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FROM *the* EDITOR

Andrew M. Markelz
Founder & Editor of JOSEP
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Welcome to the second volume of the *Journal of Special Education Preparation*! The editorial team is excited to enter our second year developing *JOSEP* to be a valuable resource. We continue to strive towards our mission of providing a high-quality, peer-reviewed journal that features research-to-practice articles for special education faculty in higher education settings. In doing so, we hope to advance the professional development of faculty by providing information, resources, and tools to improve the education and experiences of preservice special education teachers and administrators.

The education and integration of technology in teacher preparation is an acute topic. Not only are faculty charged with incorporating technology into their own coursework, but also with preparing future special educators to effectively leverage technology in their future classrooms. The previous two academic years have forced all educators to grapple with multiple formats of online and hybrid learning. It is evident that technology will continue to be an area of innovation and integration in education. That is why, the editorial team at *JOSEP* has identified *Technology in Special Education Teacher Preparation* as a worthy focus for our third special issue. We invited scholars, experienced in technology and teacher preparation, to submit articles with practical implications for special education faculty. As a result, this special issue includes six technology in teacher preparation articles that special education faculty can read and implement today to better their practices and the outcomes of their teacher candidates. We also present an *International Spotlight* article, furthering our mission in the awareness and education of world-wide special education preparation. Lastly, the editorial team wanted to offer readers and future contributors to *JOSEP* two important articles to explain the processes of writing and reviewing for this journal.

In this Issue

The first article is from *JOSEP* editors Markelz and Riden (2022) titled "How and why to write for the Journal of Special Education Preparation." This article provides a detailed description of *JOSEP*'s purpose and role within the field of special education teacher preparation. The authors outline what is and what is not published in *JOSEP* and how to write a quality manuscript that is more likely to be accepted for publication. If you are contemplating a contribution to *JOSEP*, we highly recommend reading this article to best understand the guidelines and processes of publication.

The second article is also from *JOSEP* editors Chitiyo and Weiss (2022) titled "How to review for the Journal of Special Education Preparation." If you are interested in offering your service to the field, reviewing for journals has many benefits. The authors outline how to become involved with *JOSEP*'s review process, as well as how to conduct quality reviews. The importance of quality peer-reviews to the success of emerging journals such as *JOSEP* cannot be understated.

Technology in Special Education Teacher Preparation

Flanagan et al. (2022) kick off the special issue section of this issue with a focus on Universal Design for Learning (UDL) in online special education teacher preparation. The authors discuss how UDL can break down barriers and create purposeful content in teacher preparation to recruit learner interests, sustain learner efforts, and provide learners with options to apply knowledge and demonstrate understanding.

In the next article, Nagro (2022) describes a three-phase sequential approach to developing teacher candidates as reflective practitioners. Video-based reflections are common practice in teacher preparation, but without guid-

ance on how to reflect, many candidates lack the ability to critically review, analyze, and evaluate their teaching. Nagro provides logistic details and parameters, as well as sequential steps for guiding reflective practice during each phase as candidates transition from understanding to examining their teaching practice.

Qualls and colleagues (2022) provide readers with guidance on selecting and integrating videos to address critical high-leverage practices (HLP) content in teacher preparation. With a focus on leveraging effective design elements, the authors describe the benefits of using video to address HLP content in special education teacher preparation programs and offer guidance on integrating video within coursework through the use of a multimedia instructional tool called Content Acquisition Podcasts (CAPs).

Driver and Zimmer (2022) provide a comprehensive discussion about the application of mixed-reality simulation (MRS) as an innovative and promising approach in teacher preparation programs. The authors recognize the daunting nature of this novel technology for faculty and school leaders. As such, they provide a guide to further explain the utility of MRS, provide detailed explanation and resources for integrating this technology as a practice-based learning opportunity in teacher preparation, and illustrate an example of how MRS can be used in special education coursework.

In the next article, Horn and Rock (2022) offer a rationale for making widespread, digital-age changes to coaching and supervising with the evidence-based practice of real-time performance feedback delivered via bug-in-ear technology. The authors provide an overview of relevant research pertaining to the efficiencies and efficacies of eCoaching and offer guidance and recommendations for successful online bug-in-ear integration during teacher preparation clinical experiences.

The final article in our *Technology in Special Education Teacher Preparation* section is by Kunemund et al. (2022) titled "Streamlining observations, feedback, reflection, and professional development: Are you ready to be COACHED?" In this article, the authors describe a multimedia coaching option for teacher educators and teacher candidates to use to streamline the observation and coaching process using effective coaching practices and improved consistency. Specifically, the multimedia tool can be used to document preservice teacher practice, generate feedback, deliver targeted instruction, and provide the opportunity for structured self-reflection.

> It is evident that technology will continue to be an area of innovation and integration in education.

International Spotlight

The *International Spotlight* is provided by Mathende and Beach (2022) who examine educational information and communication technology (ICT) in Angola, South Africa, and Zimbabwe. The authors discussed how several African governments are developing ICT policies to expand integration of ICTs in primary and secondary education for the benefit of students with disabilities. This article reviews these educational ICT policy implementations, successes, and challenges, and discusses implications for future policy development.

Many Thanks!

Thank you contributing authors for providing quality articles that meet *JOSEP*'s mission. The editorial team believes *JOSEP* readers can greatly benefit from a plethora of insightful, detailed, and practical suggestions within this issue. Secondly, we extend our appreciation for the reviewers who provided timely and constructive feedback that enhanced the overall quality of included articles. In particular, Dr. Elizabeth Hughes at Penn State University led a team of doctoral students to conduct guest reviews. Thank you, Dr. Hughes, Meghan Allen, Takimia Calhoun, Christina Gilhuber, Madeline Halkowski, Liang Zhigao, Tzu Hsing Lin, Mary Ellen O'Donnell, and Jaren Van for your contributions to this issue of *JOSEP*.

We are grateful for the support of the Teacher Education Division (TED) of the Council for Exceptional Children (CEC) and Ball State University Library. Also, thank you McKinley Avenue Agency for creating a professional, high-quality publication design that matches the high-quality of our content.

What's Next?

In January 2022, *JOSEP* opened for public manuscript submissions. We welcome submissions on any topic pertinent to readers of *JOSEP*. Again, we encourage everyone to read the article by Markelz and Riden (2022; this issue) to familiarize oneself with the aim, scope, and process of writing for *JOSEP*. Our next issue is scheduled to publish in Fall 2022 and is a special issue on *Small Special Education Teacher Preparation Programs*. *JOSEP* partnered with the Small Special Education Programs Caucus of TED to focus on issues germane to small programs. We currently have several author teams working on manuscripts for this issue ranging in topics from leveraging service learning in small teacher preparation programs to emphasizing special education in dual certification programs. The next *International Spotlight* will examine special education in South Korea.

We hope you enjoy this issue of *JOSEP* and get some rest and relaxation during the summer months!

How and Why to Write for the Journal of Special Education Preparation

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ABSTRACT

The *Journal of Special Education Preparation (JOSEP)* is a peer-reviewed journal that features research-to-practice information and materials for special education faculty in higher education settings. In this article we discuss the niche JOSEP is fulfilling in the field of special education teacher preparation, why authors should consider contributing to JOSEP, and how to develop and write high-quality manuscripts that have a greater chance at acceptance and publication. A general overview of the journal is presented as well as detailed checklists to use when developing a manuscript for submission.

KEYWORDS

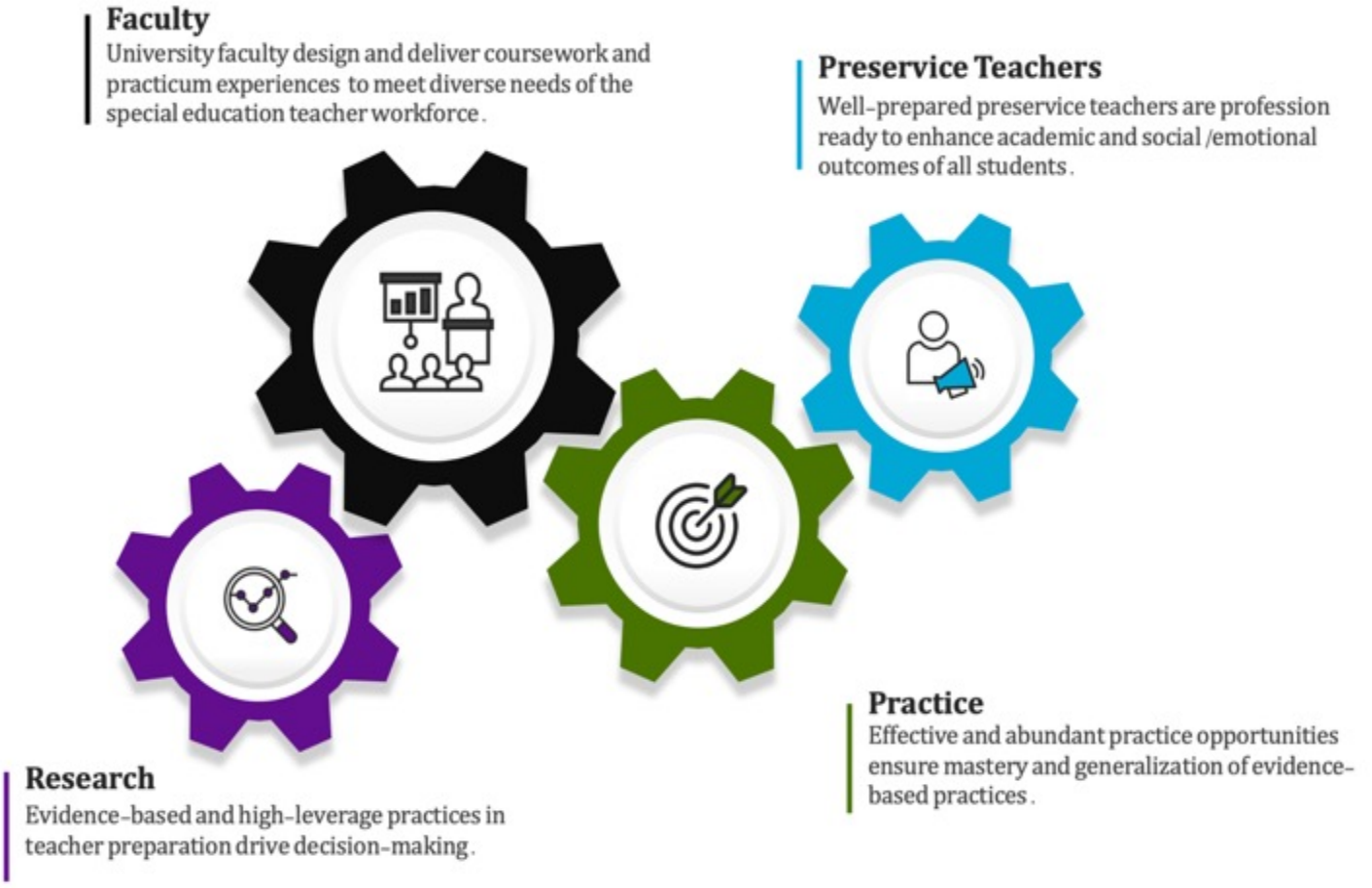
Academic journal, faculty, special education, teacher preparation

The *Journal of Special Education Preparation (JOSEP)* is a peer-reviewed journal that features research-to-practice information and materials for special education faculty in higher education settings. *JOSEP* was founded to advance the professional development of special education faculty to provide information, resources, and tools to improve the education and experiences of preservice special education teachers and administrators. Consistent with this purpose, *JOSEP* publishes articles that share innovative and successful methods and materials based on current evidence-based practice for use in a wide variety of higher education programs and settings. Quite simply, *JOSEP* articles are written for those who prepare special education teachers and administrators (see Figure 1).

