Notes on Distance Learning for Informal Settings

White Paper #2: A literature review of best practice considerations for distance education

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Executive Summary

This literature review is funded in part by a grant from the National Science Foundation #1713567 and prepared for Indiana University as part of a larger project entitled *Data Visualization Literacy: Research and Tools that Advance Public Understanding of Scientific Data*, Dr. Katy Börner, Principal Investigator. This white paper is one of three of a larger review. The larger review consists of three components starting with a white paper background section exploring definitions, the history of distance education, and the technologies used for distance education over time. This second white paper explores best practice considerations most widely employed in distance education. The third white paper focuses on the applied evaluation of distance education programs and the transferability of these approaches in informal science learning institutions for program improvement and that are appropriate for determining efficacy of teaching on behalf of the organization and the learner.

Methods

In conducting this review, the authors began by exploring the literature in numerous books, databases, journals, websites, and bibliographic resources specific to distance education. The authors approached this review by first reading some of the documents from these sources on distance education that focused on practices. The authors noted the key terms used for distance education practices, who authored specific chapters, and key findings, conclusions, or implications offered with citations. Next, the authors conducted a systematic search of the journals specifically related to distance education that included the Review of Educational Research, International Journal of Distance Education, American Journal of Distance Education, and Educational Technology & Society. The authors reviewed more than 12 national and state websites relating to distance education and virtual schools including the U.S. Department of Education and The National Center for Education Statistics websites.

The authors advanced the search strategy with the Google Scholar website using terms that included: distance education, practices in distance education, on-line education, web-based instruction, practices in virtual education programs, presence in distance education, distance learning, synchronous instruction, asynchronous instruction, and on-line learning. The criteria the authors used for including journal articles, book chapters, and other on-line documents for this review was a publication date since the early 1980s as a means for targeting relatively current and recent literature about distance education.

The authors organized and analyzed the data based on themes of best practice considerations in distance education that emerged from the review of the literature, documents, and websites. The review was not intended to be a critical literature review, but a broad scan and synthesis of what is generally agreed in the literature about considerations for best practices for distance education.

Best Practice Considerations for Distance Education

Best practices in a field are approaches that have been tested and have been generally accepted, prescribed, or adapted as being correct or most effective. Since distance education has evolved over time and continues to evolve often driven by technology, and most recently been influenced and challenged by the COVID-19 pandemic, it is the position of the authors that the literature is not yet clear or definitive on what it can confidently state about what are tested and proven best practices in distance education, especially relating to informal learning environments. However, the literature does identify practices that need to be, or should be, considered for quality distance education practices resulting in desired or positive learning outcomes. Therefore, the findings of this literature review present aspects of distance education that are referred to as best practice considerations.

The results of this literature review of best practice considerations in distance education helps provide a different and a somewhat wider, enhanced, and more in-depth perspective of distance education from the themes that the authors identified that emerged across the literature. These themes include 1) the importance of organization, vision, and planning when designing and implementing distance education programs and learning opportunities, 2) the role of educators and facilitators, 3) instructional approaches, 4) the learning environment, including creating a sense of presence, 5) motivating learners, 6) importance of learner social development, 7) learner support, 8) technical support, and 9) the importance of evaluating implementation and outcomes.

Organization, vision, and planning

The importance and practice of organization, vision, and planning for distance education is emphasized in the literature. This includes assessing learners' needs and implementing instructional design principles that operate from established instructional theory. Attention to quality course design should take precedence over attention to the characteristics of media to instruct content. Encouraging contact with and among educators and learners in distance education seems to result in better learner outcomes, especially in the case of collaborative learning.

Teachers and facilitators

Several studies indicate the most influential factor in student success or failure in learning environments (including distance education) even when accounting for

minority and socio-economic status (SES), may be teacher quality. Not unlike traditional classroom settings, educator qualities that have a positive effect on learning include demonstrating compassion and understanding (know the audience, their interests, and learning styles, exercise patience and kindness, have realistic expectations of learners), being a good listener, checking for understanding, and providing consistent and timely feedback to learners. At the same time, advocates of computer-based learning have advocated a shift in the theoretical foundations of pedagogical practice from that of behaviorist teacher-centered instruction traditional (often the case in traditional learning environments) to more student-centered constructivist approaches. At the heart of this shift is a change in the way we view the role of the educator.

Instructional approaches

One aspect of distance education instruction that most often differs from traditional classroom and face-to-face instruction is the use of synchronous (real-time) and asynchronous (delayed time) approaches and structures. Synchronous online learning, or (SOL), provides an opportunity for instructors to connect in real-time with learners separated by geographical distance. Typical distance education synchronous communication tools include the telephone, instant messaging or chat tools, video conferencing, and other tools that allow file sharing, audio, and even video communications. Synchronous instruction and learning engagement activities help learners to collaboratively construct meaning, have a sense of presence, receive immediate feedback, and provide and receive social support. An asynchronous approach can support learning opportunities and relationships among learners and educators even when participants cannot be online at the same time. Asynchronous distance education learning allows participants to log on to a learning environment at any time and download documents or send messages to educators and other learners. Asynchronous communications encompass those technologies that typically involve a delay between when a message has been sent and when it has been read. Letter writing, fax, e-mail, and threaded discussions are all examples of asynchronous communication. Asynchronous instruction and learning engagement activities help learners to remain focused on content.

