

Which Instructional Design Models are Educators Using to Design Virtual World Instruction?

Victor J. Soto

Professor and Director
Music Department
Mountain View College
Dallas, TX 75211 USA
vsoto@dcccd.edu

Abstract

The purpose of this study was to identify which instructional design (ID) models are currently used in designing virtual world instruction and why. The goal was to identify specific ID elements being used to develop virtual world instruction that enable effective utilization of the technology to support desired learning experiences for students. A review of the literature revealed that there was limited current research about how ID models are being used to develop instruction in virtual world environments. Although previous research studies have focused on understanding how existing ID models are suitable for designing and developing web-based instruction, research was not found that explains how ID models are being used to develop instruction in virtual world environments. Through the study, it was discovered that analysis, design, development, implementation, and evaluation (ADDIE) was the most commonly used process for the design of virtual world instruction. It was also deemed the most appropriate since ADDIE summarizes five phases of an ID process. Essential ID elements were also generated to design and develop virtual world instruction.

Keywords: virtual world, 3D multi-user virtual environment (3D MUVE), instructional design, ADDIE model

Introduction

Virtual worlds offer one of the most robust learning environments for complex text, graphical, and voice-based social interactions and experiences; yet, despite their potential contribution to the field of education, this area remains comparatively underresearched ([Braman, Jinman, & Trajkovski, 2007](#)). A virtual world is a computer-simulated environment that offers a three-dimensional (3D) graphical representation of a physical environment in which users can interact with one another and manipulate the environment by modifying or creating objects ([Dickey, 2005](#); [Minocha & Roberts, 2008](#)). A variety of virtual worlds have been developed in recent years, the most prevalent of which include [Second Life](#), [OpenSim](#), [Active Worlds](#), and [Twinty](#) – with Second Life being the most popular platform, in use by "hundreds of leading universities and school systems around the world" ([Linden Research, 2010](#), para. 1). Virtual worlds offer opportunities for more engaging learning experiences and interactions that cannot be easily experienced through other teaching platforms ([Anderson, Hristov, & Karimi, 2008](#)). An important question is how traditional instructional design (ID) models can be appropriated to provide guidance for the design of instruction in virtual world environments.

According to Chen (2010), traditional ID models offer no precise guidance for the process of designing instruction in virtual world environments. Traditional models tend to be process oriented, static, and linear, and do not meet user expectations in virtual world environments ([Dawley, 2007](#)). Some instructional designers have taken constructivist approaches to guide the design and development of virtual world activities that enable effective utilization of virtual worlds' capabilities to support desired learning experiences for students; yet, literature that describes how existing ID is being used to develop instruction in virtual world environments remains scarce ([Atkinson, 2009](#)). The study reported in this paper explored how existing ID models are being used to develop instruction in virtual world environments. In education, virtual worlds provide unique learning opportunities, such as accurate/real contexts and activities for

experiential learning, simulation, modeling of complex scenarios, social interaction, and opportunities for collaboration and cooperative learning that may not be experienced in other learning modalities ([Atkinson, 2009](#)). Virtual worlds can provide educational settings with unique features, so interest has been growing in regard to how students experience learning in these environments. Although literature on current ID theories and models describes how such ID models are used to develop instruction in traditional and web-based environments, it overlooks the ways in which ID models are being used to develop instruction in virtual world environments.

Literature Review

Effective online learning is dependent upon the principles of instructional design and development. The design of web-based instruction must take into account cognitive processing of information, learning tasks, the learner, and an instructional tool (Cassarino, 2003). Traditional ID methodologies often come up short when applied to contemporary online instruction. In addition, most of the traditional ID theories and ID models are based on outdated approaches to teaching and learning. According to [Irlbeck, Kays, Jones, and Sims \(2006\)](#), "instructional design models do not often appear to take a multidisciplinary approach to design, thereby omitting the most effective and innovative options for successful and creative online distance education environments" (p. 171). To support learning, the design of the online learning environment requires a shift in focus from content-delivery to a task-based instructional approach with opportunities for reflection and collaboration ([Salter, Richards, & Carey, 2004](#)).