The editorial board at *JOSEP* believes evidence-based and high-leverage practices (Council for Exceptional Children, 2018) should be comprehensively integrated throughout teacher preparation programs. To do so, special education faculty must use current best practices to design and deliver coursework and practicum experiences to meet the diverse needs of their preservice teachers and the special education profession. Through effective and abundant practice opportunities, faculty can ensure that their preservice teachers achieve mastery and generalization of evidence-based practices to meet the diverse needs of their future students. Ultimately, well-prepared preservice teachers are profession ready to enhance the academic and social/emotional outcomes of all students. Furthermore, a well-prepared special educator is more likely to remain in the field longer (Boe, 2014), which is critical in countering chronic teacher shortages (U.S. Department of Education, 2021).

The creation and dissemination of *JOSEP* is possible through a partnership with the Teacher Education Division (TED) of the Council for Exceptional Children (CEC) and Ball State University. TED is an international professional organization that leads and supports teacher education on behalf of students with exceptionalities and their families. TED accomplishes this mission through professional development, advocacy, research, and collaboration. *JOSEP* aligns with TED's mission by publishing practitioner (i.e., special education faculty) articles as an essential compo-

FIGURE 1: The Components and Purpose for the Journal of Special Education Preparation



nent to bridging the research-to-practice gap (Hott et al., 2017).

Ball State University supports *JOSEP* with a subscription to Open Journal Systems (OJS). OJS is an open-source software application for managing and publishing scholarly journals. With this support, *JOSEP* articles are free to access, download, and share by anyone, to anyone. University libraries do not need to subscribe to unlock *JOSEP* content, nor do authors pay a publishing fee. *JOSEP* allows all special education faculty, across the globe, free and easy access to content through its website: https://openjournals.bsu.edu/JOSEP

Currently, *JOSEP* content is indexed in Google Scholar. Other databases, such as ProQuest, PsycInfo, and ERIC, require 3-4 published issues before applying for indexing. Once *JOSEP* has enough issues published, the journal will apply for indexing within these commonly used databases which will expand the dissemination of *JOSEP* articles.

Why Write for JOSEP

Although *JOSEP* is a newer journal within a sea of peer-reviewed publication outlets, it fulfills a niche. No other scholarly journal specifically addresses the preparation of special education teachers in a practitioner friendly format. The journal of *Teacher Education and Special Education* (*TESE*) is the official journal of TED and is the premier journal in special education teacher preparation. However, *TESE* exclusively publishes original research which can often not translate into immediate application purposes for faculty who are designing and delivering instruction in teacher preparation programs. *JOSEP*, on the other hand, allows evidence-based practices, established in original research, to be presented in a format for immediate application. *JOSEP* and *TESE* are complimentary journals as *TESE* establishes evidence-based practices and *JOSEP* bridges the research-to-practice gap.

All special education faculty should consider submitting manuscripts to *JOSEP* regardless of program size or research expectations. For faculty who do work at institutions where original research is expected, *JOSEP* provides an avenue for implications of empirical studies to be converted into "how-to" guidance for teacher preparation. For faculty who work at institutions with higher teaching loads, *JOSEP* provides

TABLE 1: Typical Structure of a JOSEP Practitioner Manuscript

MANUSCRIPT COMPONENT	DESCRIPTION
Problem	The problem or topic of the manuscript is introduced with sufficient context. The problem can be presented in a fictional vignette. Recent research must be cited to establish that the problem or topic is relevant to a wide audience of faculty in special education teacher preparation.
Positioning of solution in evidence	The solution(s) to address the problem or topic is detailed in this section. An extensive review of literature is not appropriate; however, findings related to relevant studies may be used to highlight evidence-based practices.
Application section	This section represents a majority of the manuscript. Guidance for how to implement a practice is detailed in explicit and logical language. Supporting materials such as checklists, figures, tables, and examples should be included to facilitate understanding and application. Guidance should be general enough for implementation across a variety of settings. If a fictional vignette was used previously, it can be integrated within this section to provide specific "how-to" examples.
Conclusion	To conclude, readers should be remined of what the problem is, why a solution is important, and what are the essential elements of implementation for the solution.

a medium for best practices and "what works" in your program to be shared with colleagues. Tenure-track, contract, and adjunct faculty are all responsible for preparing future special education teachers to succeed in a challenging professional environment for the betterment of students with disabilities. *JOSEP* now allows the entire special education faculty community to contribute and read literature on the development of special education preservice teachers.

What Is and Is Not Published in JOSEP?

One of the reasons there are so many scholarly journals available is that each one is attempting to meet a demand. Having explicit inclusion and exclusion criteria help contributing authors identify which journals are suitable fits for their work and which are not. Readers also benefit from clear criteria knowing where to find articles to meet their inquiry needs. In this next section, we outline what is and what is not published in *JOSEP*.

WHAT IS NOT PUBLISHED IN JOSEP?

Original Research

JOSEP does not publish original research. This includes single-case design, group design, qualitative, survey, action, literature reviews, mix-methods, or case-study research. Original research manuscripts have a standardized format with an introduction, methods, results, and discussion section. Other scholarly journals exist that publish original research (e.g., *TESE*), therefore, *JOSEP* is not attempting to fulfill this niche.

Limited or No Research

Although *JOSEP* does not publish original research, it also does not publish articles discussing practices with limited or no research support. Some practices or strategies are evidence based—meaning more than one study has demonstrated that the practice results in improved outcomes for certain populations (Cook & Cook, 2013). The focus of an article, however, does not need to be a singular, evidence-based practice. *JOSEP* articles can be grounded in research—meaning these articles draw on evidence that have demonstrated features of the practice improve outcomes. It is easy to identify if described practices are evidence based or grounded in research if the references include original, empirical research. Most references to secondary sources, such as websites, other practitioner journals, and textbooks are less appropriate and indicate the described strategy might not have sufficient research support for publication in *JOSEP*.

Inappropriate Audience or Content

Manuscripts that are not written for the target audience of *JOSEP* will result in a desk reject from the editorial team. The target audience of *JOSEP* is faculty in higher education setting

TABLE 2: What Is and What Is Not Published in JOSEP

WHAT IS	WHAT IS NOT
Actionable guidance for readers	Original research such as empirical studies, literature reviews, and case studies
Relevant and novel topics	Topics and strategies that are not generalizable to a broad audience
Issues pertinent to those who prepare special education teachers and administrators	K-12 classroom strategies for teachers
Current research support for strategies (typically within 10 years)	Practices with limited or anecdotal evidence

who prepare special education teachers. Often, we will state that *JOSEP* is published for special education faculty. However, its content may be relevant for other faculty members for example educational psychology faculty, school counselor faculty, faculty in applied behavior analysis programs, or graduate level faculty, such as those who prepare special education administrators. Manuscripts describing practices for special education teachers to implement in their classrooms are not appropriate if the manuscript is directly addressing the special education teacher. Practitioner journals for special education teachers already exist (See TEACHING Exceptional Children). In addition, manuscripts with excessive formatting or grammatical errors are also not sent out for review.

WHAT IS PUBLISHED IN JOSEP?

Practitioner Articles

JOSEP publishes articles that are 18-25 pages in length including abstract, figures, tables, and references. As a research-to-practice journal, all manuscripts should be grounded in an appropriate research base or founded upon a strong understanding of recent legislation. The key to successful manuscripts for *JOSEP* lies in the author's ability to translate content into actionable guidance for practitioners (i.e., special education faculty). Manuscripts should be well organized with a simple message for immediate application. The typical structure of a *JOSEP* manuscript begins with a presentation of a problem followed by a brief synthesis of relevant, recent empirical research. The bulk of the manuscript is then devoted to the delineation of detailed practice guidelines supplemented with tables, figures, and examples. Many manuscripts include scenarios or examples (commonly referred to as "fictional vignettes") illustrating how suggested practices might be implemented with one or more individuals or in different contexts; however, vignettes are not required (see Table 1).

Appropriate Content

Apart from what was detailed in the previous section about what is not published in *JOSEP*, there is a wide spectrum of what constitutes appropriate content. In general, any issue or problem pertaining to the preparation of special education teachers and/or administrators is appropriate. The issue may be narrowly focused such as using a culturally responsive lens to discuss the revision of a core preparation course (e.g., Williams et al., 2021). Or address a broader issue like teacher shortages with how to recruit, support, and retain a racially diverse special education teacher workforce (e.g., Scott & Proffitt, 2021). Some critical aspects to determine appropriate content are relevancy and novelty. Relevancy means the topic is addressing a problem that many readers of *JOSEP* can relate to. Problems that are limited in scope such as recent legislation that impacts teacher preparation in one state, or an issue within a unique university course that many other universities may not offer are not considered relevant to a majority of *JOSEP* readers. Novelty means the problem and/or solution are described within the manuscript in unique and new ways. Manuscripts with relevant and novel content contribute to the field of special education teacher preparation and are considered appropriate content.

Appropriate Audience

The target audience of *JOSEP* is special education faculty and other professionals who work directly in the preparation of special education teachers and administrators. As such, manuscripts should focus on the unique needs of faculty preparing special education teachers and administrators. From research intensive universities to small programs with perhaps one special education faculty member, manuscripts for *JOSEP* should be conceptualized and written with this broad spectrum of audience in mind. Like

TABLE 3: Typical Structure of an International Spotlight Manuscript

MANUSCRIPT COMPONENT	DESCRIPTION
Introduction to country /region	Familiarize readers with general facts of the country/region such as demographic information, structure of government, and historical contexts that influence current events.
History of special education and teacher preparation	Describe the evolution of special education and the preparation of special education teachers. Summarize laws and policies that shape special education. Provide contextual facts about students with disabilities to educate readers on the status of special education in the country/region.
Current issues in special education and teacher preparation	Discuss current issues that the country/region is grappling with in relation to special education and preparing special education teachers. Proposed solutions to current issues may be included in this section but are not required.

the concept of relevancy, while not every identified problem and solution will pertain to every faculty member, implementation strategies should be generalizable to a variety of contextual settings.

