participants; n = 411

Question/Statement	Response Options	Frequency	Valid Percent
How interested were you in the subject of horses and their role in agriculture before you went through the online exhibit?	Very Interested	47	13.0%
	Interested	57	15.8%
	Fairly Interested	114	31.6%
	Neither Interested nor Uninterested	88	24.4%
	Fairly Uninterested	25	6.9%

Table 24 Continued

	Uninterested	23	6.4%
	Very Uninterested	7	1.9%
How interested are you in the subject of horses and their role in agriculture now?	Very Interested	69	19.1%
	Interested	100	27.6%
	Fairly Interested	106	29.3%
	Neither Interested nor Uninterested	55	15.2%
	Fairly Uninterested	22	6.1%
	Uninterested	6	1.7%
	Very Uninterested	4	1.1%
The topic of horses is enjoyable to me.	Strongly Agree	115	31.7%
	Agree	118	32.5%
	Slightly Agree	60	16.5%
	Neither Agree nor Disagree	46	12.7%
	Slightly Disagree	11	3.0%
	Disagree	10	2.8%
	Strongly Disagree	3	0.8%
The topic of horses in exciting to me.	Strongly Agree	110	30.3%
	Agree	103	28.4%
	Slightly Agree	53	14.6%
	Neither Agree nor Disagree	67	18.5%
	Slightly Disagree	16	4.4%
	Disagree	11	3.0%
	Strongly Disagree	3	0.8%
The topic of horses in important to me.	Strongly Agree	89	24.6%
	Agree	84	23.2%
	Slightly Agree	66	18.2%
	Neither Agree nor Disagree	88	24.3%
	Slightly Disagree	21	5.8%
	Disagree	10	2.8%
	Strongly Disagree	4	1.1%

Table 24 Continued

The topic of agriculture is enjoyable to me.	Strongly Agree	127	35.1%
	Agree	126	34.8%
	Slightly Agree	66	18.2%
	Neither Agree nor Disagree	27	7.5%
	Slightly Disagree	14	3.9%
	Disagree	2	0.6%
	Strongly Disagree	0	0.0%
The topic of agriculture is exciting to me.	Strongly Agree	122	33.6%
	Agree	115	31.7%
	Slightly Agree	69	19.0%
	Neither Agree nor Disagree	35	9.6%
	Slightly Disagree	17	4.7%
	Disagree	5	1.4%
	Strongly Disagree	0	0.0%
The topic of agriculture is important to me.	Strongly Agree	155	42.7%
	Agree	127	35.0%
	Slightly Agree	46	12.7%
	Neither Agree nor Disagree	29	8.0%
	Slightly Disagree	5	1.4%
	Disagree	1	0.3%
	Strongly Disagree	0	0.0%

Table 25: Situational Interest in Horses in Agriculture Online Exhibit of Formal Group Participants; n=411

Question/Statement	Response Options	Frequency	Valid Percent
The Horses in Agriculture online exhibit was fun.	Strongly Agree museum	16	4.4%
	Agree	125	34.5%
	Slightly Agree	114	31.5%
	Neither Agree nor Disagree	73	20.2%
	Slightly Disagree	25	6.9%
	Disagree	7	1.9%
	Strongly Disagree	2	0.6%

Table 25 Continued

The Horse in Agriculture online museum exhibit is dull.	Strongly Agree	5	1.4%
	Agree	24	6.6%
	Slightly Agree	45	12.4%
	Neither Agree nor Disagree	101	27.9%
	Slightly Disagree	75	20.7%
	Disagree	100	27.6%
	Strongly Disagree	12	3.3%
I could see myself going back to the Horses in Agriculture online museum exhibit.	Strongly Agree	17	4.7%
	Agree	79	21.8%
	Slightly Agree	84	23.1%
	Neither Agree nor Disagree	100	27.5%
	Slightly Disagree	28	7.7%
	Disagree	45	12.4%
	Strongly Disagree	10	2.8%
Because of this online exhibit, I am more interested in horses.	Strongly Agree	9	2.5%
	Agree	54	14.9%
	Slightly Agree	104	28.7%
	Neither Agree nor Disagree	139	38.4%
	Slightly Disagree	22	6.1%
	Disagree	27	7.5%
	Strongly Disagree	7	1.9%
The Horses in Agriculture online museum exhibit is a valuable resource.	Strongly Agree	44	12.1%
	Agree	178	49.0%
	Slightly Agree	80	22.0%
	Neither Agree nor Disagree	46	12.7%
	Slightly Disagree	8	2.2%
	Disagree	5	1.4%
	Strongly Disagree	2	0.6%

Table 25 Continued

Because of this online museum exhibit, I would be interested in seeing what other online museum exhibits have to offer.	Strongly Agree	16	4.4%
	Agree	98	27.0%
	Slightly Agree	89	24.5%
	Neither Agree nor Disagree	108	29.8%
	Slightly Disagree	26	7.2%
	Disagree	22	6.1%
	Strongly Disagree	4	1.1%
I see the concepts I learned in the online museum exhibit as important.	Strongly Agree	19	5.2%
	Agree	149	41.2%
	Slightly Agree	110	30.4%
	Neither Agree nor Disagree	68	18.8%
	Slightly Disagree	11	3.0%
	Disagree	4	1.1%
	Strongly Disagree	1	0.3%
I will never use the information from this online exhibit again in my life.	Strongly Agree	4	1.1%
	Agree	10	2.8%
	Slightly Agree	24	6.6%
	Neither Agree nor Disagree	80	22.0%
	Slightly Disagree	75	20.7%
	Disagree	136	37.5%
	Strongly Disagree	34	9.4%
I didn't find anything interesting about the history of horses in agriculture.	Strongly Agree	3	0.8%
	Agree	4	1.1%
	Slightly Agree	10	2.8%
	Neither Agree nor Disagree	59	16.3%
	Slightly Disagree	63	17.4%
	Disagree	164	45.2%
	Strongly Disagree	60	16.5%

Table 26: Computer Learning Situational Interest of Formal Group Participants; n=411

Question/Statement	Response Options	Frequency	Valid Percent
I enjoy working on computers more than in a book.	Strongly Agree	24	6.6%
	Agree	62	17.1%
	Slightly Agree	65	17.9%
	Neither Agree nor Disagree	88	24.2%
	Slightly Disagree	46	12.7%
	Disagree	53	14.6%
	Strongly Disagree	25	6.9%
Using a computer for learning is fun.	Strongly Agree	18	5.0%
	Agree	78	21.5%
	Slightly Agree	103	28.4%
	Neither Agree nor Disagree	93	25.6%
	Slightly Disagree	34	9.4%
	Disagree	29	8.0%
	Strongly Disagree	8	2.2%

Table 27: Free Choice Situational Interest of Informal Group Participants; n=35

Question/Statement	Response Options	Frequency	Valid Percent
Having this material available online is helpful to me.	Strongly Agree	47	12.9%
	Agree	162	44.6%
	Slightly Agree	94	25.9%
	Neither Agree nor Disagree	50	13.8%
	Slightly Disagree	5	1.4%
	Disagree	3	0.8%
	Strongly Disagree	2	0.6%
I enjoyed the exhibit being online because I can access it anytime and from anywhere.	Strongly Agree	58	6.6%
	Agree	161	17.1%
	Slightly Agree	83	17.9%
	Neither Agree nor Disagree	49	24.2%

Table 27 Continued

Slightly Disagree	7	12.7%
Disagree	3	14.6%
Strongly Disagree	2	6.9%

Table 28: Adaptability Situational Interest of Formal Group Participants; n=411

Question/Statement	Response Options	Frequency	Valid Percent
When learning online, I like the material to be straight forward and to tell me what I learn first.	Strongly Agree	62	17.1%
	Agree	169	46.6%
	Slightly Agree	68	18.7%
	Neither Agree nor Disagree	58	16.0%
	Slightly Disagree	3	0.8%
	Disagree	3	0.8%
	Strongly Disagree	0	0.0%
When learning online, I like having a choice in what order I progress through the material.	Strongly Agree	35	9.6%
	Agree	106	29.2%
	Slightly Agree	79	21.8%
	Neither Agree nor Disagree	76	20.9%
	Slightly Disagree	29	8.0%
	Disagree	31	8.5%
	Strongly Disagree	7	1.9%
Having different options in the online museum exhibit is confusing.	Strongly Agree	14	3.9%
	Agree	40	11.0%
	Slightly Agree	109	30.0%
	Neither Agree nor Disagree	73	20.1%
	Slightly Disagree	49	13.5%
	Disagree	69	19.0%
	Strongly Disagree	9	2.5%