Learning environment, sense of presence

The concept of presence in distance education is two interrelated phenomena: telepresence, the sense of "being there" at a location remote from their own immediate environment, and social presence, the sense of "being together with others". Presence looks and feels for the learner as if the educator has placed the learner at the center of the instruction and that the educators and they are accessible to each other. The research suggests that when there is a sense of presence in online learning it can greatly enhance the educator-learner relationship

and influence learning outcomes. The literature identified practice considerations for enhancing presence in distance education that include identifying type and focus of content, formatting the learning experience, interactive strategies, role of educator, types of technology, and kinds of support

Motivating learners

Learners who choose distance education need a high level of motivation to complete distance education programs successfully. When engaged in learning opportunities, they often have to work by themselves with little or no opportunities for face-to-face or peer interaction. Learners sometimes must deal with more abstract and ambiguous situations than someone engaged in traditional classroom learning. They need to be efficient in time management, be responsible and in control of their studies, and maintain an image of self-worth and self-efficacy. Studies that examine reasons for participating in distance education may offer insight into the relationship between motivation and learner success. Learners appear to enroll in online courses for similar reasons. Convenience, flexibility in scheduling, credit recovery, accelerated learning opportunities, conflict avoidance, and the ability to take courses not offered at a local school or institution.

Social Development

Social development often occurs differently when engaging in distance education compared with the face-to-face traditional classroom experience. Psychological distance that some distance education learners experience may be inherent in many distance education opportunities. However, distance is not a matter of geography but rather psychology, and although geographical or physical distance may be increased in distance education settings, its effect can be decreased. The literature suggests that the interchange within a distance education context is characterized by three different types of learner interactions: 1) learner-to-content (appropriateness of the course material and delivery vehicle considering the objectives and learners), 2) learner-to-instructor (types of communication and feedback, access and support, etc.), and 3) learner-to-learner (types of communication and feedback, support systems, and procedures for dialogue, etc.).

Learner support

The *21st Century Distance Education Guidelines* (2001) indicate that learner support appears to play a role in the success of distance education and is a key indicator of quality. Experiences in a distance education environment can actually improve learner autonomy and independence, but also indicates the importance of learner support.

Technical support

The most appropriate medium of delivering instruction to students via distance education does not necessarily mean the newest, most expensive technology available. There are several factors to consider, such as learner autonomy, types of interaction, access, and cost of the media. Technological tools and media should be chosen by how it best allows learners to interact with educators, other learners, and learning content.

Importance of evaluating implementation and outcomes

21st Century Distance Education Guidelines (2021) discuss best practice considerations in distance education as regularly evaluating distance education programs. This is critical in improving and ensuring distance education quality. These evaluations should be informed by empirical evidence including feedback from students and graduates about the academic program and information about graduates' success (e.g., employment and further education).

Discussion and Conclusions

Many of the considerations for best practice in distance education are not that dissimilar to those considered for traditional classroom or face-to-face learning programs. Deliberate and effective strategic planning of programmatic structure and instructional delivery are needed for most any learning environment. Identifying quality educators and implementing educational practices that help to create a safe and supportive environment for leaning, recognizing and respecting different learning styles, and building critical thinking skills is a consideration for best practice in most any learning environment. Assessing and evaluating the instructional process and extent that desired learning outcomes are met for instructional and programmatic improvement is a desired and beneficial practice.

There are some considerations for best practices that may be especially important for distance education. Reflecting the unique and often different factors presented by distance education, compared with traditional classroom and face-to-face learning environments, should lead to different instructional practices by educators when using synchronic and asynchronic instructional approaches. The practice of creating a sense of presence for on-line learners in distance education environments is critically important, as well as attending to their social needs which are addressed differently in traditional classroom and face-to-face learning environments. Practitioner consideration for providing and maintaining sufficient technical support for distance education learners is critically important, as well as identifying and responding to what motivates learners to pursue and engage in distance education that may be different from other types of learning environments.

As revealed in the first white paper in this series, distance learning started with, and throughout much of its history, focused on, adult learners. This is reflected in the literature reviewed for this white paper. As we found the literature to be somewhat lacking regarding distance education practices that should be considered specifically for K-12 learners, as well as practice considerations for informal learning environments that include museums, science centers, zoos, and aquariums. While further study and research is needed for distance education in these types of institutions, best practice considerations for distance education programs, in general, may be transferred, applied, or adapted for informal learning environments.

Based on the findings of this literature review, the authors conclude that future research in distance education would be beneficial to the field of distance education and should include the following:

1. Developing a theoretical framework for the design and analysis of distance education
2. Exploring more fully learner motivation including task choice, persistence, mental effort, efficacy, and perceived task value.
3. Investigating levels of learning (e.g. simple knowledge or comprehension vs. higher order thinking) and different instructional strategies for achieving these outcomes.
4. Examining inclusivity and accessibility for home learners, rural and remote learners, and learners with various disabilities.
5. Distance education for K-12 learners.
6. Distance education programs and learning opportunities in informal learning environments.

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A Literature Review

Overview

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Introduction

Distance education is defined and described in the literature from a variety of perspectives and in various ways (National Center for Educational Statistics, 2000). Simonson (2002) defines distance education as institution-based education where learners are physically separated and where interactive telecommunications systems are used to connect learners, resources, and instructors. They propose four main components that are critical to distance education. First, in order to differentiate distance education from self-study, distance education must be institutionally based. Second, there must be a separation of teacher and learner in terms of geography, time, and knowledge of the concepts to be taught. Third, some form of interactive telecommunications must be available for learners to interact with each other, with the resources of instruction, and with the teacher. In this case, telecommunications is

defined as "communicating at a distance" (p. 2) and does not necessarily mean the use of electronic media, but can also include non-electronic forms of communication such as the postal system. Fourth, the inclusion of instructional environments and resources that facilitate learning experiences and promote learning.

An exception to this definition is separation in time of educator and learner and separation of learner groups. This is because much of what is currently considered as distance education includes both synchronous and asynchronous approaches. Synchronous approaches in distance education emerged as the availability and reliability of videoconferencing and interactive television which began to be used more frequently in the mid-1980s. The premise remains the same as two or more classes or individual learners in different locations are connected via some form of technology and directed by one or more educators in real time. What could be considered as a "group-based" form of educational instruction is "individually based" distance education in which learners in remote locations work independently, or in asynchronous groups, usually with the support of an educator or facilitator. This is asynchronous, because distance education learners are not synchronized with other learners and communication is largely asynchronous, by e-mail, chatrooms, and other forms of computer software (Bernard et al., 2004). Some distance education programs use a hybrid of both approaches.