Current Research

As a rule, references should reflect research published within the past decade. It is acceptable to reference older research that is formative in the historical context of a problem or practice, however, these should be used sparingly. Using recent research to establish the problem and describe solution steps strengthens the relevancy and novelty of a manuscript (see Table 2).

International Spotlight

In addition to practitioner articles, *JOSEP* is interested in publishing articles that highlight special education preparation practices from around the globe. The International Spotlight section of *JOSEP* is tailored for article contributions that discuss country specific special education preparation policies and practices. International Spotlight submissions will need to provide readers with country specific context and laws before discussing current issues pertaining to special education and teacher preparation in that country/region (see Table 3). International Spotlight submissions may outline interesting local initiatives that can generalize to historical, social, and global trends.

HOW TO PREPARE A SUCCESSFUL MANUSCRIPT

Within the American Psychological Association (APA) publication manual, explicit guidelines for formatting a manuscript are provided. Manuscripts that vary dramatically in presentation from APA will not be sent out for review. To avoid common errors in formatting, authors should adhere to the following requirements.

Formal, Academic Language

Although *JOSEP* is a practitioner-friendly journal, the manuscript should reflect formal, academic language. Doing so makes content more accessible to readers. Authors should avoid the use of jargon in their manuscripts. Technical terms, if used, need to be clearly defined with examples and non-examples clarifying the terms. Similarly, the over reliance on long, complex sentences hamper the readability of a manuscript. Concise sentences enhance the readability of a manuscript and complement more complex content. Additionally, the use of tables, figures, fictional vignettes, and checklists supports the reader in comprehending material presented in the manuscript.

Consider Perspective

Common thought is that first-person perspective is prohibited under APA guidelines, this is not accurate. For *JOSEP*, first person point of view (I, we) can be used effectively (e.g., "We suggest…"). However, use of the editorial "we" is not permitted (e.g., "We, as a field, need to do a better job of…"; APA, 2020). Second-person perspective can help readers connect the content to their settings and experiences, but habitual use of "you" throughout a manuscript creates a dictatorial tone to the manuscript, which can be aversive to some readers. Third-person perspective tends to be the "Goldilocks" point of view for *JOSEP* manuscripts.

Maintain a Consistent Voice

Author teams who work together to submit a manuscript should be careful to maintain a consistent voice throughout the manuscript. We suggest author teams solicit an independent reader to review the manuscript and ensure a consistent voice and tone are presented across sections that may have been constructed by multiple authors.

Use Economy of Expression

Reduce wordiness, redundancy, excessive use of metaphors, and overuse of passive voice to create precise, clear communication. If authors can use one word instead of three words, they should. One of many ways to do this is to use the find feature to search for the word that. Often *that* is used as a filler word and does not add to the content.

Avoid Bias in Language

When writing about individuals with exceptionalities it is common to use person first language. However, some communities prefer disability first language, such as the blind and deaf community. In general, default to person first language unless an intentional discussion between person first and disability first language is included. People first language refers to both the placement of the person prior to the disability (e.g., "student with a learning disability" rather than "LD student") and avoidance of sensational or demeaning language (e.g., "suffers from ADHD," "is wheelchair-bound"). Avoid the use of gendered pronouns (he, she, his, hers, he/she, etc.) by making the sentence plural, dropping the pronoun, or using third person (they, them, their).

Adhere to APA Formatting Conventions

Double space all content within the manuscript (e.g., title page, abstract page, body, quotes, fictional vignettes, references) and use one-inch margins. The preferred font for APA publications is 12 point, Times New Roman.

FIGURE 2: JOSEP Manuscript Preparation Checklist

Appropriate Content for Practitioner Articles

- ☐ Has a specific research-to-practice focus
- ☐ Directly addresses the preparation of special education teachers and/or administrators
- ☐ Presents a problem and solution that are relevant and novel
- ☐ Includes graphic elements to facilitate content understanding and application
- ☐ References current research

Appropriate Content for International Spotlight Articles

- ☐ Includes introduction with summary of country/region facts
- ☐ Discusses county/region history and guiding special education policies
- ☐ Examines current issues in special education and teacher preparation

APA Style

- ☐ Uses formal, academic language
- ☐ Presents data-based information, not emotionally charged position statements
- ☐ Considers perspective
- ☐ Maintains a consistent voice
- ☐ Employs economy of expression
- ☐ Avoids bias in language

APA Formatting

- ☐ Adheres to APA formatting conventions
- ☐ Includes a concise title
- ☐ Includes a brief, focused abstract
- ☐ Uses formatting tools within Microsoft Word

Use Formatting Tools Within Microsoft Word

Manuscripts produced without the use of appropriate formatting tools often lose their formatting when translated into the portable document format (PDF) and can make the document difficult for reviewers to follow or create an unprofessional look to the document that can be off-putting to reviewers. For example, when formatting a manuscript, use page breaks rather than hard returns, hanging-indent paragraph formatting for references, and alignment tools for centered titles rather than the Tab key.

Include a Concise Title and Abstract

Manuscripts for *JOSEP* offer a research-based solution to a problem of practice; the abstract should reflect this focus. Type your title in upper and lowercase letters centered in the upper half of the page. The title should be centered and written in boldface. APA recommends that your title be focused and succinct and that it should not contain abbreviations or words that serve no purpose. Your title may take up one or two lines. Your abstract should contain your topic and purpose, how you will be presenting the content (e.g., using a vignette), and a preview of the considerations the author teams are suggesting. Abstracts should typically

ABOUT THE AUTHORS

Andrew Markelz

Andrew M. Markelz, PhD, is an assistant professor and assistant department chair in the department of special education at Ball State University. Dr. Markelz is editor of the Journal of Special Education Preparation and co-author of The Essentials of Special Education Law. The focus of his research is on expediting the novice-to-expert teaching curve in proactive classroom management strategies and issues related to special education law.

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be no more than 250 words. In addition, include 3-5 key words below the abstract that identify main topics of the manuscript.

Include Graphic Elements

Tables and figures are used within *JOSEP* manuscripts to provide checklists, sample materials, examples, definitions, etc. Tables and figures should be referred to within the narrative (e.g., "see Table 2 for a list of common terms used") and potential placement indicated by a notation such as <insert Table 1 here>. Tables and figures should not be inserted within the main body of the manuscript. They should be placed at the end of the document after the reference section.

Fictional Vignettes

Fictional vignettes are narrative texts that authors may invent to illustrate a problem or to present their solution and strategies. Vignettes are stories or situations that do not strictly report factual realities observed by the authors but assist readers in making connections between the content presented and personal implementation. Although fictional vignettes are not required, author teams should consider their usage. Please see Figure 2 for a checklist for preparing a manuscript for *JOSEP*.

Submission and Review

Once a manuscript is finalized, after careful consideration of *JOSEP*'s aim, scope, and preparation requirements, it is ready to submit for peer-review. The first author must create an account on *JOSEP*'s website https://openjournals.bsu.edu/JOSEP to gain access to the submission portal. After registration, the submitting author can upload the masked manuscript as one main document into the system. In addition, a cover letter must be uploaded separately with all authors' contact information and any declaration of conflicts of interest or financial disclosures.

When a manuscript is submitted to *JOSEP*, the editorial team reviews it and decides whether the manuscript should be forwarded for peer-review. If the manuscript passes initial editorial review, it is sent to at least two peer-reviewers to thoroughly evaluate the manuscript on the basis of clarity, accuracy and validity of the topic, value of contribution to the field, implications for special education preparation, and quality of writing. See Weiss & Chitiyo (2022) for a more detailed *JOSEP* peer-review process.

Typically, peer reviewers have 21 days to complete and submit reviews. Taking reviewer feedback into consideration, the editorial team then decides whether the manuscript is accepted for publication, needs revisions, or is rejected. It is rare for a manuscript to be accepted without at least one round of revisions required. If the manuscript is deemed appropriate for *JOSEP* but needs minor or major revisions, the first author is notified via email that the manuscript requires additional revisions to meet publication standards. Within that email, the first author will receive reviewer and editor comments that need to be addressed prior to resubmission as well as a resubmission date. Authors are generally given 30 days to complete revisions and resubmit. Missing

resubmission deadlines may result in a manuscript rejection.

To ensure all reviewer and editor comments are addressed, we recommend authors copy and paste each individual comment/recommended edit into one column in a table. Then, authors can specifically address each comment in a corresponding column. In addition, authors are asked to make edits within the manuscript in a different color font. These procedures allow future reviewers and editors to see exactly how each initial reviewer comment was addressed and where in the manuscript edits were made. Comprehensively and explicitly addressing initial reviewer comments will lead to a greater likelihood of acceptance following the first round of revisions.

The first author will then upload the edited manuscript and revisions table into the system for editorial review. If needed, the manuscript may be sent to the initial reviewers to determine if the edits meet expectations. Depending on the quality of reviews, the manuscript may be accepted, forwarded for another round of reviews, or be rejected. The process continues until the manuscript is rejected or accepted for publication and enters the copyedit and publication phase.

Publication

The publication phase of a manuscript consists of thorough copyediting and formatting to fit *JOSEP*'s online publication layout and style. The process can take several weeks to complete, but since *JOSEP* publishes issues in their entirety, a publish-ready article may be held in que until the next available issue. Currently, *JOSEP* publishes bi-annually (May and December). Additional issues may be published, however, depending on manuscript submission and acceptance rates. Authors will have one final chance to read and make minor edits to their article—called the "final proof stage"—before it is published.

Because *JOSEP* is an open-access journal, all articles are free to download with no copyright restrictions. In fact, we encourage contributing authors and readers of *JOSEP* to download and share published content far and wide. Article PDFs can be downloaded at no cost from the *JOSEP* website. In addition, article DOIs can also be found on the website and shared on social media feeds. The purpose of an open-access journal is to provide unrestricted access to scientific literature for rapid dissemination. Financial support from the TED, Ball State University Library, and the Ball State University Department of Special Education allows *JOSEP* to operate as an open access journal to the benefit of the special education teacher education community.

Conclusion

Conceptualizing, writing, editing, submitting, revising, and publishing a manuscript in any peer-reviewed journal is an extensive process. Contributing to *JOSEP* is no different. The effort, however, is worth the rewards. The field of special education teacher preparation will benefit from a peer-reviewed journal that features research-to-practice information for special education faculty in higher education settings. Although *JOSEP* is a new medium for the dissemination of best practices in teacher education, the ultimate success of the journal lies in the quality of content from contributing authors. We hope this article provides guidance for prospective authors considering *JOSEP* as an outlet for their work in effectively preparing special education teachers and administrators.