Table 29 Continued

I like having different options within the online museum exhibit.	Strongly Agree	12	3.3%
	Agree	107	29.6%
	Slightly Agree	96	26.5%
	Neither Agree nor Disagree	90	24.9%
	Slightly Disagree	30	8.3%
	Disagree	19	5.2%
	Strongly Disagree	8	2.2%
Having different options in the online museum exhibit makes the material more interesting.	Strongly Agree	13	3.6%
	Agree	110	30.3%
	Slightly Agree	86	23.7%
	Neither Agree nor Disagree	107	29.5%
	Slightly Disagree	23	6.3%
	Disagree	16	4.4%
	Strongly Disagree	8	2.2%

Table 29: Interactivity Situational Interest of Formal Group Participants; n=411

Question/Statement	Response Options	Frequency	Valid Percent
The interactivity and videos within the online museum exhibit caught my attention.	Strongly Agree	27	7.4%
	Agree	135	37.2%
	Slightly Agree	108	29.8%
	Neither Agree nor Disagree	62	17.1%
	Slightly Disagree	14	3.9%
	Disagree	12	3.3%
	Strongly Disagree	5	1.4%

Table 29 Continued

The interactivity and videos within the online museum exhibit held my attention longer than text and a picture.	Strongly Agree	39	10.8%
	Agree	125	34.5%
	Slightly Agree	95	26.2%
	Neither Agree nor Disagree	67	18.5%
	Slightly Disagree	20	5.5%
	Disagree	10	2.8%
	Strongly Disagree	6	1.7%

4.2 T-Tests of Situational Interest Before and After Participation in the Online Exhibit

4.2.1. Informal Group

Results revealed that there was a statistically significant difference (<0.05) in mean scores regarding how interested the learners were in the topic of horses in agriculture before and after participating in the online exhibit. It is also important to note that the mean score of interest in the topic of horses in agriculture after the online exhibit was higher than the mean score for interest before participating in the online exhibit.

Table 30: Paired Samples T- Test of Topic Interest Before and After Online Exhibit, $N=28$

Item Pair	Mean Difference	Standard Deviation	t	df	Significance (2-tailed)
How interested were you in the subject of horses in agriculture before you went through the online exhibit? How interested are you in the subject of horses in agriculture now?	.286	.659	2.295	27	0.030*

*significant at the 0.05 level

4.2.1. Formal Group

Results revealed that there was a statistically significant difference (<0.001) in mean scores regarding how interested the learners were in the topic of horses in agriculture before and after participating in the online exhibit. It is also important to note that the mean score of interest in the topic of horses in agriculture after the online exhibit was higher than the mean score for interest before participating in the online exhibit.

Table 31: Paired Samples T- Test of Topic Interest Before and After Online Exhibit, N=28

Item Pair	Mean Difference	Standard Deviation	t	df	Significance (2-tailed)
How interested were you in the subject of horses in agriculture before you went through the online exhibit?	.524	.833	11.936	360	0.000*
How interested are you in the subject of horses in agriculture now?					

*significant at the 0.001 level

Overall, both the informal and formal groups self-reported a significantly higher situational interest in the topic of horses in agriculture after participating in the online exhibit. The formal group reported a larger increase in situational interest after participating in the exhibit than the informal group.

4.3 Hierarchical Linear Regression Analysis

Ordinary Least Squares Regression Analysis was used to test the predictive model developed in this study. Variance in online exhibit situation interest was regressed against independent variables identified from the theoretical perspective. The independent variables were gender, years of prior horse experience, free-choice situational interest, interactivity situational

interest, and adaptability situational interest. Hierarchical regression was used to assess the predictive performance of the three online exhibit characteristics (free-choice, interactivity, and adaptability) while controlling for gender (Model 1) and years of prior horse experience (Model 2). The three independent variables were composite variables developed through item analysis, discussed in chapter 3.

Gender and years of prior horse experience were entered into the regression model using the enter method in SPSS. The three online exhibit characteristic variables were entered into the model using a stepwise entry method. The forward stepwise entry method allowed the researcher to determine the amount of variance explained by each online exhibit characteristic variable in the model. In the stepwise regression procedure, variables are entered into the model according the amount of explained variance. The procedure stops entering variables when no additional variance is explained.

Results showed that the five independent variables included in the model explained about 54 percent of the variance in the dependent variable of situational interest in the Horses in Agriculture online exhibit (Table 30). Specifically with the demographic variables, the variable of gender explained a very small amount of variance

(0.004), and years of horse experience also explained a small amount of variance (0.039). In regards to the online exhibit characteristic variables, free choice situational interest variable explained the highest amount of variance (0.428), followed by the interactivity situational interest variable (0.058) and the adaptability situational interest variable (0.013).

Table 32: Hierarchical Regression Analyses Predicting Online Exhibit Situational Interest

Predictor Variables	Model 1	Model 2	Model 3
	Standardized Coefficients β (Standardized Error)		
Gender	-0.083 (0.647)	-0.074 (0.635)	-0.009 (0.442)
Years of Horse Experience	-	-0.204 (0.207)	-0.149* (0.144)
Free-Choice	-	-	0.527* (0.102)
Interactivity	-	-	0.229* (0.088)
Adaptability	-	-	0.127* (0.041)
R ₂	0.007	0.049	0.538
Adjusted R ²	0.004	0.043	0.542
ΔR_2	0.007	0.042	0.489
ΔF	2.491	6.571	15.976

*Significant at $p < 0.001$ level

5. DISCUSSION AND CONCLUSION

5.1 Discussion

This chapter will discuss all of the findings of the design, development, and evaluation of the Horses in Agriculture online exhibit in the context of the research questions that guided both this instructional design process and study. This chapter will also address limitations, implications, suggested revisions, and overall conclusions of this instructional design process and study.

5.1.1. Research Question 1

The first research question in this study is:

1. What are the goals of the proposed online museum exhibit? Specifically:
 - a. What are the goals of the museum?
 - b. Who is the audience?
 - c. What are the needs of the audience?

This question was addressed in Chapter 3 during steps 1. Assess Needs to Identify

Goal(s); 2. Conduct Instructional Analysis; 3. Analyze Learners and Contexts (Dick & Carey, 2015). This process was completed using interviews with subject matter experts, online survey questionnaire with educators, and an online survey questionnaire with the general public of Kentucky Horse Park patrons.

Interviews with subject matter experts yielded specific goals of an online educational presence as well as involvement and possible collaboration with academia. The survey data revealed that attitudes amongst educators and Kentucky Horse Park patrons towards online learning were positive and educators indicated interest in integrating online museum exhibit into their own courses. Student interest was indicated by educators to be a priority when designing lessons and an

interest in integrating history with current material related to horse care and management. Educators indicated the most interest in using online exhibit as a supplement, information source, or free-choice learning opportunity for students. The most interest was indicated in video media, followed by pictures, audio, and interactive games/puzzles. The topic areas of interest ranked by overall average in usefulness and interest were: 1. Horses in Agriculture, 2. Horses in Sport, 3. Horses in Recreation, and 4. Horses in Different Cultures.

Therefore, the answer to Research Question 1 was that the goals of the online exhibit were to create an online module which could be used as a learning material that included media and interactivity and would also serve as a connection between the International Museum of the Horse and academia. The audience will be both students in formal education environments as well as informal learners accessing the online exhibit for enjoyment. The audience indicated interest in a free-choice online exhibit about horses in agriculture that included video, picture, and interactive media as. Educators specifically emphasized the importance of student interest and a desire to integrate history material into current management material.