Somewhat similar to Schlosser's and Simonson's perspective, Rumble (1989) stated "In any distance education process there must be, 1) a teacher or educator, 2) one or more students or learners, 3) a course or curriculum that the educator is capable of teaching and the learner is trying to learn, and 4) a contract (implicit or explicit) between the learner and educator or the institution employing the educator, which acknowledges their respective teaching-learning roles (p.18). Moore et al., (2011) identified commonalities across definitions as, 1) some form of instruction that occurs between two parties, 2) it is held at different times or places, and 3) uses various forms of instructional materials.

Distance education practices are intended to help expand access to learning opportunities for all people (Darling-Aduana & Heinrich, 2020). Building relationships between educators and learners helps to create a sense of presence and contributes to positive overall experiences of educators and learners in telepresence learning opportunities. Opportunities to interact with other learners also contributes to positive learning experiences.

Watson et al., (2004) have identified five basic types of Kindergarten through 12th grade distance education online programs that exist across two dimensions. One dimension concerns how the program operates within a state's educational hierarchy, such as statewide, multi-district or single district. The other dimension concerns whether the program operates as a cyber school where learners are enrolled and

garner credits and diplomas, or provides supplemental online courses to students who are enrolled in another school. Table 1 outlines five types of online programs (Watson et al., 2004).

Table 1. Five Types of Online Programs

	Type	Description
Supplemental program	Statewide supplemental programs	Students take individual courses but are enrolled in a physical school or cyber school within the state. These programs are authorized by the state and overseen by state education governing agencies.
	District-level supplemental programs	Are typically operated by autonomous districts and are typically not tracked by state agencies.
Cyber Schools	Single district cyber schools	Provide an alternative to the traditional face-to-face school environment and are offered by individual districts for students within that district.
	Multi-district cyber schools	Are operated within individual school districts but enroll students from other school districts within the state. This represents the largest growth sector in K–12 online learning.
	Cyber charters	Are chartered within a single district but can draw students from across the state. In many cases they are connected in some way to commercial curriculum providers.

The purpose of this literature review is to explore best practices in distance education in formal, non-formal, and informal learning environments. We are using distance education as an umbrella term that includes all the various forms of education that is a systems process involving management and components such as content sources, program and course design, delivery, interaction, and the learning environment (Mehrotra et al., 2001; Moore, 1993; Moore & Kearsley, 2012; Verduin & Clark 1991) where educators and learners are physically separated and rely on some form of technology for engaging in learning opportunities. Distance learning, on the other hand, is an internal cognitive process held by the individual learner.

Distance education as a discipline has a sufficient research base that contributes to a set of practices for quality instruction (Nsiah, 2013). Though terminology of these practices varies, the broad categories of practice are relatively consistent across the literature. Strong distance education programs have specific hallmarks of good practice, and these are discussed in this literature review.

Methods

In conducting this review, we began by exploring the literature in numerous books, databases, journals, Web sites, and bibliographic resources specific to distance education. We approached this review by first reading some of the documents from these sources on distance education that focused on practices. We noted the key terms used for distance education practices, who authored specific chapters, and key findings, conclusions, or implications offered with citations. Next, we conducted a systematic search of the journals specifically related to distance education that included the Review of Educational Research, International Journal of Distance Education, American Journal of Distance Education, and Educational Technology & Society. We reviewed more than 12 national and state websites relating to distance education and virtual schools, including the U.S. Department of Education and The National Center for Education Statistics websites.

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Results: Best Practice Considerations for Distance Education

Best practices in a field are approaches that have been tested and have been generally accepted, prescribed, or adapted as being correct or most effective. Since distance education has evolved over time and continues to evolve often driven by technology, and most recently been influenced and challenged by the COVID-19 pandemic, it is the position of the authors that the literature is not yet clear or definitive on what it can confidently state about what are tested and proven best practices in distance education, especially relating to informal learning environments.

However, the literature does identify practices that need to be, or should be, considered for quality distance education practices resulting in desired or positive learning outcomes. Therefore, the findings of this literature review present aspects of distance education that are referred to as best practice considerations.

In 2021, the National Council for State Authorization Reciprocity Agreements (NC-SARA) and the National Center for Higher Education Management Systems (NCHEMS) developed *The 21st Century Distance Education Guidelines* to determine the extent to which there were similarities in consideration of quality between the 2009 Council of Regional Accrediting Commission (C-RAC) Interregional Guidelines for the Evaluation of Distance Education and each accrediting organization's standards, policies, and guidelines related to distance education. Accreditors and other organizations and experts in the field helped to develop the new guidelines that were applicable to a wide range of institutions, congruent with the standards used by many of the institutional accreditors, relevant to accreditors and NC-SARA in assuring distance education quality, and accessible and useful to institutions for planning and continuous improvement purposes. We used this document to help identify considerations for best practices that lead to quality outcomes in distance education and cite them throughout this review.

The results of this literature review of best practice considerations in distance education helps provide a different and a somewhat wider, enhanced, and more in-depth perspective of distance education from the themes that we identified that emerged across the literature. These themes include, 1) the importance of organization, vision, and planning when designing and implementing distance education programs and learning opportunities, 2) the role of educators and facilitators, 3) instructional approaches, 4) the learning environment, including creating a sense of presence, 5) motivating learners, 6) importance of learner social development, 7) learner support, 8) technical support, and 9) the importance of evaluating implementation and outcomes. This literature review includes a discussion and conclusions based on the findings.