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How to Review for the Journal of Special education Preparation

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ABSTRACT

The *Journal of Special Education Preparation (JOSEP)* is an open access, peer-reviewed journal that is dedicated to the dissemination of research-informed practices for special education faculty in higher education settings. The peer review process for *JOSEP* involves a critical examination of submitted manuscripts for quality, organization and conciseness of ideas, novelty of ideas for practitioners, and adherence to APA guidelines. This article describes the review process for *JOSEP* and offers suggestions on how to write a high-quality review report. Reviewers for *JOSEP* follow a standard set of procedures when reviewing and providing feedback for submitted manuscripts. The ultimate goal of the review process is to ensure that manuscripts are of high quality and address important topics in special education teacher preparation.

KEYWORDS

Academic journal, peer-review, special education, teacher preparation

The *Journal of Special Education Preparation* (*JOSEP*) is dedicated to the dissemination of research-informed practices in teacher preparation. The journal is a newcomer in the world of special education journals and was established to fill the gap that existed between dissemination of research on preparation and the implementation of those practices in preparation programs. Given this purpose, that of being a journal for practitioners, providing peer reviews for manuscripts submitted to *JOSEP* is different from that of providing reviews for research journals such as *Teacher Education and Special Education*. The purpose of this article is to provide a guide for individuals who are completing reviews or considering completing reviews for manuscripts submitted to *JOSEP*.

Peer Review in General

Peer review is the process of quality control used by most academic journals. As Hoffman (2022) states, "Constructive and effective peer reviews advance scientific knowledge through respectful and civil critiques that identify both the strengths and weaknesses of the manuscript presented to them" (p. 86). Though it can be lengthy and does require significant time from members in a field of study, peer review provides a more democratic means for journal editors to determine whether or not to accept a paper for publication. The general process starts when the editor receives a manuscript for consideration. They read the manuscript and determine whether the content is appropriate for the journal and the writing is up to journal standards. If not, they can decide to issue a *desk reject* and return the manuscript to the author with reasons for the rejection. If the manuscript fits the purpose of the journal and meets writing standards, the editor will choose two or more reviewers to read and provide commentary on the paper. The editor invites those reviewers to complete the review. They can either accept or decline the invitation. If they accept, the reviewers read the manuscript, make comments

regarding the content and writing, and then provide the editor with a suggestion as to whether to accept or reject the paper. The editor always makes the final decision. Trust that reviewers and authors are working collaboratively "and in good faith in a process that examines both the merits and challenges of each submission in a fair and impartial manner" is the only way this process works (Hoffman, 2022, p. 87).

Why Should I Review?

A quality review of a manuscript takes a significant amount of time. The manuscript must be read carefully, comments must be made, thoughts put in writing, and then the review submitted. So why would anyone do this work? Being a reviewer allows an individual to read a broad range of work in areas of their own interest. As a doctoral student, being a reviewer allows one to become more familiar with the field, see multiple forms of writing, understand how other reviewers provide feedback, and become known to journal editors. As a more experienced practitioner, being a reviewer also provides a window into the field and hones one's skill at formulating ideas for papers and writing for multiple audiences. In all cases, being a reviewer is an area of service that is recognized and applauded when included in one's curriculum vita. In all honesty, the advancement and dissemination of knowledge in any scientific field would not be trustworthy or democratic without the participation of broad and diverse groups of individuals serving as reviewers.

The JOSEP Review Process

The review process begins with individuals who accept the call to be on the editorial board of any journal. For *JOSEP*, in particular, the editorial board is evolving as the journal finds its place in the field.

TABLE 1: Review Evaluation Checklist

Title	☐ Is it concise? ☐ Does it adequately align or reflect the focus of the paper?
Abstract	☐ Does it summarize the importance of topic to practice/practitioners? ☐ Does it include a brief description of background, purpose, and conclusion?
Introduction	☐ Does it give sufficient background/evidence to support practice? ☐ Does the introduction establish a generalizable practice? (i.e., is the manuscript applicable to a lot of people?) ☐ Is evidence current? (i.e., updated, most recent citations) ☐ Do the authors include a vignette (not required)? ☐ Is the paper applicable to special education faculty? ☐ Is paper written in non-technical jargon (tone)?
Vignette	**If the manuscript includes a vignette** ☐ Is it relevant and integrated into the text? ☐ Is it culturally relevant? ☐ Does it add/clarify implementation of the practice? ☐ Is it thorough enough?
Implementation/ Description of practice	☐ Are the implementation steps clear? ☐ Are sufficient examples provided? ☐ Can readers generalize article implementation tips to other settings? ☐ Are figures and tables used to enhance clarity/implementation guidance? ☐ If vignette is used, does vignette add to the clarity/readability/structure of the paper?
Checklist for international spotlight	☐ History of country ☐ Policy and practice ☐ Current education practice, policy, issues ☐ Specific to special education ☐ Is it clear, concise, grammatically sound?

An Invitation to Review

Members of the editorial board might receive two invitations a year to review manuscripts. They will receive an invitation from the *JOSEP* editor with two link options: agree or decline. The email specifies a timeframe for the reviewer to make a decision about accepting the invitation to review, usually three to five days. This time allowance enables the reviewer to evaluate their schedules and determine their availability to review the manuscript before making a commitment. Factors to consider when making a commitment may include: Do I have the time to review? Will I meet the obligation/deadline? The question

TABLE 2: Reviewer Recommendation

DECISION	DESCRIPTION
Accept submission	Does manuscript address all criterion listed in figure? If so, manuscript is ready for publication
Revisions required (Minor revisions)	Manuscript meets journal requirements with minor edits to prepare for publication
Resubmit for review (Major Revisions)	Substantial portions of the manuscript require revision in order to meet review requirements
Decline submission	Manuscript fails to address a substantial portion of review criteria

TABLE 3: Guide for Feedback Comments

DO
- Provide concrete evidence and specific examples from the manuscript to support your recommendations.
- Be specific in your recommendations.
- Be thorough.
- Be professional and respectful.
- Remember to include strengths of the manuscript.

DON'T
- Make recommendations that are unnecessary elements or are out of scope for the manuscript.
- Use the review to promote your own work.
- Focus on typos and grammar.
- Submit your review without proofreading it and checking everything one more time.

Note. Adapted from PLOS (n.d.)

FIGURE 1: Sample Review Letter Statements

Revisions Required Sample:

- *Thank you for the opportunity to review the manuscript, (Title of Manuscript Here). The material in the manuscript is very valuable to practitioners. Providing relevant and helpful feedback to teachers is critical to their practice. The process described in the manuscript could also be used for self-reflection by teachers in a meaningful way.*

- *While I believe this manuscript could be an important contribution, it will require revisions to enhance clarity and usefulness to JOSEP readers. Therefore, I am going to recommend what I will call a minor revision because I am suggesting changes to the introduction and conclusion and not so much to the description of the practice. I would like to encourage the author(s) to seriously consider the following revision suggestions, given the usefulness of the piece.*

(List specific suggestions)

Reject Sample:

- *Thank you for the opportunity to review the manuscript, (Title of Manuscript Here). The topics of experiential learning and computational thinking are very important to the teacher education literature. However, I am going to recommend that you Reject this manuscript for publication. Allow me to elaborate.*

(List reasons for reject recommendation)

regarding time is crucial because *JOSEP* works with hard binding deadlines. The target audience for *JOSEP* is higher education practitioners who may or may not have research experience. As such, the assumption is that those reviewing for *JOSEP* are familiar with the topic and purpose of *JOSEP*. Yet, unlike reviewing for research-focused journals, reviewers for *JOSEP* do not need to be an "expert" in a particular area to conduct a review. Manuscripts for *JOSEP* should be written in practitioner-friendly language that sufficiently explain theoretical concepts for a wide audience. Anyone reading a *JOSEP* article should be provided with definitions, research support, and explicit directions to learn about and implement strategies. If an expert is needed to understand the topic presented, the manuscript probably does not meet the practitioner-friendly tone and style of *JOSEP*. Therefore, reviewers should not shy away from reviewing manuscripts outside their "area of expertise." Reviewing such manuscripts may be an excellent way to ensure articles published in *JOSEP* are truly filling the niche it was created to fill.

When receiving the invitation email, it is important for potential reviewers to respond promptly. That way, journal editors can make further decisions without delay. If a reviewer declines to review for whatever reason, the editor will send invitation emails to other potential reviewers. In some cases, when reviewers decline an invitation, they may make recommendations for other potential reviewers.

When a reviewer accepts an invitation to review, they receive another email with the review materials and deadlines. The turnaround timeframe for *JOSEP* is 21 days, meaning reviewers have to submit their completed reviews within 21 days. Completing a quality review can be time consuming and we encourage reviewers to consider this when making their decision to review. The next sections of this article contain guidelines to help reviewers write high quality reviews and to make informed decisions when providing recommendations for manuscript acceptance or rejection.

Conducting the Review

JOSEP is a practitioner journal that publishes practitioner articles addressing special education teacher preparation globally. Manuscripts submitted to *JOSEP* are therefore expected to adhere to four main guidelines: (a) be a practitioner-friendly manuscript, (b) include content directly related to special education teacher or administrator preparation, (c) target an audience of special education higher education faculty, and (d) be grounded in evidence-based or high leverage practices (see Markelz & Riden, 2022). The editor makes an initial determination as to adherence to these requirements. Any submitted manuscript that does not address the goals and aims of *JOSEP* will not proceed to reviews.

Table 1 lists manuscript elements that are typically evaluated in a *JOSEP* manuscript. Each of the five sections detail key elements to consider and assess under each category. When reviewing each of these respective elements, reviewers assess the extent to which authors provide the minimum necessary details, the validity of the details, and whether they are substantiated. The title, for instance, is a concise statement summarizing the manuscript. It captures key content details about the manuscript, which includes purpose and target population. APA requires that titles be concise enough to capture minimum necessary details, avoid being too long to include unnecessary details, and contain no abbreviations. The length should not exceed 12 words.

The abstract provides a detailed summary of manuscript elements. Normally, when readers are pulling up articles to read, the abstract is the first port of call. A majority of readers will make a decision to read or not read an article based on the abstract. A well-written abstract should therefore give a reader the minimum necessary summary about manuscript background, purpose, and implications. All summary details should not exceed 250 words. Lastly, the abstract should include at least four key words that can be used as search terms in indexing databases.