5.1.2. Research Question 2

The second research question in this study was:

2. Does application of a systems approach design process result in an online exhibit effective in engaging situational interest in the audience? Specifically:
 - a. Informal learners
 - b. Formal learners

This question was addressed in chapter 3 and 4 using the online questionnaire survey designed to evaluate the online exhibit and satisfy step 10. Conduct Summative Evaluation. The descriptive data and t-test results suggested that the Horses in Agriculture online exhibit designed using the Dick and Carey's Systems Approach model resulted in situational interest in both the

informal and formal audiences. Descriptive data reported higher frequencies in the self-reported interest level in the topic of horses in agriculture after completing the online exhibit for both groups. The paired T-test analysis reported a significant difference in the mean frequencies of horses in agriculture interest before and after completing the online exhibit in both groups, the formal group at the 0.001 level and the informal group at the 0.05 level.

Therefore, the answer to Research Question 2 is that, yes, according to the descriptive data and paired t-test, the Dick and Carey Systems Approach resulted in an online exhibit that engaged situational interest in both informal and formal audiences.

These findings from each group supported what in literature is discussed traditionally as informal and formal learning groups (Cross, 2011; Vadeboncoeur, 2006). However, what is interesting and provides possible future implications is the ability of the online exhibit to address the situational interest needs of both groups. This brings into the discussion once again the argument against completely different silos of thought in regards to formal and informal education, but rather how the commonalities can be used to bridge the gap between the two and serve both audiences (LaBelle, 1982; Richardson & Wolfe, 2001). While there are obvious requirements and performance objectives in formal environments, there is potentially something to be gained by utilizing certain techniques that are considered informal. Other studies have focused on bridging the gap between informal and formal learning in the current climate of technology and participatory media (Bull et al., 2008; Cook, Pachler, & Bradley, 2008; Dabbagh & Kitsantas, 2012). Conversely, it was a formal instructional design process that was used to design something also intended for informal use, which suggests there might be something to be gained from the crossover of these two constructs.

5.1.3. Research Question 3

The third research question in this study was:

3. Do audience characteristics impact how the online exhibit engages situational interest?

This question was addressed in Chapters 3 and 4 during step 10. Conduct Summative Evaluation and is a further exploration of Research Question 2. While both groups were shown to have a significant difference in the mean frequencies of horses in agriculture interest before and after completing the online exhibit, the formal group did indicate a higher increase in interest after participating in the exhibit than the informal group. Upon further examination of the descriptive data, a possible explanation for the lower increase in interest for the informal group could be due to the fact that this group appeared to have a higher pre-existing interest in the topic of horses in agriculture. This would be characteristic of the informal learner from a theoretical standpoint, as these learners are motivated by intrinsic factors such as interest in a topic or activity (Cross, 2011; Vadeboncoeur, 2006). The descriptive data of the formal group overall did not indicate very much pre-existing interest in horses in agriculture or horses in general. It is also worth mentioning that 82% of the informal group had over five years of experience with horses, while in the formal group 23.4 indicated over five years of experience and 48% indicated no experience. The age range of the informal group was 19-69, while the formal was 17-28. Primary and secondary characteristics were originally intended to be included in a regression analysis of the informal group, but due to a low N in the informal group, this analysis was not performed. The formal group consisted entirely of undergraduate animal science students at Purdue University, and because of this lack of variation, further analysis related to identity was not performed.

However, according to the descriptive data and the t-test analysis, Research Question 3 can be answered with a tentative yes, that this data suggests that audience characteristics potentially

impact how situational interest is engaged by the online exhibit, but further exploration is needed. The area of identity-related characteristics related to motivations in museum learning has been documented and would be a variable to explore more rigorously in online informal environments as well (Falk & Dierking, 2000; Falk, 2006; Falk, Heimlich, & Bronnenkant, 2008; Falk, 2008).

5.1.4. Research Question 4

The final research question in this study was:

4. Do online exhibit characteristics affect how the online exhibit engages situational interest in the audience? Specifically:
 - d. Adaptable
 - e. Free-choice
 - f. Interactivity

This research question was addressed in Chapter 3 and 4 during step 10. Conduct Summative Evaluation. This analysis took the evaluation a step even further into the complexities of how certain intentional characteristics of the online exhibit affect the situational interest of the learners in the online exhibit. An Ordinary Least Squares Regression Analysis was used with the formal group (N=411), as the informal group had a low number of participants (N=35). The resulting model and coefficients revealed that the situational interest variable of free-choice was responsible for the highest amount of variance (0.428) in the self-reported situational interest in the Horses in Agriculture online exhibit, followed by the interactivity situational interest variable (0.058) and the adaptability situational interest variable (0.013). Upon further examination of the descriptive data, the responses for the adaptability items in both groups were conflicting, whereas a respondent would indicate a desire for learning pathways while at the same time indicate an affinity toward linear formats. This contradiction in answers related to situational interest in

adaptable learning pathways of an online module was also found in a smaller study conducted by Lofgren, Brady, and Lewandowski (2016) in an undergraduate horse management course.

Four of the five variables in the final model were shown to be statistically significant predictors of situational interest, explaining 54% of the variance in the dependent variable (Model 3, Table 9). Free-choice situational interest is the most powerful predictor of situational interest, as demonstrated by the relatively high standardized Beta coefficient. The positive sign of the coefficient indicates that higher levels of free-choice are associated with higher levels of situational interest. Interactivity is the second-most important predictor of situational interest. Higher levels of interactivity are associated with higher levels of situational interest. Years of horse experience is the third most powerful predictor in the model. Increasing years of horse experience are associated with lower levels of situational interest. Adaptability is the fourth-most powerful predictor of situational interest. Higher levels of adaptability are associated with higher levels of situational interest. Gender was not a statistically significant predictive variable in the final model.

Therefore, the answer to Research Question 4 is that yes, for this specific online exhibit, the regression model indicated the independent variable of free-choice was responsible for the most variance in situational interest overall, followed distantly by interactivity. Adaptability was responsible for the least amount of variance in situational interest overall.

Previous research into factors influencing situational interest has focused in environments such as undergraduate zoophysiology classroom and German middle school students in computer-based learning environments (Dohn, Madsen, & Malte, 2009; Knogler et al., 2015; Magner et al., 2014;). Magner's (2014) found prior knowledge in a topic was an important moderator in catch situational interest. This study's model supports that finding but not in as powerful of a way, in that years of horse experience was a variable included in the model and explained for $R^2=0.039$ of the variance. However, what is interesting in the case of this research study is that situational interest

and the online exhibit and previous years of horse experience have an inverse relationship in the model, that is, the more years of experience the learner had, the less situational interest in the exhibit there was. Perhaps this is because the pre-existing interest and knowledge was already high, thus not leaving much room for an increase in situational interest.

Mitchell's (1993) study, from which the instrument of this study was derived, explored situational interest in a secondary school mathematics classroom and the regression model for this study accounted for $R^2=0.64$ of the variance. Specifically, the variable of involvement explained the most variance at $R^2=0.23$. Upon closer examination of Mitchell's (1993) original instrument, the items present statements such as "We learn the material ourselves instead of being preached at", "We often do something instead of the teacher just talking", and "We often hear long, long explanations and I quickly lose interest". These statements are reminiscent of ones that may be asked about situational interest in free-choice learning, as free-choice learning is

"what people do when they get to control what they learn, when to learn, where to learn, and with whom to learn" (Falk & Dierking, 2002).

It is crucial to remember that each of these models are specific to the individual context of the learning experience and intervention (Dohn, Madsen, & Malte, 2009; Knogler et al., 2015;). This project and subsequent regression model applies specifically to the Horses in Agriculture online exhibit with the population of undergraduate animal science students.

5.2 Limitations

There are multiple limitations in this analysis that should be considered. Firstly, the major difference between the sizes of the informal group ($N = 35$) and the formal group ($N = 411$) were due to the nature of the necessary dissemination process for each group. Unfortunately, the

dissemination process for the informal group did not result in a higher level of respondents. This also limits the capability of further analysis of the informal group in the next chapter.

Another limitation that serves as a possible explanation for the smaller number of respondents in the informal group was technological failure. Upon the first posting of the informal group's link on Facebook, it was brought to the researcher's attention that some of the respondents were experiencing problems with loading the online exhibit module using certain web browsers. This was resolved immediately with the help of tech support, but this problem continued to arise inconsistently throughout data collection until the module was republished using a newer version of the Articulate Storyline software. It is entirely possible that these technical difficulties cost the data collection many potential respondents if they were unable to access the module.