Organization, Vision, and Planning

The importance and practice of organization, vision, and planning for distance education is emphasized in the literature by several authors (Berge, 2021; Berge and Clark, 2005; Bunn, 2001; Nsiah, 2013; Rice, 2006; Stansfield et al., 2009). According to Cavalluzzo (2005), educational leaders who see the possible role for distance education in their school system and other learning environments should begin by assessing learners' needs and identify clear objectives for their education program. Berge and Clark (2005) support this idea by asserting that the vision of offering a virtual school or other learning opportunity programs must be grounded in the reality of needs, resources, and capabilities.

Because distance education involves the physical separation of educator and learner, the design of instruction must be highly precise to ensure that learners have all of the information they need, and that it is presented in a logical and easy-to-follow format (Nsiah, 2013). Instructional design principles that operate from established instructional theory should be standardized and applied to course and learning opportunity environments so that learners have a consistent interface with which to engage and a logical flow to instructional materials. Program design should focus on the simplest way to convey the content and should be transparent to the learners (DiPietro et al., 2008; Evans et al., 2008; Levy & Beaulieu, 2003). Best practice considerations for quality distance education programs that we surmised from *The 21st Century Distance Education Guidelines* involves having design teams that include individuals with expertise in the subject-matter, instructional design, interaction with students, and assessment of learning outcomes. These learning outcomes are clear to prospective learners and the public.

Bernard et al (2004) found in their meta analysis study of distance education that attention to quality course design should take precedence over attention to the characteristics of media to instruct content. This includes what both the educator and learner do. Inclusion of active learning (e.g. problem-based learning) in distance education program design that includes or encourages some degree of collaboration among learners appears to foster better learning outcomes. Opportunities for communication appear to benefit learners in synchronous and asynchronous distance education. (synchronous and asynchronous learning is addressed later in this review.) Encouragement of contact with and among educators and learners in distance education seemed to result in better learner outcomes, especially in the case of collaborative learning. This suggests that distance education programs should not be designed as a solitary experience for the learner or a one-off program. Instructionally relevant contact is not only desirable, it is probably necessary for creating learning environments that lead to desirable learning outcomes and general satisfaction with a distance learning experience.

The literature provides several approaches, frameworks, and models for planning and designing distance education. For example, Bunn (2001) provides a framework for distance education program planning that refers to "timeless issues" in distance education planning and design. Timeless issues are those that come into consideration when the institution designing and providing distance learning programs and opportunities recognizes the need to tie new distance education objectives to establish larger strategic institutional objectives (Bunn, 2001). This begins with demand forecasts and a subsequent development of clearly defined programs and courses that meet the needs of the target population. Timeless issues are divided into three major decision areas: 1) learner-related issues, 2) instructional issues, and 3)

organizational issues. The framework intends to help distance education planners recognize the nature of both the timeless and timely issues and pinpoints the need to clearly address the timely issues while, at the same time, monitoring the need to revisit the timeless issues relevant to distance education program planning.

In distance education, more responsibility for the learning experience comes under the control of the learner. This requires a different view of the development and implementation of distance education programs than for more traditional in-class, face-to-face, instructor-centered instruction. The timely issues in distance education planning and design includes whether there is a need to adopt a different view of a targeted population of learners that may be a factor of shifting demographics, socioeconomics, Internet access, work schedules, or world events such the COVID-19 pandemic. One timely issue found in the literature may be a shift to view learners more like "customers" (Conway et al,, 1994). Many timely organizational issues concern a reorientation of institutional systems to take advantage of new opportunities (Bunn, 2001). At issue is whether the institution designing distance education "knows" its learners and bases program decisions on that understanding.

Best practices in planning and designing distance education considers instructional methods based on emerging technologies that require new perspectives on developing materials, delivering courses, and creating faculty incentives for innovation and experimentation (Hodgson, 1993). It involves identifying a set of priorities to gain a sharper view of what needs to be done to work toward a vision of a successful distance education program or learning opportunity (Bunn, 2001). There should be a strong rationale for distance education that correlates to the mission of the institution, implementation of guidelines for course development, and review of instructional materials (Chaney, et al, 2009)

Watkins & Kaufman (2003) present a model of planning and design of distance education with five levels. These include 1) Mega, 2) Macro, 3) Micro, 4) Process, and 5) Inputs. The Mega level is planning and assessment whose primary client and beneficiary is society and whose results are termed outcomes. The Macro level is planning and assessment whose primary client and beneficiary is the institution and whose results are termed output. The Micro level is planning and assessment whose primary clients and beneficiaries are the individuals and teams within the institution and whose results are termed products. The Process level is planning and assessment whose primary focus is on institutional processes and activities. The Inputs level is planning and assessment whose primary focus is on resources and assets.

The review of research literature, as well as a scan of key published works (e.g., books, practitioner articles, commentaries) regarding online instruction overall and K–12 virtual schooling experiences, yielded three important contextual considerations that must be attended to when designing full-time or part-time online instruction for

K–12 learners (Johnson, et al., 2023). These factors are related to infrastructure and student characteristics that are relatively fixed in the short term that should be understood before designing and making instructional design decisions. These factors are educators' knowledge and preparation for online instruction, technology infrastructure and support, and students' developmental needs and abilities. It should be noted that contextual factors such as students' developmental needs and abilities are equally as relevant for in-person instruction as for online instruction.

Educators and Facilitators

The role of the educator has been the topic of a significant number of adult distance education studies as well as studies associated with traditional K–12 classroom environments. Several studies indicate the most influential factor in student success or failure in learning environments, even when accounting for minority and socio-economic status (SES), may be teacher quality (Berg, 2008; Sanders & Rivers, 1996; Smith, 2005). Not surprisingly, it has also been posited that teacher quality plays a significant role in distance education outcomes (Cavanaugh et al., 2009). Indeed, one of the motivational influences for the development of distance education programs in K–12 education is the notion of increased access to highly qualified teachers.