The introduction section serves many purposes of setting the manuscript context and significance, rationale and relevance, and purpose statements. For a *JOSEP* publication, the introduction provides background information about the topic and evidence supporting the practice. Studies cited to support evidence should be relevant and current. When assessing the introduction, reviewers should examine for the following elements: Do authors provide enough evidence for the practice? Does it include a generalizable practice? Does it include a vignette? Does the discussion target special education general audiences (i.e., faculty, teachers, students, etc.)? If the introduction includes a vignette, the reviewer needs to check if the vignette is culturally relevant, if it clarifies implementation of the practice, if it is thorough enough, and if it is truly integrated into the content. The introduction should also establish a generalizable practice, provide evidence for application to a general audience, and not use excessive technical jargon.

The main body of a *JOSEP* manuscript provides a thorough description of the practice, implementation procedures, issues, challenges, and opportunities. In this case, reviewers need to ascertain whether the practice is clearly explained, implementation steps are clearly described, sufficient examples are provided (through vignettes or other), and if tips for generalization are complete. If authors provide figures and tables to sup-

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plement the implementation narrative, reviewers need to check if the tables and figures are properly formatted to APA.

JOSEP also publishes manuscripts that address special education practice in countries other than the United States in the International Spotlight section. The procedures and requirements for this section are similar, however, reviewers will need to evaluate whether the international spotlight manuscript provides sufficient background of the country's history and local contexts. International spotlight articles do not have to focus on a particular strategy, rather, the purpose is to educator readers on country or region specific special education preparation policies and practices.

JOSEP follows APA guidelines for style of writing. In addition to the critical elements described above, reviewers need to inspect manuscripts for APA formatting for in-text citations, headers, font and font size, spacing, margins, paragraph alignment and indentation, and referencing. These should all conform to the APA 7th edition manual.

Writing the Review

After completing the manuscript review, a recommendation has to be made regarding whether or not the editor should accept, revisions required (minor revisions), review and resubmit (major revisions), or reject the manuscript. The reviewer should include all suggestions for revisions in a report to the editor and authors (see Table 2). When writing feedback for recommendation, the reviewer's aim is to describe what authors need to do in order to qualify for publication. As such, reviewer feedback should be explicit regarding areas that need revision. Reviewers are therefore encouraged to provide constructive and critical feedback comments that authors can use to improve their manuscript. Specific and actionable comments are necessary to assist the editor in making an accept or reject recommendation and are also necessary for authors to edit the manuscript as suggested. It is best practice to provide author feedback on a separate Microsoft Word document with an introductory statement (see Figure 1). When listing specific revisions, list page and paragraph numbers for each suggestion so that authors can easily identify these sections in the manuscript. Some additional guidelines on giving feedback are listed in Table 3.

Conclusion

Volunteering to be a reviewer for *JOSEP* is critically important to its success. Please consider lending your expertise to the journal as a reviewer. Given that *JOSEP* is a practitioner journal and one that has a goal to encourage diversity in perspectives, reviews for the journal should always: (a) include professional unbiased language, (b) provide clear and constructive critique with suggestions, (c) be thorough and substantive, and (d) meet timelines and deadlines. We encourage reviewers to use the checklists and descriptions included in this article to guide their reviews. Additional resources can also be found in Weiss (2017). When in doubt, always contact the editor to ask questions or to clarify any details.

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Use of Universal Design for Learning in Online Special Educator Preparation

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ABSTRACT
By using principles of Universal Design for Learning (UDL) within online learning environments, teacher education faculty have an opportunity to break down barriers and create purposeful course content that will benefit all learners. The application of UDL helps teacher education faculty recruit learner interest, sustain learner efforts, and provide learners with options to apply knowledge and demonstrate understanding. Examples and strategies for using UDL in online learning environments are provided.

KEYWORDS
Online learning, teacher preparation, universal design for learning

With increasing options for online degree programs and courses, including in teacher preparation (NCES, n.d.), different learning theories are useful for understanding how adults learn within these environments. Student engagement (Kahu, 2013), adult learning theory (Knowles, 1980), and Community of Inquiry (Garrison et al., 2000) provide frameworks for instructional design when creating or improving existing online courses to support adult learning and engagement. More recently, researchers have developed learning theories in response to the shift of instruction to online learning environments. With the understanding that learning takes place in virtual communities, connectivism (Siemens, 2004) recognizes that learners need "opportunities to form connections and make meaning based on information obtained from virtual communities and other non-human objects (e.g., databases or information sets)" (Ornelles et al., 2017, p. 548). Likewise, generativism (Carneiro, 2010) understands that adult learners produce new knowledge by deriving new meaning from social learning within technology-rich environments. Regardless of the learning theory that drives instruction, many adult learners experience educational barriers to engagement in and access to learning in online environments.

Universal Design for Learning

Educational barriers to learning and strategies to promote student engagement are generally thought of as a concern for PK-12 students and educators. However, postsecondary students in teacher education programs experience similar barriers to learning due to personal factors (e.g., lack of time, family responsibilities) and educational factors (e.g., anxiety, negative self-perceptions, technology barriers). To better support all students, Universal Design for Learning (UDL) calls on educators, including those at the postsecondary level and in teacher education programs, to critically examine their instruction and reduce educational barriers.

UDL includes three essential principles: multiple means of engagement, multiple means of representation, and multiple means of action and expression (CAST, 2018b; Edyburn, 2010; Rose, 2000; Rose & Meyer, 2002). Each offers suggestions to create purposeful and meaningful instruction. First, multiple

means of engagement examines *why* students learn. Within the why, UDL focuses on the role of student interest and engagement in the topic such as through giving choice and making instruction relevant to students' careers. Essentially, to motivate and engage students by showing relevance; students should see a direct connection between coursework and their future careers. Multiple means of engagement also includes purposeful instructional support for self-regulation, self-assessment, and sustained effort through strategies like specific, timely mastery-oriented feedback and setting goals with short-term objectives (CAST, 2018b; Edyburn, 2010; Rose, 2000; Rose & Meyer, 2002).

Next, multiple means of representation examines *what* students are learning. Options and alternatives for how teacher education faculty are presenting the content should be considered, such as providing options to watch or listen to content instead of just using a text-based presentation format. Multiple means of representation also includes strategies specific to comprehension and vocabulary such as reviewing jargon and acronyms like those used in special education prior to instruction, instruction in multiple formats, scaffolding and modeling, and explicit instruction (CAST, 2018b; Edyburn, 2010; Rose, 2000; Rose & Meyer, 2002).

Last, multiple means of action and expression examines *how* the students are demonstrating their knowledge and completing course tasks. Course components may include access to assistive technology or options for physical access, including using and creating materials from the start that are compatible with alternative keyboards, screen reading software, and other assistive technologies. Additionally, teacher education faculty should provide alternatives for expression and communication, for how students are sharing and communicating their ideas. For example, instead of assigning a standard final paper to evaluate students' knowledge, students may have the option for alternative mediums like creating a blog, infographic, or video to demonstrate that same knowledge. Whatever medium students demonstrate their knowledge still provides students opportunities to develop fluency in that skill through scaffolding with models, non-examples and examples, differentiated feedback, and mentoring. Multiple means of action and expression also includes executive functions, or an individual's ability "to plan and flexibility adjust to changes in their environment" as they complete any number of tasks from an in-the-moment class activity to a long-term project (Vasquez & Marino, 2021, p. 179). Within UDL, teacher education faculty should purposefully include executive function supports such as goal setting then monitoring those goals, and time management strategies by breaking apart a large project over the course of the semester with regular check-ins and due dates for feedback and reflection (CAST, 2018b; Edyburn, 2010; Rose, 2000: Rose & Meyer, 2002).

It is important to consider that UDL is not simply just giving students options of assignments or content presented as a video instead of text, it is a *purposeful* design of a course and instructional components to reduce barriers to learning. Further, the goal of UDL is to create dynamic learning experiences where students become expert learners who are "purposeful and motivated, resourceful and knowledgeable, and strategic and goal-directed" (CAST, 2017, p. 1).

A common task in a special education teacher preparation program is scoring a reading running record. While reading a text-based chapter may provide the information, teacher education students may experience several barriers such as a lack of engagement in the topic, poor comprehension on how to use a reading running record through text-based instruction, not having a model, and difficulties with vocabulary impacting comprehension. Instead, through UDL, teacher education faculty might first scaffold their instruction through reviewing any key background information or vocabulary to connect the topic with their prior knowledge. Then, implement explicit instruction by video modeling the scoring, followed by working together with the faculty or a peer with purposeful guided feedback, and then independent practice. Video modeling should include the teacher education faculty talking through and demonstrating each step, and a handout with each step explained that includes images and text to reference. To engage students and show relevancy, scoring a reading running record might be anchored to a case study or work with a PK-12 student and lead to sharing the results with a classroom teacher as well as selecting an instructional strategy. Ultimately, for students in special education teacher education programs, UDL provides multiple opportunities to learn academic content, express understanding, and develop skills to become excellent special educators (see Courey et al., 2012; Craig et al., 2019; Israel, 2014). Thus, when designing online courses, teacher educators must integrate strategies and course design elements in alignment with the UDL principles.

UDL Online

Many teacher education programs include online coursework and/or course components. The online format provides a unique opportunity to incorporate UDL through incorporating opportunities for engagement, representation, and expression of understanding in coursework. Adult learners are typically self-motivated to learn (Knowles, 1984) and online coursework must provide

options to recruit and sustain learner interest, and provide multiple options for the organization of assignments, application of learning, and expression of understanding (CAST, 2018b). Thus, what does UDL look like in an online course? While there is no one answer to this question, there are many solutions with or without technology. For example, teacher educators might provide options for engagement beyond text-based discussion boards and recorded PowerPoint presentations by giving students purposeful choices for how they interact with content. Or they may opt to watch a video, listen to a podcast, or participate in asynchronous discussions using tools such as Twitter and Flipgrids (see Table 1 for a summary of online instructional strategies and their alignment to UDL).

Online Course Design Elements

Technology use within the UDL framework for all teacher education courses, including online courses, must begin with *purposeful* course design. When online courses are not clearly organized and do not follow a consistent structure, students are more likely to become frustrated and, in turn, become less engaged and experience barriers to simply accessing course content (see Buelow et al., 2018; Joosten et al., 2019). Purposeful course design may include a consistent format for each module with clear organizational structure and labeling that does not rely simply on color coding or a symbol such as a logo of a piece of notebook paper for an assignment. Instead, an assignment link should always clearly be labeled with the module name, topic, and/or that it is an assignment (e.g., Week 1 Assignment: Educational Philosophy). Additionally, purposeful course design includes scaffolds for long-term assignments with deadlines and feedback for portions of the assignments staggered throughout the semester, expectation reminders, and clear deadlines for course tasks. Checklists, lists of requirements, and other strategies to highlight the instructional goals and tasks are recommended. Such purposeful design aligns to multiple means of action and expression and multiple means of representation with being able to clearly and consistently access the online learning environment and one that supports students' executive functions.