Research indicates that the fundamental principles of ID are based on the educational paradigms of the era in which they were created ([Gustafson & Branch, 2002](#)). Thus, ID models developed several decades ago may be incompatible with current perspectives about developing instruction for online environments, especially with the growth of new technologies, such as 3D virtual world environments. Although no specific model for developing instruction in virtual world environments has become standard, many designers seem to use elements of the existing ID models to help them meet users' expectations in such environments (Chen, 2010). One of the most widely used ID models for online instruction is the Analysis, Design, Development, Implementation, and Evaluation (ADDIE) model ([Allen, 2006](#); [Fresen, 2007](#)). Although the ADDIE process is still used as a foundation model for many instructional designers, researchers have suggested modifications to meet the changing needs of the online educational environment including the virtual classroom ([Fresen, 2007](#); Kapp & O'Driscoll, 2010; [Irlbeck et al., 2006](#); [Wang & Hsu, 2009](#)).

However, some instructional designers suggest that the traditional models (e.g., Morrison, Ross, & Kemp, 2004; Dick, Carey, & Carey, 2009) and the ADDIE process tend to be too process-oriented, static, and linear, and fail to meet user expectations in virtual world environments ([Atkinson, 2009](#); [Chen, Toh, & Wan, 2004](#); [Dawley, 2007](#); [Hodge & Collins, 2010](#)). As Dawley argues, traditional ID models have potential shortcomings when applied to the development of virtual world environments. Most traditional ID models are criticized for their resistance to change, their narrow fit, and their unchanging scenarios. Additionally, traditional ID models tend to be process- as opposed to people-oriented, and fail to take advantage of new information technologies or shift toward a conceptual and knowledge-based society. A different approach to ID is needed to guide the development of learning activities that engage learners to cooperate, discuss, and reflect upon their learning within a virtual world environment.

Yet, virtual world and other 3D virtual learning environments have been in use in education for more than a decade, often without the implementation of a needs assessment or other phases of the instructional systems design process, such as evaluation. Virtual world ID should be based on the fundamental principles of effective ID that are aligned with and built using clear pedagogical practices that specify the connection between what is learned and the conditions in which learning occurs in a virtual simulated environment.

In devising the present study, the researcher had two goals in mind: First, to gain an understanding of the ID models in use by educators for the design of virtual world instruction, and second, to ascertain which of the ID elements being used enable the capabilities of virtual worlds to be leveraged in effective ways to support the learning experiences of students.

Method

A quantitative, descriptive survey approach was adopted for the study, which included a cross-sectional survey questionnaire aimed at investigating why existing traditional ID models are used and why some seem inappropriate for virtual world ID. This study also intended to investigate which existing ID models

or combinations of models were best suited for virtual world instruction, and what essential steps should be included in virtual world ID. The following research questions guided the study:

- 1) What ID models are used in the design and development of virtual world instruction, and why?
- 2) Which elements of an ID model do instructional designers consider essential in the development of virtual world instruction, and why?

The sample for the study consisted of members from the listservs of [The Sloan Consortium](#) and the [EDUCAUSE Virtual Worlds Constituent Group](#). The former had 538 active members and the latter had 366 active members, giving an accessible sample population of 904. To qualify for inclusion in the study, participants were required to meet specific criteria. Specifically, they had to be instructional designers, university faculty, or other qualified individuals who had been researching/working in the field of ID for at least 5 years. Furthermore, they had to have prior experience designing and developing virtual world instruction and/or have authored publications related to ID models or ID for virtual worlds.

Following a 3-week data collection process, a total of 99 responses were received, 38 of which indicated that the participant had not met the required criteria to qualify for inclusion in the study. Sampling theory was employed to determine the minimum acceptable response rates required ensuring that the respondents accurately represented the target population. For this study, a 10% error rate was used with a confidence level of 90%, indicating that there was a 90% chance that the interval contained the population means (Norusis, 2006). To attain a 90% confidence level with a $\pm 10\%$ error rate, the literature indicates that the recommended sample size for a population of 904 should be 209 ([Creative Research Systems, 2010](#); [Raosoft, 2004](#); [The University of Texas at Austin, 2010](#)). The sample size was calculated using the following formula (Dillman, 2000, pp. 206-207):

$$Ns = \frac{(Np)(p)(1-p)}{(Np-1)(B/C)^2 + (p)(1-p)}$$

where

Ns is the completed sample size needed for the desired level of precision;

Np is the size of population;

p is the proportion of population expected to choose one of the two response categories;

B is the acceptable amount of sampling error; and

C is the confidence level.