Many of the skills and knowledge reported in the literature as effective for online teaching were first demonstrated as evidence-based practices in face-to-face settings. Johnson et al., (2023) found in their study that existing literature strongly suggests that certain best practice considerations from traditional (i.e., face-to-face) instructional settings transfer to online or blended learning.

The literature identifies four interrelated roles played by educators and facilitators in distance education that are similar to traditional classroom environments. These roles include intellectual, social, managerial, and technical (Fein et al., 2003; Wang, 2008). Intellectually, educators and facilitators help learners achieve objectives by helping them comprehend critical learning concepts. They also distribute and collect class materials, proctor exams and quizzes, and report class needs or problems as they occur (Spencer, 2020; Wang, 2008). Socially, the facilitator creates and maintains a friendly environment. Such an environment makes learners feel safe and comfortable interacting with the educator and with each other (Anderson, 2003; Wang, 2008).

In their research, Yi and Majima (1993) found that the relationship between the educator and the learner for distance education (and similar to traditional classroom instruction) has an impact on learning. Positive relationships between the educator and learner has a positive effect, while negative relationships affect learners negatively. According to MacGregor and Atkinson (2002-2003), educators should be mentors and role models to the learners. Johnson (2013, 39-41) identified the following educator qualities that have a positive effect on learning, including:

demonstrating compassion and understanding (know the audience, their interests, and learning styles, exercise patience and kindness, have realistic expectations of learners), being a good listener, checking for understanding, providing consistent and timely feedback to learners,

As with traditional classroom learning, effective distance education depends on the provision of pedagogical excellence. Keys to pedagogical effectiveness in distance education center on the appropriate and strategic use of interactivity among educators and learners, with the material leading to learner engagement, deep processing, and understanding (Bernard et al, 2004). The design of interactivity with learning materials should be derived from cognitive psychology, including socio-cognitive and constructivist principles of learning. (Bernard et al 2004). Learning materials and tasks must engage the learner in ways that provide meaningfulness, understanding, and transfer.

Other researchers, however, emphasize that different skills are needed for online instruction than for face-to-face instruction and traditional classroom environments (Barbour, 2019; Pulham & Graham, 2018; Pytash & O'Byrne, 2018) and caution against simply putting existing courses into online formats (Hassenburg, 2009). For example, managerially the educator sets agendas such as timeline, rules, and norms for smooth online discussions. In so doing, he or she demonstrates leadership abilities by keeping the learners focused. Technically, the educator or facilitator assists learners by operating electronic classroom media that are appropriate to the delivery of each class session. In addition to that, the educator or facilitator also helps students get familiar and comfortable with the delivery technology (Spencer, 2020; Wang, 2008). The distance educator also must be clear about preferred mode of communication (e.g., email, chat, social media, phone, course discussion board). One difference for distance educators compared with those in traditional classrooms is the need to create a sense of presence with learners. (This is discussed later.)

Advocates of computer-based learning have advocated a shift in the theoretical foundations of pedagogical practice from that of behaviorist teacher-centered instruction to more student-centered constructivist approaches (Herring, 2004; Hill et al., 2009). At the heart of this shift is a change in the way we view the role of the educator. The interaction models that are considered characteristic of today's technology-rich learning environments and the increasing emphasis on synthesis and application of knowledge to authentic tasks and project-based student work most often are described as being learner centered. In distance education, learners often work independently as individuals or in groups. The educator's role changes from being the primary source for knowledge and direction to becoming more a facilitator of learning or (speaking metaphorically) "a kind of ringmaster in a circus of learning events" (Blomeyer, 2002, p. 8).

The literature states the need for distance learning program administrators to set appropriate standards for hiring and retention of distance education faculty, and ongoing development opportunities should be provided. Meeting instructors' professional development needs enhances the learning experience (Levy & Beaulieu, 2003; Lockard, 2001).

Instructional Approaches

Best practice considerations for distance education instruction are often similar to those for traditional classroom face-to-face instruction. For example, in respecting the diverse ways in which students learn, Dillon and Greene (2003) argued that "our most important task as educators is indeed to help learners build a repertoire of approaches to learning so that they can learn to learn under the variety of circumstances that life will surely bring" (p. 238). Therefore, a way of respecting different ways of learning involves helping students to be "more flexible in their approaches across the variety of learning settings they are sure to face" (p. 239). Anderson (2003) proposed instruction that includes opportunities for learner and educator interaction, such as learner to learner, learner to educator, learner to content, educator to content, educator to educator interaction, and content to content. Active learning techniques involve the student's being engaged in interactive activities that can lead to increased "enthusiasm for learning as well as increased achievement beyond course expectations" (Hannafin et al., 2003, p. 250).

Prompt feedback to learners is included as part of instructional best practice considerations for distance education programs. According to Sherry (2003), "communications from faculty that directly engages students and offers timely feedback may contribute to interchanges and the students' subsequent success in the course" (p. 454). While providing feedback to learners is best practice for traditional classroom and learning environments, prompt feedback is important in distance education to help reduce the often reported feelings of lack of presence.

One aspect of distance education instruction that most often differs from traditional classroom and face-to-face instruction is the use of synchronous (real-time) and asynchronous (delayed time) approaches and structures (Romiszowski, 2004). Synchronous online learning, or (SOL), provides an opportunity for instructors to connect in real-time with learners separated by geographical distance (Martin et al., 2021). Typical distance education synchronous communication tools include the telephone, instant messaging or chat tools, video conferencing, and other tools that allow file sharing, audio, and even video communications. Hrastinski (2008) found that synchronous instruction and learning engagement activities help learners to collaboratively construct meaning, have a sense of presence, receive immediate feedback, and provide and receive social support.