5.3 Revisions to the Online Exhibit

While the Dick and Carey Systems Approach Model is seemingly linear because of its 10 steps, the process is more cyclical in nature (Dick & Carey, 2006). While the summative evaluation provides information about the instruction after its implementation, it is also used to continue to revise and improve the instruction based on that feedback (Dick & Carey, 2005). Based on the results of this study as previously discussed, there are some revisions that could be made to the Horses in Agriculture Online Exhibit.

5.3.1. Technological Difficulties

While not necessarily a part of the data analysis, this issue was a large limitation to data collection for the informal group. Going forward, a more extensive pilot test and formative evaluation should take place to troubleshoot early on. While a pilot test was conducted with subject matter experts and a student group, further testing on various web browsers was not completed.

This led to major malfunction during data collection in the informal group. The module should also be published on the most recent version of the Articulate Storyline software, as that seemed to solve the issues in the web browser.

5.3.2. Linear Pathway Format

The data analysis revealed that the adaptable learning pathway format was confusing for the learners in both groups and overall not a relevant source of variance in the regression model for the formal group. Previous work done by Lofgren, Brady, and Lewandowski (2016) in a very similar population supports the premise that adaptable learning pathways in online modules are not desirable nor do they have a major influence on the situational interest of the learner. If they cannot first stimulate situational interest of the learner, it does not serve the intended purpose of transitioning into overall attainment of knowledge or understanding. Therefore, the recommendation would be to streamline what adaptable pathways exist within the module into more linear formatting.

5.3.2. Interactivity

The data analysis revealed that while interactivity wasn't largely responsible for variance, it was still well-received by learners even though in the model it explained a low amount of variance. What is important to take into consideration is that the regression model was only used for the formal group, but that descriptively the interactivity variable was well-received by both groups. Further exploration and data collection would be needed to make a more informed decision as to whether or not interactivity should be reduced in the module.

5.3.3. Evaluation Instrument

While the original instrument was valid and reliable, certain additions and omissions may be more beneficial to gathering information about the online exhibit experience going forward. The addition of more interactivity questions would provide more understanding of how the variable of interactivity is stimulating situational interest in the learners. Also, a re-working of new catch and hold interest questions related to certain aspects of the exhibit would be beneficial, although they would have to first be tested for reliability and validity as the original questions used in the pilot scored poorly. The addition of some pre-existing knowledge questions may also be helpful as this has been identified in other studies as discussed earlier.

5.4 Implications

There were multiple implications in this study that can be made from the results observed during the use of the Systems Approach process. The first one, which is relevant from the perspective of the International Museum of the Horse, was the use of this approach in the first place. Specifically, a large take-away from this research was the use of a front-end analysis in the decision-making process of the museum. This was not a technique previously used to the degree in which it was used in this research project, and it could be used for both future online exhibits and in the traditional museum exhibit as well. From a practical standpoint, it allows the museum to make more informed choices about what kind of exhibits should be offered. This has the potential to increase museum traffic because it is informed by the experiences that the museum's desired audience would like to see.

Another result in this study is that the variable of free-choice was unanimously explanatory of the most variance in situational interest in the Horses in Agriculture online exhibit for the formal group. This holds implications for future free-choice educational offerings in formal education

settings. Perhaps this is preliminary quantitative data that support bridging of the gap, as discussed throughout this project, between the informal and formal processes of thought. From a practical point of view, future implications of this study would include more educational resources in a free-choice format for formal learners. Resources such as virtual reality anatomy labs that can be accessed outside of lab time, or modules that include snippets and specific sections of a professor's traditional lecture. Continued research in this specific area of the online exhibit as well as future innovations are necessary to further explore the possibilities of what implementing an informal concept into the formal classroom could do for learners.

What needs further exploration as well is the situational interest of informal learners in this online exhibit which was designed using a formal process. Because the number of participants was so low, analysis was limited. Repeating this study with a new online exhibit and hopefully avoiding technological failure would provide great insight not only into the online exhibit variables such as free-choice, but also identity-related characteristics of these learners. Ultimately, this could also lead to informal learning environments, such as zoos or museums, using formal instructional design methodologies perhaps not previously used when designing educational material.

Overall, the implementation of an instructional design strategy such as the systems approach has the potential to be useful in a variety of contexts. While the Dick and Carey Systems Approach is tedious and time-consuming, it does provide a framework for goal-oriented instructional design and encourages systems thinking in educational innovation. The spirit of Systems Thinking is alive and well in this approach, and it gives immediate direction to any context in an instructional design process. Even if this approach were to be adapted and not done to the extent of this research, the result would still be positively influenced as long as the goals, objectives, and assessments were clear and aligned. In the case of this museum, the front-end analysis was the

most influential in the content selection and design of the online exhibit. Perhaps the most prominent implication of this research is an adapted Systems Approach model for informal learning environments. This kind of operationalization of the Systems Approach could provide a best practices guideline to educators in informal environments in more brevity, but also help them meet their needs and the needs of their stakeholders.

5.5 Conclusion

The use of the Dick and Carey Systems Approach Model of Instructional Design made it possible to simultaneously design, develop, and evaluate of the Horses in Agriculture online exhibit and also answer the following research questions:

1. What are the goals of the proposed online museum exhibit? Specifically:
 - a. What are the goals of the museum?
 - b. Who is the audience?
 - c. What are the needs of the audience?
2. Does application of a systems approach design process result in an online exhibit effective in engaging situational interest in the audience? Specifically...
 - f. Informal
 - g. Formal
3. Do audience characteristics impact how the online exhibit engages situational interest?
4. Do online exhibit characteristics affect how the online exhibit engages situational interest in the audience? Specifically:
 - h. Adaptability
 - i. Free-choice
 - j. Interactivity

The use of the Dick and Carey Systems Approach Model of Instructional Design resulted in an online exhibit about Horses in Agriculture. This exhibit was intentionally designed, using specific online exhibit characteristic variables, to stimulate situational interest in both formal and informal learning environments and evaluated using a modified, validated situational interest survey instrument. The results indicated situational interest in both informal and formal groups and the variables of previous years of horse experience, free-choice, interactivity, and adaptability were identified as predictors of situational interest in the online exhibit of the formal group. Specifically, the variable of free-choice learning was responsible for over 40% of the explained variance in situational interest in the formal group, which provides implications of future research in the integration of free-choice opportunities in the formal education domain.

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APPENDIX A. SURVEYS

Front-End Analysis Survey

In conjunction with the International Museum of the Horse, we are building an online museum exhibit that will be freely accessible to the general public. Please answer the following questions that will help us in designing the exhibit to fit the needs of our stakeholders.

1. Please indicate your memberships/occupations. Select all that apply.
 - a. National Association of Equine Affiliated Academics
 - b. American Youth Horse Council
 - c. HorseQuest
 - d. 4-H Volunteer
 - e. USPC Volunteer
 - f. International Museum of the Horse/Kentucky Horse Park Patron
 - g. Equine Science Society
 - h. North American Colleges and Teachers of Agriculture
 - i. High School History/Social Studies Teacher
 - j. High School Science Teacher
 - k. High School Agriculture Teacher
2. How many years of horse experience do you have?