For a sample size of 209, the response rate or number of survey responses needed for a range of accuracy had to be within the range of 62 respondents. Since a total of 61 qualified participants represented the population for this study, 61 completed surveys were included in the data analysis. This constitutes a 29.2% response rate, which was deemed to be sufficiently close to the average 30% response rate for online surveys ([The University of Texas at Austin, 2010](#)). What follows is a description of the findings; quantitative data were analyzed using a combination of the Statistical Package for the Social Sciences (SPSS) and the built-in features of the [SurveyMonkey](#) online survey tool.

Results

The first research question asked, "What ID models are used in the design and development of instruction using virtual worlds, and why?" The data analysis showed that the majority of participants (65.6%) had always and usually used an existing ID model to design and develop virtual world instruction (see Table 1).

Table 1. *ID model use by participants to design and develop virtual world instruction (N = 61)*

How Often ID Model(s) is/are Used	Frequency	Percent
Always	15	24.6
Usually	25	41.0
Occasionally	16	26.2
Seldom	3	4.9
Never	3	4.9

Out of all the models reviewed, 46 of the 61 participants (75.4%) used the ADDIE process and deemed it to be the most appropriate for virtual world instruction. Table 2 shows a summary of all ID models used for the design of virtual world instruction including the ID models and strategies suggested by the participants. Other listed models that were also considered as appropriate included the following: Dick et al. (2009); the ARCS (Attention, Relevance, Confidence, Satisfaction) model of motivational design (Keller, 1987; Keller & Suzuki, 1988); rapid prototyping (Tripp & Bichelmeyer, 1990); and Gagné and Briggs (1979). Other models or strategies that were appropriate for virtual world instruction that were not presented in the original list included the following: TranceFormational Learning (Jamison, 2008); 4C-ID (four-component ID) (van Merriënboer, 1997); multimodal model (Picciano, 2009); and PADDIE (Plan–Analyze–Design–Develop–Implement–Evaluate). Most of the models presented in Table 2 are known as "traditional" ID models; however, models such as TranceFormational Learning, 4C-ID, and the multimodal model are not based on the ADDIE framework and cannot be considered as such.

Table 2. ID models used by participants for designing virtual world instruction (N = 61)

ID Model	Frequency	Percent
ADDIE	46	75.4
Dick, Carey, and Carey	18	29.5
ASSURE	12	19.7
Gagné and Briggs	12	19.7
Rapid Prototyping	11	18.0
Evaluate and Revise	10	16.4
Morrison, Ross, and Kemp	10	16.4
ISD	8	13.1
ARCS	8	13.1
EOD	5	8.2
Gerlach and Ely	5	8.2
Hall, Watkins, and Eller	5	8.2
Hannafin and Peck	5	8.2
Layers of Necessity Model	5	8.2
Jerrold Kemp	5	8.2
R2D2	5	8.2
Smith and Ragan	5	8.2
Eternal, Synergistic, and Developmental	5	8.2
Seels and Glasgow	4	6.6
Rothwell	3	4.9
Knirk and Gustafson	3	4.9
TranceFormational Learning	2	3.3
4C-ID	2	3.3
PADDIE	1	1.6
Multimodal	1	1.6
ASSURE, Smith and Ragan, CHAT	1	1.6
ERIC	1	1.6
Merrill's First Principles of Instruction	1	1.6

ADDIE is seen as a generic description of the ID process or a conceptual framework for ID: "a mental frame of reference that loosely guides instructional designers as they attempt to approach instructional design problems in a systematic way" (Bichelmeyer, 2005, p. 5). Generally, the ID process can be summarized into the five phases of Analysis, Design, Development, Implementation, and Evaluation, which is probably why ADDIE was the preferred choice of participants.

In response to the question of whether or not existing ID models were appropriate for virtual world instruction, 20 participants (32.7%) stated that the current existing ID models were appropriate for virtual world instruction and twenty-four participants (39.3%) indicated that current ID models were inappropriate for virtual world instruction. Fourteen participants (24.6%) responded that it depended on the project, and four participants (6.6%) were uncertain.