Purposeful, online course design also includes using an online learning platform and materials that are accessible from the start instead of making changes later to accommodate specific students. All students may benefit from accessible formats, especially when the teacher educator may not see their students in a course that is delivered primarily online and asynchronously or may not know of their students' learning needs. Less than one in four college students with disabilities disclose their disability to access accommodations and services (Lindsay et al., 2018). Students may also choose not to disclose a disability, develop a short or long-term condition impacting course access, and/or any other reason to use such features (e.g., turning on captions to watch a video while in a loud). Thus, in alignment with multiple means of representation, effective online learning is accessible not only in that the online learning platform meets accessibility standards, but so also does anything posted in the class. Accessibility considerations include, but are not limited to: instructional videos, video-based meetings with accurate and readable captions, video transcripts, image descriptions in videos, ability to change contrast and resize images or text, and use of alt text and image descriptions. All documents should be posted in an accessible format that is compatible with assistive technology. Tools such as Grackle for Google Docs, Microsoft Word Accessibility Checker, and the accessibility menus in PDF readers allow teacher education faculty to check for accessibility and then make changes to create an accessible document.

Discussion Options

In online learning environments, it is difficult to replicate the sense of community felt within a face-to-face classroom (Banas & Wartalski, 2019; McInnerney & Roberts, 2004; Sung & Mayer, 2012). Promoting in-depth conversations and exploration of content may be challenging for many special education students who may be busy practitioners themselves. Providing options for how to engage in discussions to demonstrate knowledge is essential to UDL in special education teacher preparation, aligning with both multiple means of action and expression and multiple means of engagement.

Many teacher education courses, both in-person and online, use discussion boards to promote student engagement with content. Lin et al. (2007) found that providing choice of discussion board post format increased student satisfaction with the course. Options include having students share accessible audio or video responses to the questions posted by the teacher education faculty. Seeing and hearing content helps students experience a sense of community, and provides options for busy adult learners, and those with print, visual or hearing challenges (see Kebritchi et al., 2017). By modeling this multimodal conversation format, teacher education faculty can discuss how these strategies may also help students' future PK-12 learners to engage in meaningful conversations and build a sense of community.

Assignment Menus

Teacher education students are a diverse group of practitioners. One way to ensure that online course assignments

TABLE 1: Sample Online Technology-Based Course Tools for UDL

Tool	Strategies to Reduce Barriers	UDL Alignment
Course design	• Course and all course components are accessible (e.g., captions, image descriptions, accessible documents) • Embedded links and videos for students to access for background information • Consistent format • Clear organizational structure and labeling • Checklists for weekly tasks and for longer, multi-step assignments	Action and Expression Representation
Discussion boards	• Choice of discussion format (e.g., text, audio, video, images) posted by the students • Teacher education faculty modeling using a different discussion format in their response to students' posts	Action and Expression Engagement Representation
Assignment Menus	• Applied assignments • Menu of choices to select the assignment format most relevant to the student	Action and Expression Engagement
Feedback and progress monitoring	• Consistent, timely feedback • Feedback posted in a variety of ways (e.g., video, audio, text) Multiple types of feedback (e.g., role playing, video review, peer-review, self-assessment)	Action and Expression
Video modules and models	• Align to explicit instruction by providing a video-based demonstration then guided practice prior to working independently • Allow students to rewatch and pause a video as many times as needed • Supplement text-based content to provide demonstrations and explanations	Engagement Representation
Simulations	• Provide practical experiences in a "low-risk" environment • Provide feedback and self-reflection, then encourage students to practice the instructional strategy as many times as needed to work towards mastery	Action and Expression Engagement

are relevant to their professional roles is by providing a choice of applied assignments. Embedding choice in online course design increases interest and engagement and allows students to choose assignments of most relevance to their careers. This allows students to choose the option that is most applicable to their professional role. Classroom assignment menus have been used across PK-12 grade levels special education to provide options for organization, demonstration of learning, and content to explore (Cressey, 2020; Delisio & Bukaty, 2019; Edyburn & Edyburn, 2021). These assignment menus may benefit teacher education students in online courses as well. One author of this article, for instance, uses a choice of applied assignments in their Assessment for Students with Severe Disabilities graduate-level online course. Students are given the option to choose one of the following for their final assignment: (a) an evidence-based practice (EBP) literature review, (b) an interdisciplinary assessment report, or (c) an online parent or teacher training module on one of the assessments learned in the course. Students are encouraged to make their final assignments multi-modal and to include audio and video components to model their EBP, results of the assess-

ment, or to demonstrate a skill for parents in the training module. This aligns with the UDL concept of multiple means of engagement.

Feedback and Progress Monitoring

In addition to assignment menus, students' learning occurs when they are provided individualized feedback to better understand the progress they are making, within a timely manner. Formative feedback is especially important as this type of feedback "allows learners to monitor their own progress effectively and to use that information to guide their effort and practice" (CAST, 2018a, n.p.). There are a variety of customizable feedback options that enhance capacity for monitoring learner progress and support multiple means of action and expression. For example, role playing, video reviews, and peer feedback are opportunities for students to engage in self-assessment strategies. Additionally, assessment checklists, rubrics, video feedback, audio notes, and annotated work samples are examples that guide students' self-reflection.

Video Models

Asynchronous, online courses do not allow for live, in-class demonstrations and monitoring of students while they complete course activities. A lack of demonstration or model can be especially problematic when a concept is new to students, when it includes multiple steps, and/or when students might have misconceptions. Research suggests that an essential component of explicit instruction for all students, including teacher education students, is first demonstration and then guided practice prior to independent work (see Archer & Hughes, 2010; Hughes et al., 2017). Video models provide a powerful learning tool to demonstrate the concept ("I do") and allow students to practice with the teacher education faculty with embedded practices ("We do") prior to independent work ("You do") within explicit instruction (see Dieker et al., 2009; Gaudin & Chaliès, 2015). For example, in another graduate online course on critical issues in special education and professional writing, students learn how to use and format in-text citations, references, and other components of APA Style. To learn APA style, students first watch a video model, then watch additional video examples with a handout to practice as a low-risk assignment, primarily for feedback. Lastly, students complete an assignment for independent, applied practice.

Essentially, video models present content in a different format than just text-based information to provide students an option for how they access the materials in alignment with multiple means of engagement. Video models also give students the ability to stop and pause a video while working along with it and rewatch a video as many times as needed. When using video models, it is important to consider the format. Videos that show a teacher education faculty member reading the text on the screen, without images or demonstrations, and that present multiple concepts at once, are not as effective as videos with clear examples and purpose.

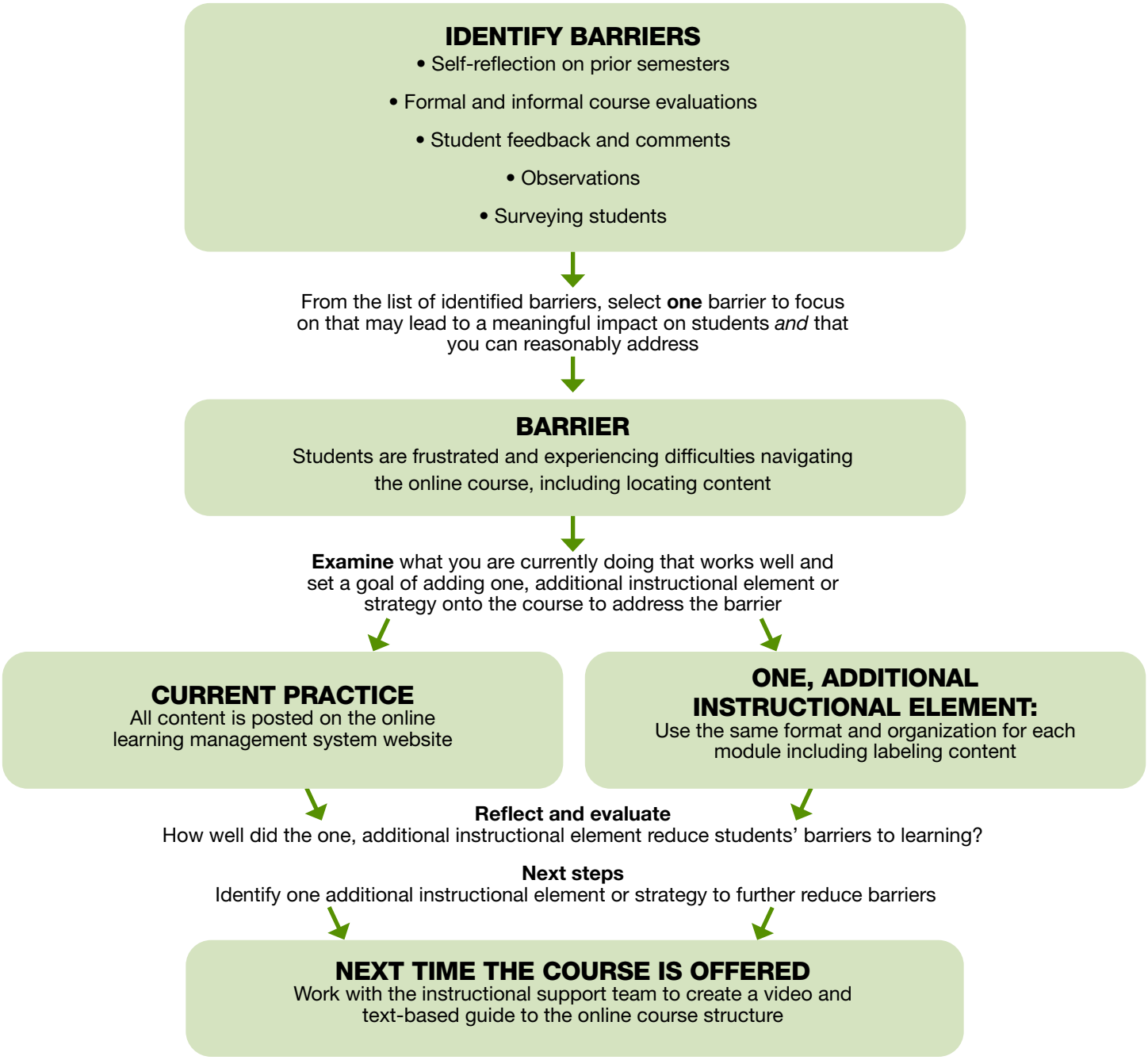
Simulations

The application of teaching theory and methods to practice in real-life classrooms is a seminal stage in the teacher education process. To this point, Billingsley and Bettini (2019) found that teacher preparation graduates who received more intensive and higher-quality student-teaching and practicum experiences are more likely to persist in the field and less likely to leave early in their careers. Although increasing evidence is emerging supporting practice-based experiences to special educator preparation, teacher education is increasingly shifting toward online and digital technologies that give an alternate means to provide realistic experiences when traditional in-person practicums are not a viable option (e.g., Starkey et al., 2020).