3. How familiar are you with the International Museum of the Horse?
 - a. Very familiar
 - b. Somewhat familiar

- c. Not very familiar
 - d. Not familiar at all
4. Have you ever visited the International Museum of the Horse?
- a. No
 - b. Once
 - c. More than once
5. If you have visited the International Museum of the Horse, how would you describe your experience?
-
6. If you have visited the International Museum of the Horse, why did you visit?
- a. I was already at the Kentucky Horse Park and thought I would check it out
 - b. I brought a class/group of youth for a field trip
 - c. I was interested in visiting the museum specifically for my own enjoyment
 - d. Other: _____

Instructional Portion

7. How would you describe your teaching style? (Select all that apply?)
- a. I prefer to utilize a traditional lecture format
 - b. I prefer to facilitate activities and interactions with others
 - c. I prefer to assign online readings and assignments so class time can be used for discussion
8. What is your attitude on the usefulness of online learning in a course?
- a. Very Useful
 - b. Useful

- c. Fairly Useful
- d. Not Useful

Please indicate your level of agreement with the following statements:

9. Having teaching material available online is helpful to me.
- a. Strongly Agree
 - b. Agree
 - c. Slightly Agree
 - d. Slightly Disagree
 - e. Disagree
 - f. Strongly disagree
10. I would trust the validity of the educational material provided by the International Museum of the Horse.
- a. Strongly Agree
 - b. Agree
 - c. Slightly Agree
 - d. Slightly Disagree
 - e. Disagree
 - f. Strongly disagree
11. Please explain your answer for question #10 below:
-
12. I would trust the validity of the educational material provided by Purdue University.
- a. Strongly Agree
 - b. Agree

- c. Slightly Agree
- d. Slightly Disagree
- e. Disagree
- f. Strongly disagree

13. Please explain your answer for question #12 below:

14. I would be the most interested in integrating historical material into my lessons/instruction.

- a. Strongly Agree
- b. Agree
- c. Slightly Agree
- d. Slightly Disagree
- e. Disagree
- f. Strongly disagree

15. Please explain your answer for question #14 below:

16. What influences are present in making your curricular decisions? Select all that apply. a.

Student interest

- b. Alignment with necessary curriculum
- c. State academic standards
- d. Other: _____

Please rate the following topics based on your **interest** if they were to be covered in the online exhibit.

17. Prehistoric Origins of Horses

Not Interested ___ ___ ___ ___ ___ ___ ___ ___ Very Interested

18. Horses in our Language

Not Interested ___ ___ ___ ___ ___ ___ ___ ___ Very Interested

19. Horses in Literature

Not Interested ___ ___ ___ ___ ___ ___ ___ ___ Very Interested

20. Horses in Religion

Not Interested ___ ___ ___ ___ ___ ___ ___ ___ Very Interested

21. Horses in War

Not Interested ___ ___ ___ ___ ___ ___ ___ ___ Very Interested

22. Horses in Entertainment

Not Interested ___ ___ ___ ___ ___ ___ ___ ___ Very Interested

23. Horses in Agriculture

Not Interested ___ ___ ___ ___ ___ ___ ___ ___ Very Interested

24. Horses in Different Cultures

Not Interested ___ ___ ___ ___ ___ ___ ___ ___ Very Interested

25. Horses in Pop Culture

Not Interested ___ ___ ___ ___ ___ ___ ___ ___ Very Interested

26. Horses in Sport

Not Interested ___ ___ ___ ___ ___ ___ ___ ___ Very Interested

27. Horses in Recreation

Not Interested ___ ___ ___ ___ ___ ___ ___ ___ Very Interested

28. If there is a topic of interest not listed, please indicate it here:

39. Horses in Recreation

Not Useful _____ Very Useful

40. If there is a topic of interest not listed, please indicate it here:

41. How would you use the online museum exhibit?

- a. To entertain my own interest
- b. As a supplement for a topic covered in an educational lesson/instruction
- c. As a complete section of an educational lesson/instruction
- d. As a reference for information while creating my own lesson/instruction

Please rank the following forms of media based on **importance** within the online exhibit.

42. Pictures

Not Important _____ Very Important

43. Videos

Not Important _____ Very Important

44. Audio

Not Important _____ Very Important

45. Interactive puzzles/games

Not Important _____ Very Important

46. How would you prefer to use the material within the online museum exhibit?

- a. To teach specific information directly from the exhibit (ex. history of horse domestication)
- b. To encourage critical thinking by making connections between the past and present (comparisons of past management practices to current day practices)

- c. To provide interesting, engaging “fun facts” to transition into different topic areas
(using an interesting story from history to begin a lesson on hoof care)
- d. A free-choice option for learners to explore on their own time

Online Exhibit Situational Interest Survey

Online Museum Exhibit and IMH Questions

1. How familiar are you with the International Museum of the Horse?
 - a. Very familiar
 - b. Somewhat familiar
 - c. Not very familiar
 - d. Not familiar at all

2. Have you ever visited the International Museum of the Horse?
 - a. No
 - b. Once
 - c. More than once

3. If you have visited the International Museum of the Horse, how would you describe your experience?

4. If you have visited the International Museum of the Horse, why did you visit?
 - a. I was already at the Kentucky Horse Park and thought I would check it out
 - b. I brought a class/group of youth for a field trip
 - c. I was interested in visiting the museum specifically for my own enjoyment
 - d. Other: _____

5. How interested were you in the subject of horses and their role in agriculture before you went through the online exhibit?
- Very interested
 - Interested
 - Fairly interested
 - Neither interested nor uninterested
 - Fairly uninterested
 - Uninterested
 - Very Uninterested
6. How interested were you in the subject of horses and their role in agriculture now? a. Very interested
- Interested
 - Fairly interested
 - Neither interested nor uninterested
 - Fairly uninterested
 - Uninterested
 - Very Uninterested
7. How confident are you in your prior knowledge of horses in agriculture?
- Very Confident
 - Confident
 - Fairly Confident
 - Neither Confident nor Unconfident
 - Fairly Unconfident
 - Unconfident

- g. Very unconfident
8. How confident are you in your knowledge of horses in agriculture now?
- a. Very Confident
 - b. Confident
 - c. Fairly Confident
 - d. Neither Confident nor Unconfident
 - e. Fairly Unconfident
 - f. Unconfident
 - g. Very unconfident

Demographic Questions

9. How would you describe yourself primarily?
- a. I am an educator looking for resources to use
 - b. I am a student using this for a course
 - c. I am a horse enthusiast
 - d. I work in the horse industry
 - e. I am interested in working in the horse industry
 - f. I have no prior knowledge about horses, but I was curious
 - g. I have no prior knowledge about horses, but I am interested in museums
 - h. I have no prior knowledge about horses, but I am interested in agriculture
 - i. I am interested in history
 - j. Other: _____
10. How would you describe yourself primarily?
- a. I am an educator looking for resources to use

- b. I am a student using this for a course
- c. I am a horse enthusiast
- d. I work in the horse industry
- e. I am interested in working in the horse industry
- f. I have no prior knowledge about horses, but I was curious
- g. I have no prior knowledge about horses, but I am interested in museums
- h. I have no prior knowledge about horses, but I am interested in agriculture
- i. I am interested in history
- j. Other: _____

11. How many years of prior horse experience do you have?

- a. None
- b. One year or less
- c. 2 to 5 years
- d. Over 5 years

12. Do you own a horse?

- a. Yes
- b. No

13. What is your gender?

- a. Female
- b. Male
- c. Other

14. What is your age?

15. Do you reside in the United States?

- a. Yes
- b. No

i. If no, then what country in which do you reside? _____ 16.

What state do you live in? _____

Interest Questions

For the following statements, please indicate your level of agreement.

17. The topic of horses is enjoyable to me.

- a. Strongly agree
- b. Agree
- c. Slightly agree
- d. Neither agree nor disagree
- e. Slightly disagree
- f. Disagree
- g. Strongly disagree

18. The topic of horses is exciting to me.

- a. Strongly agree
- b. Agree
- c. Slightly agree
- d. Neither agree nor disagree
- e. Slightly disagree
- f. Disagree

g. Strongly disagree

19. The topic of horses is important to me.

a. Strongly agree

b. Agree

c. Slightly agree

d. Neither agree nor disagree

e. Slightly disagree

f. Disagree

g. Strongly disagree

20. The topic of agriculture is enjoyable to me.

a. Strongly agree

b. Agree

c. Slightly agree

d. Neither agree nor disagree

e. Slightly disagree

f. Disagree

g. Strongly disagree

21. The topic of agriculture is exciting to me.

a. Strongly agree

b. Agree

c. Slightly agree

d. Neither agree nor disagree

e. Slightly disagree

- f. Disagree
- g. Strongly disagree

22. The topic of agriculture is important to me.

- a. Strongly agree
- b. Agree
- c. Slightly agree
- d. Neither agree nor disagree
- e. Slightly disagree
- f. Disagree
- g. Strongly disagree

23. The topic of horses is important to me.

- a. Strongly agree
- b. Agree
- c. Slightly agree
- d. Neither agree nor disagree
- e. Slightly disagree
- f. Disagree
- g. Strongly disagree

24. The Horses in Agriculture online museum exhibit was fun.

- a. Strongly agree
- b. Agree
- c. Slightly agree
- d. Neither agree nor disagree