Among the 24 participants who thought that some current models were inappropriate in the design and development of virtual world instruction, the typical answer supported the idea that traditional ID models were not suited to the new pedagogical perspectives of complex 3D environments. Chen (2010) and [Dawley \(2007\)](#) also support this result, stating that current ID models do not offer precise guidance for that type of learning environment. A participant also stated that:

"Most traditional models maintain a focus on the world of the activity rather than the world of the learner. As a result, activities designed in a virtual environment are more replication of traditional activities, and do not take advantage of the real potential of virtual worlds. There is no value of using traditional models in a non-traditional platform."

Participants were also concerned that traditional models were "too process oriented" and "too time consuming." Similar responses can be found in the research studies by [Li \(2003\)](#) and [Royal \(2007\)](#). Both researchers have studied elements and types of ID models that instructional designers believed were useful in designing and developing web-based instruction, of which virtual world environments are a subset. In addition, some instructional designers suggest that current ID models (e.g., Morrison et al., 2007; Dick et al., 2009) tend to be too process-oriented, static, and linear, failing to adequately satisfy user needs and expectations in virtual world environments ([Atkinson, 2009](#); [Chen et al., 2004](#); [Dawley, 2007](#); [Hodge & Collins, 2010](#)).

Participants also suggested that current ID models need to be adapted to new teaching and learning environments. In the words of one participant:

"Using a virtual world is a paradigm shift. There are many factors that are unlike traditional teaching and learning models. These factors include new communication modes, vehicles of expression and visualization, and multi-modal learning support. A model that supports these changes and recognizes the unique experience needs of designing learning via avatar embodiment needs developing."

Although several participants expressed an opinion that "one size does not fit all," most participants argued that current ID models are obsolete in virtual world ID.

The second question asked, "Which elements of an ID model do instructional designers consider essential in the development of virtual world instruction and why?" First, participants were presented with a list of 10 design steps using a 5-point Likert scale. The design step/stage that participants most often followed was "identify instructional goal(s)," and the least often step/stage followed was "design and conduct formative and summative evaluations of instruction." This is probably because many ID models include "analyze instructional goal(s)" as a design step at the beginning of an ID process (Dick et al., 2009; Hall, Watkins, & Eller, 2003; [Molenda, 2003](#); Sims & Jones, 2003). Participants also contributed to this question by adding extra design steps/stages not currently listed that they deemed important during the ID process for virtual world environments.

Of the 61 participants, 14 (23.0%) indicated that they had followed every step/stage of the model they selected when designing instruction for virtual worlds, and 31 (50.8%) stated that they had not followed every step/stage of the selected model(s). Fifteen (24.6%) responded "not always" and one participant (1.6%) was uncertain (see Table 3). Some participants observed that it was unnecessary to conduct a learner needs analysis in higher education settings since the audience is somewhat standardized. Many ID models incorporate the needs analysis as a design step early in the ID process (Dick et al., 2009; [Molenda, 2003](#)); however, it is questionable whether this design step is used in designing and developing virtual world instruction, as online programs are being developed without needs assessments (Chen, 2010; [Dawley, 2007](#); [Royal, 2007](#); [Yang & Lui, 2004](#)).

In addition, 46 participants (75.4%) who responded that they never or only occasionally followed every step/stage of the model expressed a belief that each project requires a unique approach to design instruction, in that it depends on the project and that it may be too time consuming or impractical to complete all of the steps/stages of an ID model. These results can also be supported by the literature, which states that different instructional situations may dictate the use of different ID models, since no ID model can satisfy them all (Dick et al., 2009; [Gustafson & Branch, 2002](#); [Irlbeck et al., 2006](#); [Molenda, 2003](#)).

Because the majority of participants (75.6%) did not or did not always follow every step/stage of the model, participants were asked to provide a list of elements they considered essential to make existing ID

models appropriate for virtual world instruction. The 51 respondents to this question generated several items they considered as essential. Duplicated items were removed, and the researcher combined similar items to produce a final list of 10 items. Most participants (41.2%) suggested that in order for existing ID models to be appropriate for virtual world instruction the level of engagement and interactivity needed to be raised. They also suggested that ID models need to be more flexible in order to allow adaptation to cater to more complex scenarios. Another participant stated that ID models should incorporate elements of game design. The following are the rest of participants' responses to this question (see Table 4).