Simulations offer teacher educators a chance to apply and practice in a "safe" low-risk environment where they can actively engage in realistic learning and receive feedback on their application of teaching principles. Simulated teaching applications provide an opportunity for students to self-reflect prior to actual implementation (e.g., practice using an instructional strategy in simulation before practicing with PK-12 students). Simulated teacher education experiences vary from high-tech applications implementing virtual reality to simpler lower-tech applications using role playing among classmates (Leko et al., 2015). Teaching simulations offer several practical advantages over traditional means of practicum including offering multiple practice opportunities to shape special education teachers' behaviors towards mastery. Simulations might also provide a means of tightening the feedback loop between teacher education students and supervisors to provide more timely feedback to refine skills and allow students to practice skills as many times as needed (Dieker et al., 2014). This efficiency in mastering skills within specific contexts could contribute to UDL principles related to generalization of skills to other environments and settings. Thus, while simulations might not replace actual embedded practice in real-time classroom settings, they may provide for multiple means of both engagement and action and expression as students develop critical competencies needed for proficiency in their future roles.

Teacher education faculty should also be mindful of the sustainability of teacher education simulation platforms

FIGURE 1: Sample Plus One Approach



when considering and selecting virtual practicum options. Technology to simulate and predict human behavior based on complex stimuli such as a classroom is still emerging so many simulation platforms rely on human input through virtual role playing (see Driver & Zimmer, 2022 [this issue], for a detailed discussion of mixed-reality simulation in teacher education).

Implementing UDL Online

For teacher education faculty, it can be overwhelming to implement UDL by making changes to tasks and assignments, course format, or an entire course. However, the benefits of UDL for teacher education students outweigh the challenges. Through implementing UDL, faculty not only model an effective practice to support all PK-12 students but provide opportunities for teacher education students to learn and demonstrate their knowledge in a way that reduces barriers to their own learning. When considering UDL, it is important to remember that UDL

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involves *purposeful* changes in course design and content to increase access and decrease barriers to learning. UDL is not just adding technology or any other component to add it without directly connecting the component to UDL and instructional goals.

The Plus One (or, Plus One Design Thinking) approach describes a straightforward, practical way to implement UDL in any course, including for online teacher preparation (Tobin & Behling, 2018). Instead of attempting to address all aspects of UDL at once, the Plus One approach calls for teacher education faculty to first identify students' barriers to learning (see Figure 1). These barriers might be based on trends in course evaluations, informal comments from students, surveying students about their needs, and/or considering instances when students ask more questions, make increased errors on assignments, or misunderstand the content. Next, faculty target just one of those areas to apply UDL that might make the most difference in a course or address the highest need, but that is also manageable and practical for faculty to update or change (see Lieberman, 2018; Tobin & Behling, 2018). For example, if a barrier is students' difficulties finding the needed content in an online course, it is unlikely that a faculty member can change the online learning platform, but a faculty member can examine their course organization and navigation.

Using the targeted area, the next step in the Plus One approach is to set a goal. Using the aforementioned example, a teacher education faculty member might set a goal to use consistent organization across each online module to reduce students' frustrations locating course materials and tasks. Last, select one purposeful change that aligns to UDL to address this goal and reduce barriers to learning. Continuing the example, the faculty member might purposefully use the same format and organization for each module, clearly labeled content, and/or create a video or text-based guide on how to access the course components. Faculty should consider soliciting formal or informal student feedback to evaluate the change. For each subsequent time a course is offered, repeat this process with one additional instructional element to apply UDL. As faculty are more comfortable with UDL and making changes to a course, they can address several goals simultaneously during a semester, especially if the goals are similar such as providing students an assignment menu and options on how to post a discussion response. Essentially, to implement UDL in an online course using the Plus One approach, teacher education faculty (1) identify barriers to learning, (2) target *one* barrier to address, (3) set a goal for themselves on *one* element in their course to change using UDL targeting this barrier, and (4) implement and evaluate *one* instructional change (see Tobin & Behling, 2018).

Ultimately, UDL supports students' access to engaging content, provides students opportunities to demonstrate their knowledge and understanding in purposeful and meaningful ways, and reduces barriers for all students, including teacher education students enrolled in an online program.

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Three Phases of Video-Based Reflection Activities to Transition Teacher Candidates from Understanding to Examining Practice

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ABSTRACT

Video-based reflection activities, common to teacher preparation, serve as a bridge between theory and practice and support teacher candidate professional growth overall. Without the necessary guidance on how to reflect, many teacher candidates lack the ability to critically review, analyze, and evaluate their teaching to learn from and apply new insights to future teaching situations. Candidates likely need to develop foundational skills prior to engaging in complex, video-based reflection activities. The purpose of this article is to describe a three-phase sequential approach to developing teacher candidates as reflective practitioners. Specifically, the three phases begin with foundational skills of understanding practice, then shift to approaches for connecting practice, and finally transition to sophisticated professional growth opportunities through examining practice. Details regarding logistics and parameters for exemplar video-based observation activities as well as steps for guiding reflective practice at each phase are discussed.

KEYWORDS

Field experience, reflective practice, simulation, video analysis, video-based reflection activities

Why is Reflective Practice Important?

Reflective ability, within the context of teaching, is essential to improving practice and optimizing performance. Reflective practitioners are professionals who consider their actions and perceptions with intentionally to inform their professional decision making and more broadly, their professional identity. This ability to engage in critical reflection requires a clearly defined approach for self-confrontation and self-evaluation where purposeful examination of one's own thoughts, perspectives, biases, and actions takes place (Slade et al., 2019). Dewey (1933), a foundational reflection theorist, posited experiences alone do not necessarily result in new knowledge since he believed it was only through reflection that meaning-making and planning for the future based on past insights could occur. During meaningful reflection, a person likely engages in perspective taking, confronts existing beliefs, questions causation, and compares expectations to reality.

The ability to critically reflect goes beyond recalling a lesson or sharing feelings about perceived student learning. Reflective practitioners (a) demonstrate an awareness of actions and events, (b) justify their decision-making process based on one or more perspectives or factors, and (c) draw conclusions about the need for similar or alternative actions in the future based on their desired outcome (Beck et al., 2002; Nagro et al., 2017). Through reflective practice, teacher candidates can make sense of events, log experiences, and, when similar events happen, teacher candidates can recognize the experience and know what to do. Reflection activities linked to field experiences provide teacher candidates with robust opportunities to draw connections between knowledge and application through self-confrontation.

Further, teacher candidates' reflective practices are more likely to translate to professional routines upon entering the workforce if initiated during teacher preparation field experiences (Etscheidt et al., 2012).

Given the importance of reflection, it is not surprising that reflective practice is a shared expectation of the teaching profession. In fact, both the Council of Chief State School Officers (CCSSO), through its Interstate Teacher Assessment and Support Consortium (InTASC), and the Council for Exceptional Children (CEC) include professional teaching standards that focus on lifelong learning through reflection on one's own teaching practices (CCSSO, 2021; CEC, 2020). For example, the *InTASC Model Core Teaching Standards and Learning Progressions for Teachers* (CCSSO, 2021) state teachers should reflect to (a) examine their practice to evaluate how well it addresses individual learner needs; (b) share their practice with others to obtain feedback on better meeting learner needs; and (c) understand their practice to better make adjustments. Similarly, CEC's (2015) *What Every Special Educator Must Know: Ethics, Standards and Guidelines* posit that reflection is important so that special educators become aware of how their attitudes, behaviors, and approaches to communication impact their professional practice.

What are the Challenges of Reflective Practice?

Despite the clear reasons for including reflection activities in teacher preparation, teacher candidates often default to superficial reflective statements that focus on summarizing rather than examining practice (Kalk et al., 2014; Nagro et al., 2017). Even with repeated exposure to reflective practice, candidates tend to focus on simplisitc descriptions of classroom events rather than critically considering the reasons for their decision-making or success of their instructional practice (deBettencourt & Nagro, 2019). In multiple examples, where candidates were asked to write self-reflections throughout a field experience, the candidates focused on recalling technical aspects of the lesson such as pacing, scheduling, models of co-teaching, or types of activities (e.g., Brantley et al., 2008; Calandra et al., 2008; deBettencourt & Nagro, 2019). Similarly, providing candidates with probing questions or topical suggestions without including a deliberate approach for inquiry has resulted in a misunderstanding of the role of reflective practice as an awareness activity and not a transformational activity (Kalk et al., 2014; Khan, 2017).

Without the necessary tools and structured guidance on how to reflect, teacher candidates have not demonstrated improvements in reflective practice (Kalk et al., 2014; Nagro et al., 2017). Simply requiring teacher candidates to reflect frequently throughout one field experience or even throughout an entire preparation program without careful consideration of how to develop reflective practice, is unlikely to result in meaningful self-confrontation because constructing reflective ability does not happen spontaneously (Mulryan-Kyne, 2021). Teacher candidates have to be taught how to reflect similar to needing to learn how to plan a lesson or design a behavior system. Teacher candidates first need to learn what reflection is, why it matters, and how to engage in reflective practice before they develop the ability to reflect critically and with purpose. Fortunately, there are research-supported methods for guiding teacher candidates towards improved reflective practice.

What Promising Activities Promote Reflective Practice?

One promising activity for promoting reflective practice is video analysis. Video analysis is one of many video-based reflection activities, but is uniquely defined as reflecting on video evidence of one's own instruction from authentic teaching experiences. Because teacher candidates have video evidence to support their reflective practice, they are not overly dependent on recollection and feelings. Reflecting using video evidence has been shown as a more effective method for developing reflective practice when compared to traditional, memory-based forms of reflection activities (Seidel et al., 2011). Candidates can re-watch a single teaching event multiple times, through different lenses, while pausing, rewinding, and re-watching, to develop the ability to identify critical classroom events during dynamic classroom situations (Martin & Ertzberger, 2013; McDuffie et al., 2014). Video analysis typically follows a recurring approach such as the *record, review, reflect, revise* cycle (Nagro et al., 2020a). In this approach, teacher candidates can *record* themselves teaching during a field experience, *review* the video evidence at their own pace and through multiple lenses, *reflect* on what they observe, and then make plans for *revising* instructional decision-making in preparation for future teaching experiences. This deliberate approach has resulted in deeper engagement in self-reflection, self-confrontation, and self-evaluation thus promoting increased pedagogical knowledge and improved instructional practice (e.g., Nagro et al., 2017; Nagro, 2020; Nagro et al., 2021; Nagro & Monnin, 2022).