An asynchronous approach can support learning opportunities and relationships among learners and educators even when participants cannot be online at the same time (Hrastinski, 2008). Asynchronous distance education learning allows participants to log on to a learning environment at any time and download documents or send messages to educators and other learners. Asynchronous communications encompass those technologies that typically involve a delay between when a message has been sent and when it has been read. Letter writing, fax, e-mail, and threaded discussions are all examples of asynchronous communication. Hrastinski (2008) found that asynchronous instruction and learning engagement activities help learners to remain focused on content.

Best practice considerations for synchronous and asynchronous instruction in distance education include seamless and easy educator and learner interactions with the Internet, computer software, and instructional system features (Warden et al., 2013). It is important to have a clear purpose and rationale for using one approach (e.g. synchronous) versus the other (e.g. asynchronous). This may depend on the type of communication and instructional delivery regarding content (e.g. sharing information, expressing an idea of thought), planning of tasks (e.g. planning work, allocating tasks, negotiating and resolving conflicts), or social support (e.g. expressing emotions, providing advice, talking about life-related issues) (Hrastinski, 2008). Best practice considerations in distance education use synchronous or asynchronous approaches to create and maintain a sense of presence (discussed in the next section) (Mikropolous & Natsis, 2021). Instructional best practices in distance education incorporate different distance education activities and opportunities, such as chat rooms, discussion boards, and Web search activities, to provide flexibility in approaches to learning, as well as multisensory channels for user interaction. For younger learners, the structure of synchronous distance education may be better suited for their academic schedules and their need for spontaneous guidance and feedback (Bernard et al., 2004).

Evans et al. (2008) noted that the distance education environment affords benefits to both educators and learners by changing the dynamic of the educator-learner relationship. Following a constructivist philosophy, Evans et al. (2008) recommended that a sound approach to distance education involves instructional strategies that empower the learners to construct their own meanings from the content and apply it in personal ways. Sound instruction, then, relies upon the ongoing initiative of engaged instructors who are committed to teaching within the online environment, and to approaching their instruction as co-learners.

Herring (2004) examined the issues surrounding this shift in instructional practices for distance education. In a Delphi study conducted using the Web, a panel of experts in university positions from 13 states was asked to identify core constructivist-based

experiences or elements necessary for their implementation in distance education settings. The result is a list of pedagogical guiding practices for curriculum and professional development activities that promote the tenets of constructivist learning environments. Perhaps a more important outcome from this study was an acknowledgment of the primary role of the instructional process in distance education, rather than a focus on operational issues such as time management, classroom management, interaction, and delivery mechanisms. McLoughlin (2002) provided insight into how the core principles of effective instruction espoused by constructivist tenets may be implemented in a distance education setting through a detailed examination of scaffolding and associated technological tools. "Effective support would need to include the encouragement of reflective thinking, provision of social support for dialogue, interaction and extension of ideas with feedback from peers and mentors on emerging issues" (p. 152).

Learning Environment Sense of Presence

The concept of presence is two interrelated phenomena: telepresence, the sense of "being there" at a location remote from their own immediate environment, and social presence, the sense of "being together with others" (Biocca, 2001, p.36). It looks and feels for the learner as if the educator has placed the learner at the center of the instruction. The learners feels that the educators and they are accessible to each other (Dunaher et al, Lehman & Conceiao, 2020).

The research suggests that when there is a sense of presence in online learning it can greatly enhance the educator-learner relationship and influence learning outcomes (Munro, 1998). Biocca (2001) stated "To create presence in the online environment, we need to think, feel, and behave differently than we do in the in person face-to-face environment, because we have to make an effort to be aware of the intentions of others and their thoughts, emotions, and behaviors when they are connected to us via technology" (p. 10). Presence includes the dynamic interplay of thought, emotion, and behavior in the online environment (Lehman & Conceiao, 2020, p. 4).

Online communication can positively influence social presence when it is stimulating, expressive, carries feelings and emotions, is significant, and is implicit. When interactions among participants are enjoyable, immediate, and reactive, and when participants are comfortable and recognize discussion themes, social presence is positively affected. (Lehman & Conceiao, 2020, p. 5; Caspi & Blau, 2008). Social presence is important because humans are social creatures. Our social nature is integral to our perceptual process when interacting with others, not only in the real world but also in online environments. We search for appropriate resources to challenge, support, and enhance our experiences and perceptions.

Lehman, and Conceiao (2020) identify practice considerations for enhancing presence in distance education that complement practices for educators and facilitators (Lehman & Conceiao, (pp. 26-30). These include:

Identifying type and focus of content

Some online learning experiences focus more on process while others more on content. The instructional design might involve learners in completing tasks in small groups (process focus), It might engage participants through discussions to debate, for example, intercultural issues, governmental policies, or best practices (content focus).

Formatting the learning experience

In a mixed format, a blend of self-paced and group-based learning opportunities is specifically designed to provide both individual and group learning experiences. Presence can be enhanced through use of videos, audio, direct communication via telephone or conference calls, email, and other methods, either as individual participants, group collaboration, or a combination of both.

Interactive strategies

Interactive strategies are approaches used to engage the learners with the educator and with other learners. These can take the form of personalizing, discussions, case-studies, role-plays, team projects, scavenger hunts, debates, interviews, guest experts for question and answer, and others.

Role of the educator (instructor or facilitator)

In this role, educators become instructional designers who create the online experience for learners and who engage them in the learning process and instigate conversations.

Types of technology

The technology needs to be accessible and user-friendly, Learners should be able to interface with the technology as if they are participating in an in-person face-to face learning opportunity.

Kinds of support provided:

Instructional and technical support assists both the instructor/facilitator and learners in creating and maintaining presence.

Ijsselstaijn et al (2000) present four types of experience related to creating a sense of presence: subjective, objective, social, and environmental.
1. *Subjective*: Subjective experience is personal and psychological and takes place in the learner's mind. It is the illusion of being in another place. The subjective and

dynamic interplay that results from the interaction between learners and instructor is guided by the learners' emotions, which direct both thought and behavior. This interplay is unique for each learner.