Table 3. *Participants' responses to the question of whether they followed every step/stage of the ID model of choice (N = 61)*

Response	Frequency	Percent
Yes	14	23.0
No	31	50.8
Not Always	15	24.6
Not Sure	1	1.6

Table 4. *ID elements participants believe are needed to make existing ID models suitable for virtual world instruction (N = 51)*

ID Element	Frequency	Percent
Increased engagement and interactivity	21	41.2
Greater flexibility to accommodate complex scenarios	9	17.6
More assessment and learner feedback	8	15.7
Immersion and more room for simulation	6	11.8
Incorporation of elements of game design theory	5	9.8
Use of Merrill's first principles of instruction	4	7.8
Focus on the instructional activities rather than process	3	5.9
Addition of a planning phase	2	3.9
Assessment of technology	2	3.9
Kinesthetic learning	1	2.0

In the last survey question, participants were asked if a new ID model was needed specifically for designing and developing virtual world instruction. Thirty-two (52.5%) participants replied that it was not needed. Analysis of the data found six primary reasons why participants believed that a new ID model is not needed specifically for designing and developing virtual world instruction. Twelve participants (19.7%) believed that an ID model by itself would not serve all possible learning scenarios due to the nature of the teaching disciplines that exist. Eleven participants (18.0%) stated that there are plenty of models already in existence; with the amount of models already created, the designer could take approaches from some and make them work within a virtual world environment. Ten participants (16.4%) responded that the ADDIE process presents the necessary method for guiding the design of all elements needed in a virtual world environment; depending on the specific learning needs, the ADDIE process can be modified to accommodate specific situations. The rest of the participants' responses are shown in Table 5.

Table 5. *Reasons why a new ID model for virtual worlds is not needed*

Reason	Frequency	Percent
No single ID model will suit all scenarios/disciplines	12	19.7
Numerous ID models already exist	11	18.0
ADDIE can be adapted as needed	10	16.4
Use of virtual worlds in education is still evolving	7	11.5
Merrill's principles are adequate for guiding the ID process	5	8.2
ID models specific to virtual worlds have already been created	4	6.6

Although it is unlikely that any single ID model will be able to serve all possible learning scenarios, a new ID model may be needed specifically for the design of virtual world instruction. Twenty-two (36.0%) participants seemed confident that a few modifications of existing ID models could be sufficient to meet users' expectations in a virtual world environment; therefore, a new ID model specifically for virtual world

instruction was deemed unnecessary. While the ADDIE process has long represented the fundamental elements of the ID process, "change continues in the field of education as a result of the influence of technology and certainly ID models are not exempt from this influence" ([Häkkinen, 2002](#), p. 463).

Discussion

This research study produced several findings that identified which ID models are currently used in designing virtual world instruction, the reasons why experts believe these models meet or do not meet instructional needs for virtual world instruction, and specific ID elements needed to design and develop virtual world instruction. This study showed that the majority of the participants used an ID model or parts of ID model(s) to design and develop virtual world instruction.

Although the ADDIE process is still used as a foundation model for many instructional designers, researchers over the years have suggested modifications to meet the changing needs of the online educational environments, such as the virtual classroom ([Fresen, 2007](#); [Irlbeck et al., 2006](#); Kapp & O'Driscoll, 2010; [Wang & Hsu, 2009](#)). That may be why most participants believed that each ID project requires a unique approach, especially when designing instruction for a virtual world environment. The following are some reasons why participants did not or did not always follow every step of an ID model of their choice.

ID Models are Outdated

Using a virtual world for instruction involves a paradigm shift. Factors such as new online communication modes, vehicles of expression and visualization, and multi-modal learning are unlike traditional face-to-face teaching and learning models. Research literature indicates that fundamental principles of ID are based on educational paradigms of the era in which they were created ([Gustafson & Branch, 2002](#)). The current ID models explored in this study were not created for the new pedagogical perspectives of complex 3D virtual environments. While no specific model for developing instruction in virtual world environments has become standard, many designers seem to use elements of the existing ID models to help them meet users' expectations in virtual world environments (Chen, 2010). According to the literature and the participants' responses, to adapt current ID models to virtual world instruction, modifications may need to be made to support the ID for virtual world environments (Chen, 2010; [Dawley, 2007](#); [Fresen, 2007](#); [Wang & Hsu, 2009](#)).