- e. Slightly disagree
- f. Disagree
- g. Strongly disagree

25. I could see myself going back to the Horses in Agriculture online museum exhibit.

- a. Strongly agree
- b. Agree
- c. Slightly agree
- d. Neither agree nor disagree
- e. Slightly disagree
- f. Disagree
- g. Strongly disagree

26. The Horse in Agriculture online museum exhibit is dull.

- a. Strongly agree
- b. Agree
- c. Slightly agree
- d. Neither agree nor disagree
- e. Slightly disagree
- f. Disagree
- g. Strongly disagree

27. The Horses in Agriculture Online Museum exhibit is a valuable resource.

- a. Strongly agree
- b. Agree
- c. Slightly agree

- d. Neither agree nor disagree
- e. Slightly disagree
- f. Disagree
- g. Strongly disagree

28. Because of this online museum exhibit, I am more interested in horses.

- a. Strongly agree
- b. Agree
- c. Slightly agree
- d. Neither agree nor disagree
- e. Slightly disagree
- f. Disagree
- g. Strongly disagree

29. I didn't find anything interesting about the history of horses in agriculture.

- a. Strongly agree
- b. Agree
- c. Slightly agree
- d. Neither agree nor disagree
- e. Slightly disagree
- f. Disagree
- g. Strongly disagree

30. Because of this online museum exhibit, I would be interested in seeing what other online museum exhibits have to offer.

- a. Strongly agree

- b. Agree
- c. Slightly agree

31. I see the concepts I learned in the online museum exhibit as important.

- a. Strongly agree
- b. Agree
- c. Slightly agree
- d. Neither agree nor disagree
- e. Slightly disagree
- f. Disagree
- g. Strongly disagree

32. I will never use the information from this online exhibit again in my life.

- a. Strongly agree
- b. Agree
- c. Slightly agree
- d. Neither agree nor disagree
- e. Slightly disagree
- f. Disagree
- g. Strongly disagree

33. Having this material available online is helpful to me.

- a. Strongly agree
- b. Agree
- c. Slightly agree
- d. Neither agree nor disagree

- e. Slightly disagree
- f. Disagree
- g. Strongly disagree

47. I enjoy the exhibit being online because I can access it anytime and from anywhere.

- a. Strongly agree
- b. Agree
- c. Slightly agree
- d. Neither agree nor disagree
- e. Slightly disagree
- f. Disagree
- g. Strongly disagree

48. I enjoy working on computers more than in a book.

- a. Strongly agree
- b. Agree
- c. Slightly agree
- d. Neither agree nor disagree
- e. Slightly disagree
- f. Disagree
- f. Strongly disagree

49. Using a computer for learning is fun.

- a. Strongly agree
- b. Agree
- c. Slightly agree

- d. Neither agree nor disagree
- e. Slightly disagree
- f. Disagree
- g. Strongly disagree

50. When learning online, I like having a choice in what order I progress through the material.

- a. Strongly agree
- b. Agree
- c. Slightly agree
- d. Neither agree nor disagree
- e. Slightly disagree
- f. Disagree
- g. Strongly disagree

51. When learning online, I like the material to be straight forward and to tell me what I should learn first.

- a. Strongly agree
- b. Agree
- c. Slightly agree
- d. Neither agree nor disagree
- e. Slightly disagree
- f. Disagree
- g. Strongly disagree

52. Having different options in the online museum exhibit is confusing.

- a. Strongly agree

- b. Agree
- c. Slightly agree
- d. Neither agree nor disagree
- e. Slightly disagree
- f. Disagree
- g. Strongly disagree

53. I like having different options within the online museum exhibit.

- a. Strongly agree
- b. Agree
- c. Slightly agree
- d. Neither agree nor disagree
- e. Slightly disagree
- f. Disagree
- g. Strongly disagree

54. Having different options in the online museum exhibit makes the material more interesting.

- a. Strongly agree
- b. Agree
- c. Slightly agree
- d. Neither agree nor disagree
- e. Slightly disagree
- f. Disagree
- g. Strongly disagree

55. The interactivity and videos within the online museum exhibit caught my attention.

- a. Strongly agree
- b. Agree
- c. Slightly agree
- d. Neither agree nor disagree
- e. Slightly disagree
- f. Disagree
- g. Strongly disagree

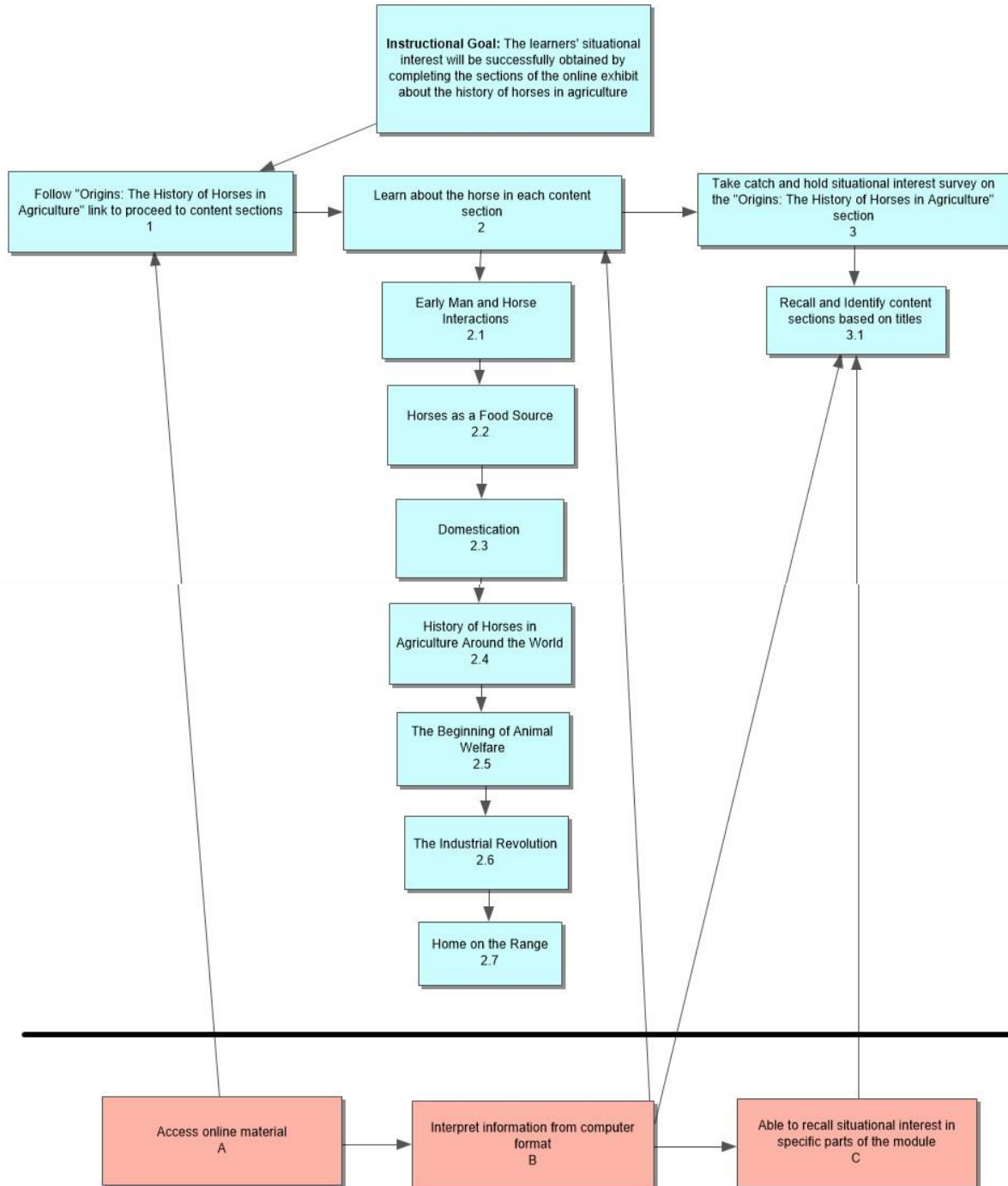
56. The interactivity and videos within the online museum exhibit held my attention longer than text and a picture.