2. *Objective*: This experience has the facilitator and learners feel as if they are actually located within the technology-mediate space with the facilitator and other learners, versus possibly being separated by hundreds or thousands of miles.

3. *Social*: Social presence comes from communicating and interacting with others, or with animated characters in which learners create an avatar to represent themselves. When learners recognize and respond to one another, it validates both the individual and the group experience. If more than one person is in the online environment, there is an increased feeling that the environment really exists.

4. *Environmental*: This is when the online environment incorporates both the physical and the educational aspects of the learning experience. The physical aspect involves the learners having technical access and support for the technology and the tools they are using. The education aspect comprises the extent that learners feel they are an integral part of the environment and can react to it.

Motivating Learners

Educators in general believe that all students can learn. The strength, desire, and temperament to learn vary from one learner to the other (Sankaran & Bui, 2001). Learners who choose distance education need a high level of motivation to complete distance education programs successfully. When engaged in learning opportunities, they often have to work by themselves with little or no opportunities for face-to-face or peer interaction. Learners sometimes must deal with more abstract and ambiguous situations than someone engaged in traditional classroom learning. They need to be efficient in time management, be responsible and in control of their studies, and maintain an image of self-worth and self-efficacy.

Ormrod (2010: p. 200- 368).) who commented on the importance of tapping student motivation for distance learning offered the following guidelines for good practice in fostering learner motivation:

1. When learners approach a task believing they can make sense of the information (that is, when they are engaged in meaningful learning) they are more likely to consume and process that information meaningfully.

2. Learners with a high sense of self-efficacy are more likely to exert effort when attempting a new task. They are also more likely to persist (to try, try again) when they confront obstacles to their success.

3. Learners often set goals for themselves and direct their behavior accordingly. In essence, they are motivated to accomplish their goals.

4. Learners with high achievement motivation seek out challenging tasks that they know they can accomplish with effort and persistence. They set increasingly high standards for excellence as their current standards are met.

Research has shown that learners exhibit greater motivation when the content of a learning opportunity is of interest to them and they perceive some personal relevance in the content (Adler, et al., 2001; Brass, 2002; Burke, 2003). Motivation and performance were found to be significantly correlated and that high motivation is associated with high performance, while low motivation is correlated with low performance (Dunigan & Curry, 2006; Nikolaki et al., 2017; Sankaran & Bui, 2001).

According to Parker (1999), distance education necessitates the use of real world problems that learners work on in teams to find solutions for and consistent levels of interaction among learners of a distance education program and with the educator. He suggested that distance education courses and learning opportunities should therefore be designed in a manner that would allow for interaction through questioning, evaluation, and analysis. Such activities support learner motivation by linking theory to practice.

Studies that examine reasons for participating in distance education may offer insight into the relationship between motivation and learner success. Learners appear to enroll in online courses for similar reasons. Convenience, flexibility in scheduling, credit recovery, accelerated learning opportunities, conflict avoidance, and the ability to take courses not offered at a local school or institution are just some of the reasons identified in the research (Chen & Jang, 2010); Tunison & Noonan, 2001) Research also indicates that factors such as learner attributes and their choice of engagement delivery method may also influence motivation (Roblyer, 1999; Tunison & Noonan, 2001). Hypothesizing that there is a relationship between learner attributes, motivation, and success, Roblyer and Marshall (2002) used the results from an educational success instrument to predict student success in online courses.

Social Development

Social development often occurs differently when engaging in distance education compared with the face-to-face traditional classroom experience. Improvements in distance education technologies that assist in providing enhanced opportunities for interaction, such as threaded discussion boards and real-time audio and video communication tools, are examples of a perceived need or desire to replicate classroom interactions as closely as possible. For this reason, social dimensions and affective learning domains continue to generate interest in both traditional and virtual learning environments.

Of particular interest related to motivation is the research that examines learner outcomes through the lens of the theories of transactional distance, interaction, and

social presence. The research provides evidence that interaction in distance education opportunities involves a complex array of variables that include social, instructional, and technological. Interaction also plays a role in social presence, and Wolcott (1996) confirmed that psychological distance is a problem inherent in many distance education opportunities. Moore (1989) believed that distance is not a matter of geography but rather psychology, and although geographical or physical distance may be increased in distance education settings, its effect can be decreased. He suggested that the interchange within a distance education context is characterized by three different types of learner interactions: 1) learner-to-content (appropriateness of the course material and delivery vehicle considering the objectives and learners), 2) learner-to-instructor (types of communication and feedback, access and support, etc.), and 3) learner-to-learner (types of communication and feedback, support systems, and procedures for dialogue, etc.). Hillman, Willis, and Gunawardena (1994) add an additional mode of interaction related directly to distance education, learner-to-interface, where interaction is related to user access and competency with the specific technology employed.

Learner Support

The *21st Century Distance Education Guidelines* (2001) indicate that learner support appears to play a role in the success of distance education and is a key indicator of quality. Even if learners are highly motivated and self-directed, in a distance education environment they can still find the experience to be isolating, difficult, and discouraging. Although many distance education–related support services are controlled and maintained by the organization, the program planner should explore strategies to provide student support services equitably (Chaney, et al, 2007).

In adult learner research, instructional support, technical support, services that promote a sense of community, and the design of the learning environment have all been found to influence learner success (LaPadula, 2003; McLoughlin, 2002). Unfortunately, the literature provides little insight into addressing the specific needs of K–12 learners in the form of learner supports.

A study conducted by Frid and Soden (2001) concluded that experiences in a distance education environment can actually improve learner autonomy and independence, but also indicates the importance of learner support. In this case, the amount of engagement by educators seemed to influence the amount of and quality of participation by learners. Interactions with peers appeared to have an effect on learner outcomes. When evidence of interaction with peers was apparent, learners were more likely to persist with a challenging problem.