ID Models Lack Flexibility

According to participants, current ID models are not flexible enough to meet the needs of specific courses in a virtual world environment. They are too process-oriented and lack enough integration for students to be fully immersed in 3D virtual world-based activities. Although this was not directly measured in this study, it concurs with the literature in which most traditional ID models are criticized for their resistance to change, narrow fit, and static scenarios. They tend to be process-oriented, too static, and linear, which do not meet user expectations in virtual world environments ([Atkinson, 2009](#); Chen, 2010; [Dawley, 2007](#); [Hodge & Collins, 2010](#)).

ID Models Do Not Incorporate Game Design Theory

With current ID models, the element of game design theory is missing from the development process. Most existing ID models maintain a focus on the world of the activity rather than the world of the learner. As a result, activities designed in a virtual world environment are more of a replication of traditional activities, and do not take advantage of the great potential of virtual worlds. While the purpose of video game design is intended for enjoyment, it requires users to think at higher cognitive levels than the recognition and recall frequently used in other learning environments (Gee, 2003). Users must be immersed in the situation to successfully navigate complex levels of difficulty, maps, and other interactions where users will need to apply both new knowledge and older learned skills to overcome given obstacles or situations. Learning experiences gathered through video game design provide an opportunity for learners to be immersed in a virtual world reality.

Choice of ID Model is Dependent on the Project

The ID model for a given project depends on the nature of specific learning goals that the instruction is created to achieve. For some instructional needs it is necessary to skip or add steps during the design and development phases. Each discipline requires a unique approach for designing instruction in virtual world environments. While many instructional designers may use ID models with which they are familiar,

different instructional situations may require the use of a different ID model, as no ID model can satisfy them all (Dick et al., 2009; [Gustafson & Branch, 2002](#); [Irlbeck, et al., 2006](#); [Molenda, 2003](#)).

Based on these findings, it seems that some instructional designers preferred a game-based learning approach that includes simulation and interactive features when developing instruction in a virtual world. Therefore, a more constructivist approach may guide the development of virtual world activities that engage users by providing a framework for immersive educational activities. This constructivist approach might include in-world synchronous environments for collaboration, problem-solving, critical thinking, and interaction guided by an instructor who encourages learners to actively participate and reflect on their learning. Users should be able to learn through exploration and reflection, interaction with each other through roleplay, comparing multiple perspectives, and the simulation of real life in authentic context through real world activities and events. Therefore, including these elements within an existing ID model should better support learning in a virtual world. This could be a reason why participants tend to use either a modified version of the ADDIE process and/or combinations of current ID models for design and development of virtual world instruction. According to the participants, current ID models in their unmodified state structure are inappropriate for this type of environment.

The majority of participants also suggested that in order for existing ID models to be appropriate for virtual world instruction, further adaptation of elements of particular ID models is needed. A list of 10 suggested essential instructional elements for design and development of virtual world instruction were identified for adaptation or modification of processes. Raising levels of engagement and interactivity and the need for flexibility within design processes were the two most essential elements needed to make existing ID models suitable for virtual world instruction, participants suggested. To make best use of virtual world instruction, accommodations may be needed to incorporate more interaction.

The findings suggest that modifications of the ADDIE process or other ID models provide the necessary methods for guiding the design of elements needed for instruction in virtual world environments. A logical conclusion may be that modifying existing ID models and integrating them with desired levels of immersion, interactivity, elements of virtual reality, and game design would be sufficient to meet users' expectations in virtual world environments. These modifications should provide a foundation for designing effective instruction that assists a designer in creating learning situations in which students can: (1) experience learning by solving a problem that may be encountered in a real-world situation; (2) build on what they already know by adapting, modifying, and transforming the virtual world to construct new knowledge as well as to apply existing knowledge to new contexts/situations; (3) interact in an immersive environment where knowledge is presented in an authentic context; (4) transfer and apply the in-world learning to everyday life situations; and (5) work collaboratively to undertake tasks, exploring and negotiating with one another to complete the activities and reflecting on their learning along the way.