- a. Strongly agree
- b. Agree
- c. Slightly agree
- d. Neither agree nor disagree
- e. Slightly disagree
- f. Disagree
- g. Strongly disagree

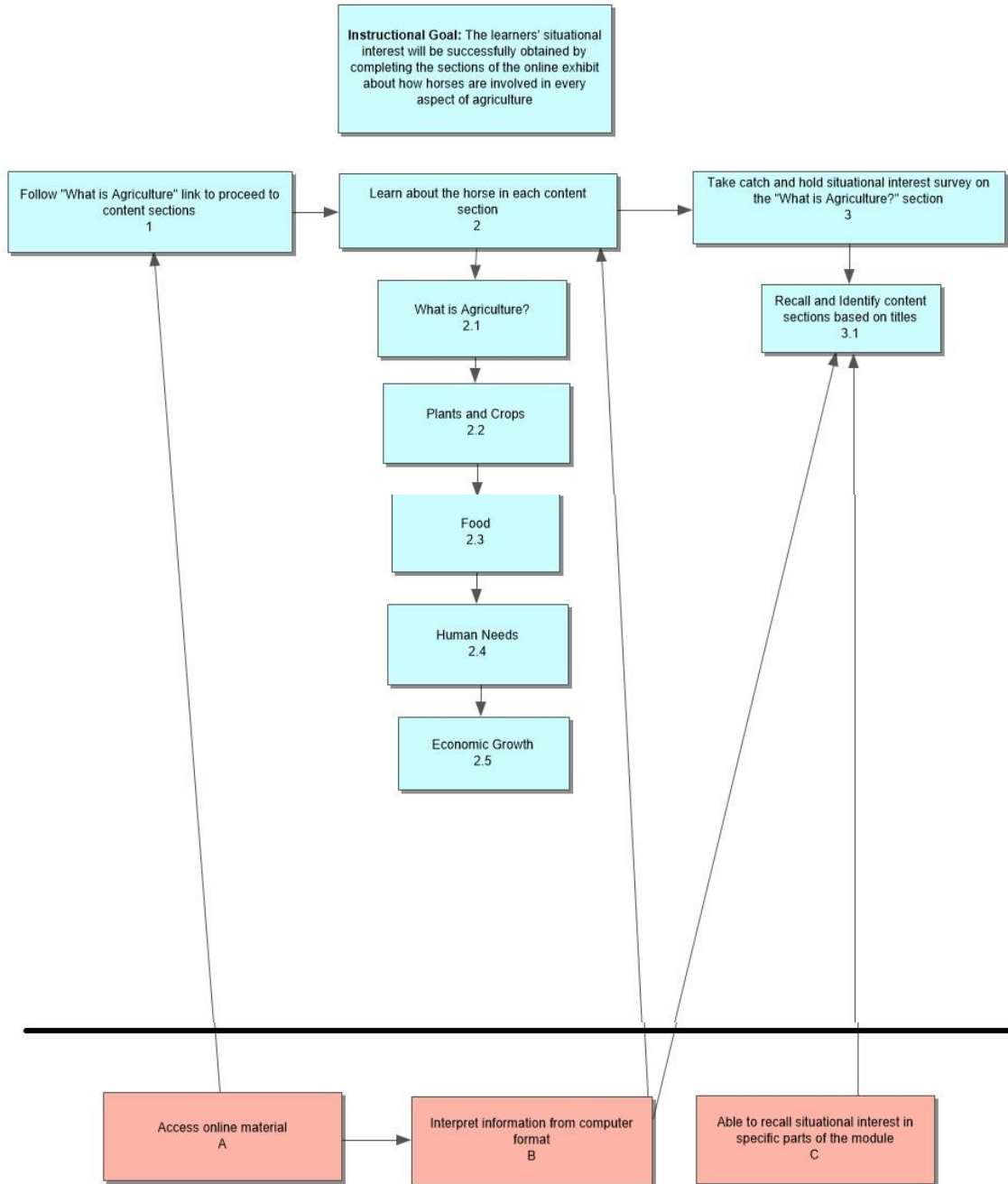
APPENDIX B. FORMS

Goal Task Analysis Flow Charts

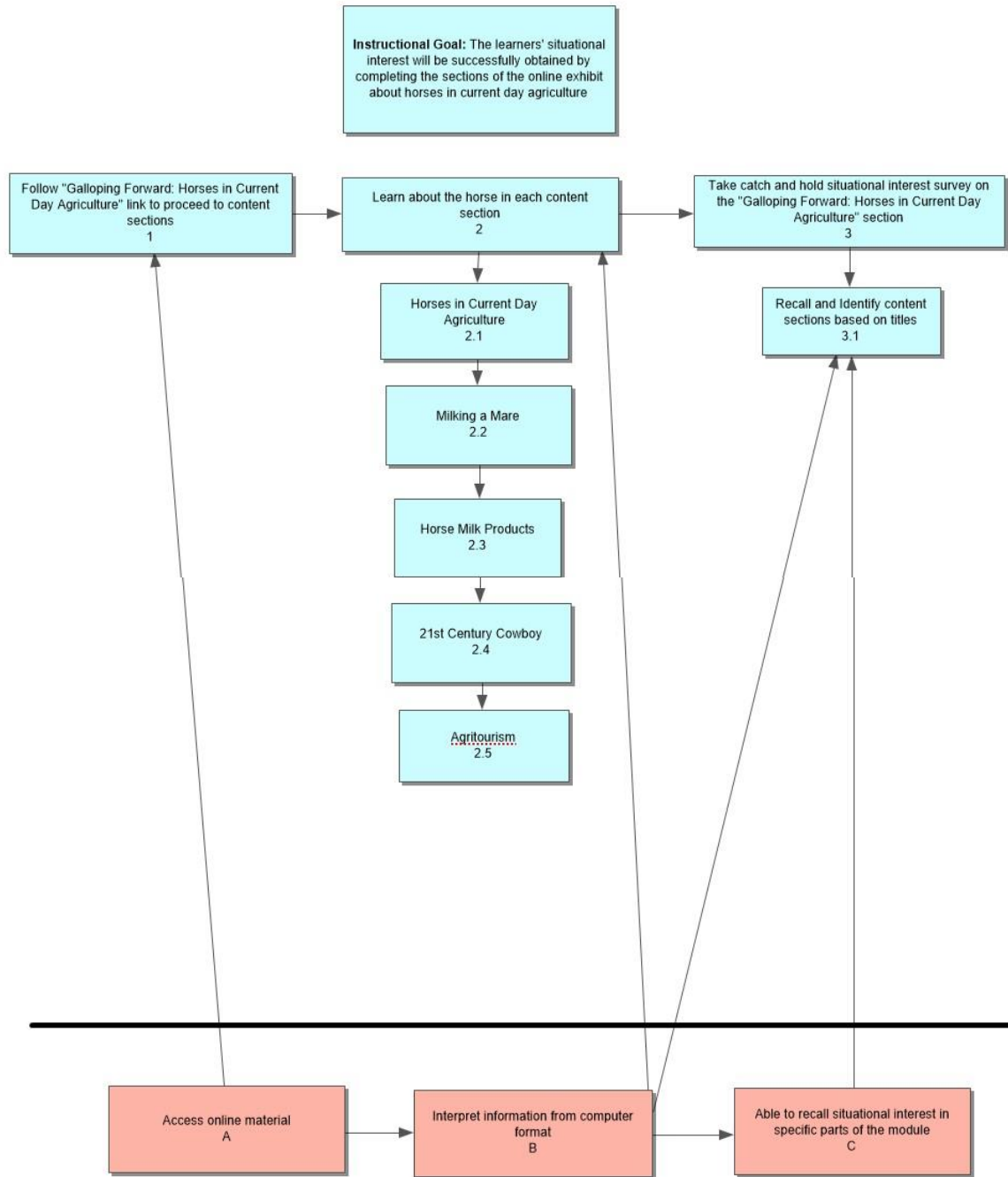
Subordinate and Entry Skills
Type of Skill: Intellectual



Type of Skill: Intellectual



Type of Skill: Intellectual



VITA

Elise A. Lofgren

elofgren@purdue.edu

OBJECTIVE

To obtain a position at the intersection of technology, instructional design, and agriculture. I am pursuing a career where my leadership skills, instructional design experience, and variety of educational experiences can help others to achieve their goals. I am passionate about developing, designing, and implementing creative and engaging learning experiences for specific audiences within the context of equine and animal science, as well as other subject areas within agriculture.