Weiner (2003) examined information gathered through surveys and interviews in a qualitative, descriptive case study that revealed students' attitudes toward learning,

motivational issues, academic achievements, and strengths and weaknesses of Web-based instruction. In summarizing the results she reports "The research findings confirmed that a high degree of student-teacher interaction, including feedback and summaries to the students, are a necessity in the virtual classroom, otherwise students felt ignored, lonely and lost in their courses" (p. 49).

Academic and support staff who interact with students should be able to guide them to the range of support services offered by the institution providing the distance education experience. Continuing support helps students develop as engaged learners, with the information and skills to seek special opportunities to enhance their success. Academic and student support services should be available remotely, easy to access, and available at times when students need them. Collective responsibility for student success should be accepted by academic, technical, and student support staff.

Technical support

The development of a high-quality distance education course involves the selection and use of appropriate tools and media. The most appropriate medium of delivering instruction to students via distance education does not necessarily mean the newest, most expensive technology available. There are several factors to consider, such as learner autonomy, types of interaction, access, and cost of the media. At the end of the day, technological tools and media should be chosen by "how it allows or does not allow the other elements of the course to behave in a systems environment where all the elements or variables interact" (Shearer, 2003, p. 275).

To decide on what is appropriate for any particular distance education course, the educator must first assess the needs of learners to identify what best meets their needs and consider technologies used in the past and how these types of media provided access while promoting learner autonomy, interaction, and cost effectiveness. According to Shearer, (2003) "There is no one best technology, and it is usually a combination of technologies that produces the best course in terms of meeting the learners' educational objectives, designers of instructional material for distance education courses understand the strengths and weaknesses of a vast array of technologies and how the older technologies have been deployed in the past to address the multitude of design factors." (p. 285)

Evaluating Implementation and Outcomes

21st Century Distance Education Guidelines (2021) discuss best practice considerations in distance education as regularly evaluating distance education programs. These evaluations should be informed by empirical evidence including feedback from students and graduates about the academic program and information about graduates' success (e.g., employment and further education). Evaluation and assessment of instructional techniques for distance education are critical in improving

and ensuring distance education quality (Black, et el, 2008; Clark, 2000). According to the Statement of Regional Accrediting Commissions on the Evaluation of Electronically Offered Degree and Certificate Programs (2008), institutions offering distance education courses or programs should conduct sustained, evidence-based and participatory inquiry as to whether these programs are achieving objectives. The results of such inquiry should be used to guide curriculum design and delivery, pedagogy, and educational processes, and may affect future policy and budgets perhaps having implications for the institution's role and mission. (Council of Regional Accrediting Commissions, 2001, p. 433).

Discussion and Conclusions

Best practices in a field are approaches that have been tested and have been generally accepted, prescribed, or adapted as being correct or most effective. Since distance education has evolved over time and continues to evolve, and most recently been influenced and challenged by the COVID-19 pandemic, it is the position of the authors that the literature is not yet clear or definitive on what it can confidently state about what are tested best practices in distance education, especially when it comes to informal learning environments. However, after scanning the literature regarding distance education, the authors have identified practices that need to be, or should be, considered for quality distance education practices to result in desired or positive learning outcomes. These include 1) the importance of organization, vision, and planning when designing and implementing distance education programs and learning opportunities, 2) the role of educators and facilitators, 3) instructional approaches, 4) the learning environment, including creating a sense of presence, 5) motivating learners, 6) importance of learner social development, 7) technical support, 8) learner support, and 9) the importance of evaluating implementation and outcomes.

Many of the considerations for best practice in distance education are not that dissimilar to those considered for traditional classroom or face-to-face learning programs. Deliberate and effective strategic planning of programmatic structure and instructional delivery are needed for most any learning environment. Identifying quality educators and implementing educational practices that help to create a safe and supportive environment for leaning, recognizing and respecting different learning styles, and building critical thinking skills is a consideration for best practice in most any learning environment. Assessing and evaluating the instructional process and extent that desired learning outcomes are met for instructional and programmatic improvement is a desired and beneficial practice.

There are some considerations for best practices that may be especially important for distance education. Reflecting the unique and often different factors presented by distance education, compared with traditional classroom and face-to-face learning environments, should lead to different instructional practices by educators when using synchronic and asynchronic instructional approaches. The practice of creating a sense of presence for on-line learners in distance education environments is critically important, as well as attending to their social needs which are addressed differently in traditional classroom and face-to-face learning environments. Practitioner consideration for providing and maintaining sufficient technical support for distance education learners is critically important, as well as identifying and responding to what motivates learners to pursue and engage in distance education that may be different from other types of learning environments.

As revealed in the first white paper in this series, distance learning started with, and throughout much of its history, focused on, adult learners. This is reflected in the literature reviewed for this white paper. As we found the literature to be somewhat lacking regarding distance education practices that should be considered specifically for K-12 learners, as well as practice considerations for informal learning environments that include museums, science centers, zoos, and aquariums. While further study and research is needed for distance education in these types of institutions, best practice considerations for distance education programs, in general, may be transferred, applied, or adapted for informal learning environments.

Based on the findings of this literature review, we conclude that future research in distance education in informal settings would be beneficial to the field of distance education and should include the following:
1. Developing a theoretical framework for the design and analysis of distance education in informal settings.
2. Exploring more fully learner motivation including task choice, persistence, mental effort, efficacy, and perceived task value for informal science distance learning.
3. Investigating levels of learning (e.g. simple knowledge or comprehension vs. higher order thinking) and different instructional strategies of best practices for achieving these informal learning outcomes.
4. Examining inclusivity and accessibility for home learners, rural and remote learners, and learners with various disabilities.

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