Although a brand new ID model for virtual world ID would be a contribution to the ID body of knowledge in the field of virtual world instruction, it may not be a necessity. This may be the reason why more than half of participants believed that a new ID model specifically for virtual world instruction is not needed.

A discrepancy between the results obtained for the first and second research questions was also found in this study. The results pertaining to the first question show that more than half of the participants (65.6%) responded that they always/usually used an ID model to design and develop virtual world instruction. In addition, the ADDIE process was most frequently used for design and development of virtual world instruction and was also considered the most appropriate. The following are some of the participants' responses on why ADDIE was the most appropriate:

"ADDIE model provides a set of guidelines, model keeps a team focused on the same tasks, and creates a common language for the team."

"It provides a context of participation that positions the players as active agents of change."

"ADDIE is a process more than a model, and offers a fundamental approach since most of the other models are based on ADDIE."

According to these responses, if the participants use an ID model to design virtual world instruction, the assumption would be that they should follow the ID steps/stages of their preferred ID model. To complement this assumption, some of the results found in relation to the second research question indeed showed that 14 participants (23.0%) considered as "always necessary" or "usually necessary" all of the ID steps/stages of an ID model when designing or developing virtual world instruction.

However, a discrepancy was found as 31 participants (50.8%) stated they did not follow every step/stage of a particular model(s). The following are some participants' responses on why they do not follow every step/stage of an ID model:

"Depends on the project. Most of the time, we encounter time constraints that won't allow us to follow every single step."

"Each discipline requires a different approach for designing instruction."

"Without further modification they are not efficient enough in their pure form to be able to work in a virtual environment."

"The challenge is to create a virtual environment that is engaging and draws learners in, and we can't necessarily do that using traditional ID models."

This inconsistency in the results could indicate that participants believed that some ID models in theory are appropriate for the design and development of virtual world instruction, but in practice must be modified based on the nature of the problem, the discipline, and the type of instructional environment. Although it is understandable that current ID models in their unmodified structure might be inappropriate for virtual world instruction, the question relies on how much modification an ID model can be exposed to before it becomes a completely different model or process. For example, according to the literature, a few ID models – such as those of Dick et al. (2009), Morrison et al. (2007), and Smith and Ragan (2005) – share the basic ADDIE components (Dick et al., 2009; [Gustafson & Brach, 2002](#)). All of these models used the basic ADDIE component to address a specific instructional situation, but due to significant additions to the ADDIE process a new ID model was then created. If a significant amount of modifications are needed to make an ID model appropriate for virtual world instruction, then most of the step/stages and other elements of that specific model have changed. Therefore, the outcome of this modification could result in a completely new ID model that has been designed specifically to address instructional problems in a virtual world environment. Even though a majority of participants believed that a new ID model specifically for virtual world instruction is not needed, the majority of the participants seemed to be confident that the modification of existing ID models would be sufficient to meet users' expectations in a virtual world environment.

Conclusion and Future Work

The study reported in this paper sought to identify the ID models currently being used for the design of virtual world instruction and the reasons behind their use, as well as to identify specific ID elements used to develop virtual world instruction that enable effective utilization of virtual worlds' capabilities to support desired learning experiences and learning outcomes. Through the study, it has been discovered that ADDIE was the most commonly used process for the design of virtual world instruction. It has also been deemed the most appropriate since ADDIE summarizes five phases of the ID process. Essential ID elements were also generated to design and develop virtual world instruction. According to this research, participants in this study believed that merging various ID models could help create unique processes to address specific learning needs.

Further study should be conducted to identify what combinations of models professionals are using to design and develop virtual world instruction and why. Also recommended is that a study be conducted to determine the effectiveness of the following ID models in more depth: the TranceFormational learning model ([Jamison, 2008](#)), the multimodal model ([Picciano, 2009](#)), PADDIE, and ERIC (Experience–Reflect–Interact–Construct) ([Sharma & Mishra, 2007](#)). According to some participants, these models specifically target the needs of those designing for learning in virtual world environments. Yet, such environments have survived for more than a decade, often without the implementation of a needs assessment or other phases of the instructional systems design process, such as evaluation. The design of virtual world instruction should be based upon the fundamental principles of effective ID, aligned with clear pedagogical practices, and built using an ID model that specifies the connection between what is learned and the conditions in which learning occurs in a virtual simulated environment.

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