EDUCATION

Purdue University; West Lafayette, IN

Doctoral Candidate; *Youth Development and Agricultural Education*; Present

Murray State University; Murray, KY

Masters of Science in Agriculture; *Animal/Equine Science*; May 2014

Bachelor of Science in Agriculture; *Animal/Equine Science*; May 2012

WORK EXPERIENCE

Purdue University | *Instructional Designer for Dr. Natalie Carroll*; August 2017 –

Present

- Working closely with the instructor to update and streamline courses
- Adapting existing courses to an online or hybrid format
- Creating assessment materials
- **Extension Horses, Inc.** | *Project Manager*; January 2015 – Present
- Providing support to other team members in the development of new educational materials
- Building new online educational material, such as infographics and online modules
- Managing various on-going programs, grants, and projects
- Contributing to and managing the website
- Updating and troubleshooting existing courses and educational webpages

Purdue University; West Lafayette, IN | *Graduate Teaching Assistant*; August 2014 –

Present

- Teaching Assistant in animal science courses taught by Dr. Colleen Brady
- Assisting in online teaching tool innovations
- Assisting in developing new online courses
- Assisting YDAE department with transitioning existing courses to an online format
- **Jubilee Stables**; Mulberry, IN | *Riding Instructor, Website Designer and Manager*; August 2015 – Present
- Teaching horseback riding lessons
- Coaching clients at horse shows and other events

- Managing and updating the Jubilee Stables webpage and social media outlets
Ivy Tech Community College; Lafayette, IN | *Adjunct Instructor*, February 2015 – May 2015
- Teaching Animal Science and Animal Nutrition courses
Murray State University; Murray, KY | *Graduate Teaching Assistant*, August 2012 – August 2014
- Instructor in Basic Horsemanship classes, including lecture portions
- Coach of the Murray State University Dressage Club
- Assistant to Dr. Shea Porr in equine science courses
- Assisted in facilitating an equine welfare course with William Dewees, DVM

ACTIVITIES

Purdue University

- 4-H Academy Horse Workshop Speaker and Facilitator, June 2015, June 2016, June 2017
- Graduate School Social Media Ambassador, 2014-2016
- Graduate Student Representative, Youth Development and Agricultural Education, August 2015 – August 2017
- Videographer, Purdue Horse Extension Horse Health Workshops, January 2015
- Session Instructor, Horse Judging and Hippology Camp, February 2015, February 2016, February 2017 □ Invited Speaker, Mentoring at Purdue (MAP) Program, “What Does Mentoring Mean to Me?”, January 2015
- Invited Speaker, Marion County 4-H Club, “How Aware Are You? A Look into the Five Freedoms through the Eyes of your Equine Sidekick”, April 2017
- Invited Speaker, Mentoring at Purdue (MAP) Summer Scholars Program Graduate Student Panel, June 2017
- Invited Speaker, Mentoring at Purdue (MAP) Program, “Mentoring Best Practices”, November 2017

Indiana Veteran’s Home

- Health Records Computer Peer Training Module Designer, November 2015

Little Egypt Dressage Association

- Board Member, 2015 – Present

Technical Large Animal Emergency Rescue Training

- Certified and Participated in Awareness Level Training Course, 2014 **Murray State**

University Horseman’s Club

- President; 2010 – 2012
- Fundraising Chair; 2009 – 2010

Murray State University Dressage Club

- Coach; 2011-2014
- Founder and President; 2011 – 2012

HONORS AND AWARDS

North American Colleges and Teachers of Agriculture Graduate Student Teaching Award

- Award Recipient, 2018

Bilsland Dissertation Fellowship Award at Purdue University

- Award Recipient, Fall 2017

Agricultural Research at Purdue University

- Agricultural Research Spotlight, March 2017

18th Annual Celebration of Graduate Teaching Excellence

- Teaching Academy Graduate Teaching Award Recipient, 2016

24th Symposium of the Equine Science Society Graduate Student

Competition

- First Place Award in the Teaching and Extension Section, 2015

Community Foundation of Greater Lafayette

- Recipient of the Dorothy and Harlan Parr Memorial Scholarship, 2015 and 2016

Technical Large Animal Emergency Rescue Training

- Certified and Participated in Awareness Level Training Course, 2014 **Murray State University Horseman's Club**

- Outstanding Horseman's Club Member; 2010 and 2012

Murray State University Dressage Club

- Most Improved Student Organization at Murray State University, 2014
- Outstanding Dressage Club Member; 2012

JOURNAL PUBLICATIONS

Allen, E. C., Lofgren, E. A., & Brady, C. M. (2018). Using Digital Storytelling to Assess Outcomes in a StudyAbroad Course. *NACTA Journal*, (in press).

Horse
37, 58-62.

Lofgren, E. A., Voigt, M. A., & Brady, C. M. (2016). Information-Seeking Behavior of the Competition Industry: A Demographic Study. *Journal of Equine Veterinary Science*,

Effect of
59(3).

Lofgren, E.A., A.M. Shultz, & C.A. Porr. (2015). Social Media and Equine Science: The Effect of LinkedIn on In-Class Engagement of Equine Higher Education Students. *NACTA Journal*,

ORAL PRESENTATIONS

Analysis of
Forum.
Wagga,
AU.

Lofgren, E.A., Allen, E.A., and Brady, C.M. (2017). Opinion by Discipline: A Content Attitudes and Perceptions regarding Equine Training Techniques in an Online Discussion Proceedings of the International Society for Equitation Science Conference in Wagga

Discipline

Lofgren, E.A., Tucker, M. A., Rice, B., Voigt, M. A., & Brady, C. M. (2017). Does Matter? An Analysis of Equine Welfare Perceptions and Beliefs in the Context of Horse Show Participation. Submitted to the 25th Symposium of the Equine Science Society in Minneapolis, MN.

Five
MN.

Rice, B., Lofgren, E.A., Tucker, M. A., Voigt, M.A. & Brady, C.M. (2017). Demographic Characteristics Influencing Perceptions of the Equine Welfare through the Lens of the Freedoms. Submitted to the 25th Symposium of the Equine Science Society in Minneapolis,

Allen, E. C., Lofgren, E. A., & Brady, C. M. (2017). Using Digital Storytelling to Assess Outcomes in a Study Abroad Course. Submitted to the North American Colleges and Teachers of Agriculture Conference, Purdue University, West Lafayette, IN.

Horse Lofgren, E. A., Voigt, M. A., & Brady, C. M. (2015). Information-Seeking Behavior of the
Equine Competition Industry: A Demographic Study. Proceedings of the 24th Symposium of the
Science Society in St. Pete Beach, FL.

Lofgren, E.A., A.M. Shultz, & C.A. Porr. (2014). Social Media and Equine Science: The Effect of LinkedIn on In-Class Engagement of Equine Higher Education Students. Proceedings of the North American Colleges and Teachers of Agriculture Conference in Bozeman, MT.

POSTER PRESENTATIONS

Effect of Lofgren, E.A., A.M. Shultz, & C.A. Porr. (2014). Social Media and Equine Science: The
the LinkedIn on In-Class Engagement of Equine Higher Education Students. Proceedings of
the National Association of Equine Affiliated Academics Conference in Louisville, KY.

in an Lofgren, E.A., Brady, C.M., & Lewandowski, J. (2016). Factors Impacting Student Interest
Equitation Online Module on Equine Learning Theory. Proceedings of the International Society for
Science Conference in Saumur, FR.

in an Lofgren, E.A., Brady, C.M., & Lewandowski, J. (2016). Factors Impacting Student Interest
Teachers of Equine Science Learning Module. Proceedings of the North American Colleges and
Agriculture Conference in Honolulu, HI.

Designing, Lofgren, E.A., Brady, C.M., & Lewandowski, J. (2016). Horses in Agriculture Online:
Methodology. Developing, and Evaluating an Online Museum Exhibit Using Instructional Design
Technology Conference in Proceedings of the Association for Educational Communication and
Las Vegas, NV. 43