Video analysis is often included as a requirement during student teaching field experiences and has even been linked to credentialing requirements (e.g., edTPA). Video analysis activities can be embedded across a range of teaching contexts because such activities are feasible, flexible, and robust.

Frequently capturing video evidence of teaching is feasible given ongoing advances in the video-recording capabilities of computers, tablets, and mobile devices. Video analysis is also flexible because teacher candidates can record any type of teacher led instruction (with proper parental permissions) and have an opportunity to learn from analyzing the video evidence. Recording portions of lessons for video analysis offer robust opportunities to review instruction and reflect on engagement methods, communication strategies, questioning techniques, content accuracy, feedback types, and language precision. However, the robust nature of video analysis can be overwhelming. For example, when tasked with watching video evidence of veteran teachers, 296 teacher candidates from one study could not identify specific examples of good instruction with accuracy, and instead emphasized static elements of teaching such as classroom set-up (Wiens et al., 2013). This is not surprising given that teacher candidates have described video analysis activities as challenging and time-consuming (Nagro et al., 2017). Without proper training, candidates do not know what to focus on and report extremely low levels of enthusiasm towards video analysis (Nagro et al., 2020b). Teacher candidates need a scaffolded approach to building capacity for video analysis activities that begin with the fundamentals of reflective practice. Therefore, the purpose of this article is to describe a three-phase sequential approach to developing teacher candidates as reflective practitioners. Specifically, the three phases begin with foundational skills of understanding practice, then shift to approaches for connecting practice, and finally transition to sophisticated professional growth opportunities through examining practice. The three phases are outlined in Figure 1 and detailed in subsequent sections.

PHASE ONE: UNDERSTANDING PRACTICE

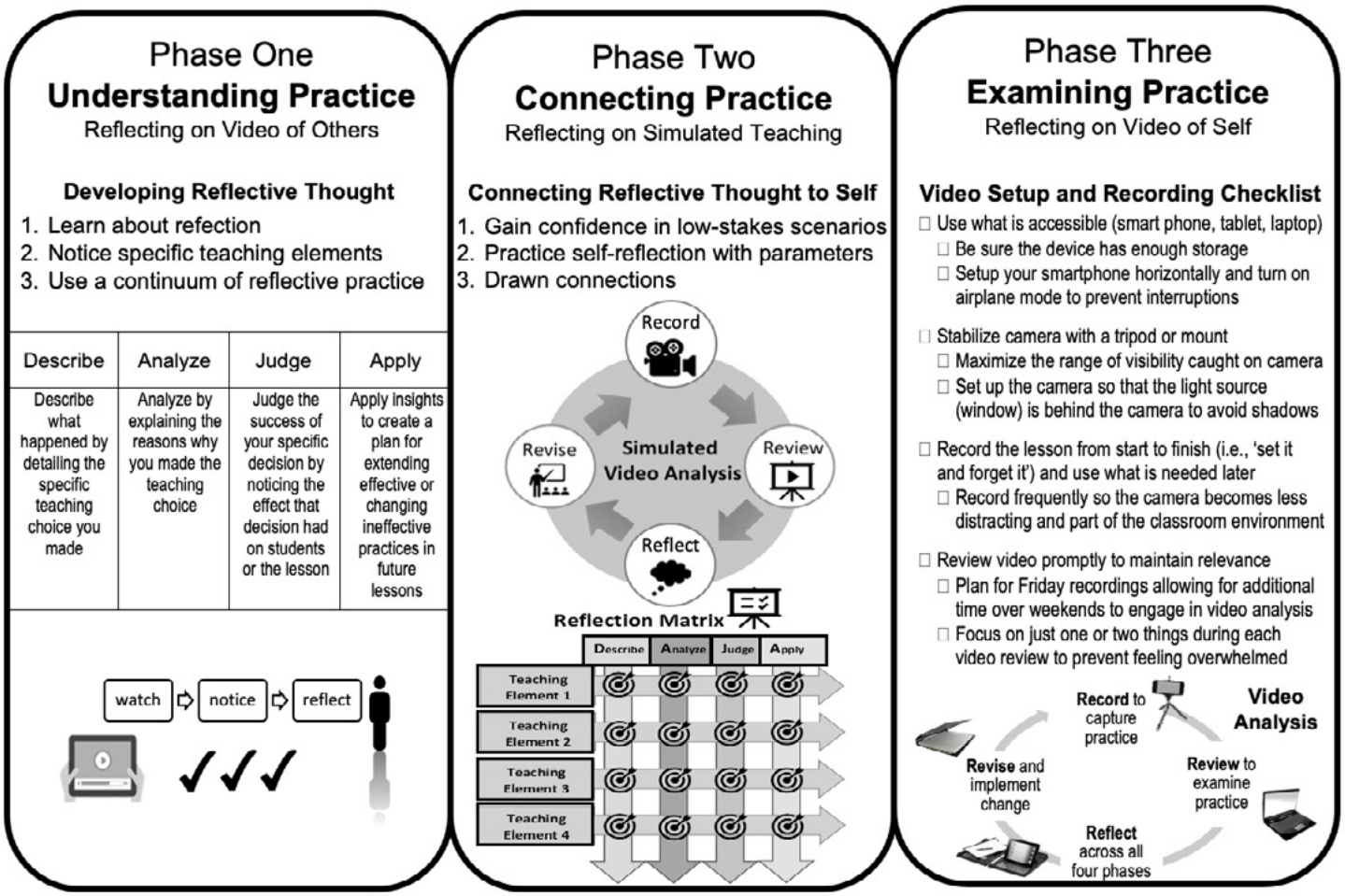
During this initial phase of understanding, the goal is to build foundational skills related to observing teaching to recognize instructional decision-making as it happens and learning about the importance of reflective practice (see Figure 1). Teacher candidates who have not learned how to observe teaching, whether it be recordings of themselves or others, tend to concentrate on student behaviors rather than their own, not yet seeing the classroom "through the eyes of the teacher" (Jenkins, 2014 p. 304). Observation opportunities such as reviewing video evidence of others are common in teacher education and likely a good first step towards building understanding. Teacher educators can use video evidence of other teachers (i.e., peers, veteran teachers, novice teachers) to help candidates learn how to notice dynamic elements of teaching rather than focusing on static components such as classroom set-up or the teacher's attire (e.g., van Es, 2014). Building class discussions around noticing specific teaching choices can both spotlight implementation approaches taken by different teachers and emphasize the teacher as the change agent in the classroom. This is more meaningful for candidates who otherwise center on student behaviors as the driver for undesired outcomes in the lesson or class schedule (e.g., deBettencourt & Nagro, 2019). Focusing on student behaviors during reflection activities is less helpful for teacher candidates who need to contemplate how they, as the facilitator of learning in the room, can structure their practice in a way that results in positive outcomes for their students. Overall, these foundational video-based activities are only helpful if teacher candidates know what to look for during such observation opportunities.

Building Understanding Logistics

One method for guiding attention away from student actions and towards teaching actions is to use an observation framework during video-based reflection activities. This level of guidance further demystifies such activities. Teacher educators that already use an observation tool or other measurable teaching performance assessment for field experiences can use this same assessment tool to help teacher candidates learn what types of teaching characteristics they should focus on when reviewing and reflecting on teaching. Building understanding using well-defined definitions of quality teaching from vetted resources such as the high leverage practices, professional teaching standards, and teaching observation frameworks like the Danielson Framework (Danielson, 2013) or CT Scan (Kunemund et al., 2021) improves video review and peer discourse early on when candidates' knowledge of evidence-based teaching practices is likely emergent.

Once teacher candidates are able to discuss (in a group, with a peer, in writing) observed elements of instruction from video evidence, the next step is to introduce various types of reflective statements. Typically, the continuum of reflective practice spans from simple retelling to higher-order critical thinking or application type reflective statements (see Etscheidt et al., 2012 and Nagro & deBettencourt, 2018 for lists of reflective continuums by study). By reflecting using a continuum, teacher candidates can go beyond the initial recognizing and begin to examine instructional decision-making (Crawford et al., 2012; Gün, 2011). One popular approach to classifying reflective statements across a continuum includes four steps where teacher candidates *describe* past teaching choices, *analyze* why such choices were made, *judge* the success of those choices based on student

FIGURE 1: Three Phases of Sequencing Video-Based Reflection during Teacher Preparation



outcomes, and *apply* new insights to plans for future lessons (Coogle et al., 2019; Nagro & Monnin, 2022; O'Brien et al., 2020). The goal is for candidates to reflect comprehensively on each teaching event by using all four phases for reflection moving them through the complete critical thinking activity. Allowing candidates to learn about the reflective process using a continuum of reflective statements helps candidates develop a professional lens through which to recognize successful teaching in others and eventually in themselves.

Building Understanding Parameters

Video-based observation and reflection activities at this early stage should be narrow in scope. One example for a narrow activity is asking candidates to clip or pin a portion of a video highlighting specific critical classroom events or instances of effective teaching (e.g., Bruce et al., 2015; Calandra et al., 2018). Candidates can pull specific examples where a selected teaching practice is illustrated, such as identifying a teaching segment when the teacher provided timely, specific, positive student feedback or when the teacher drew connections between the reading content, students' lives, and current world events. As candidates build their understanding of the dynamic nature of video observation, they can learn to identify specific elements of instruction with accuracy (Nagro & Monnin, 2022).

Video-based observation activities in the building understanding phase can occur in small groups allowing for peer-to-peer support. During these introductory activities, peer discussions may be particularly helpful for exposing candidates to alternative perspectives as well as focusing candidates on relevant rather than irrelevant elements of the video evidence (e.g., Jordan, 2012). Teacher candidates have reported that group reflection activities centered on video evidence of others are beneficial because they lead to collaborative meaning-making and force candidates to consider the nuances of critical classroom events (Nielsen, 2015). Overall, the goal is to build understanding so candidates can generalize lessons learned from reflecting on others' practice while subsequently reflecting on their own practice.

PHASE TWO: CONNECTING PRACTICE

During the second phase in this sequential approach, the goal is to help candidates draw connections between their newly developed understanding of both video observation and reflection activities and their own teaching. Furthermore, phase two is intended to help candidates draw connections between their teaching decisions, their reasoning or initial thought process during planning, and observed student outcomes. Teacher candidates, who are new to capturing their own instruction on video, have expressed anxiety about reviewing their own video evidence (Calandra et al., 2018). During this phase, the focus is on practicing self-reflection in low-stakes scenarios to help candidates build confidence and minimize anxieties related to drawing new and lasting connections (see Figure 1).

Drawing Connections Logistics

One low-stakes, yet meaningful, opportunity for video-based reflection is simulated teaching. Simulated teaching is an instructional scenario where the candidate experiences teaching in a controlled environment with specific parameters to target instructional objectives (University of New South Wales, 2015). Introducing a video-based reflection activity paired with simulated teaching scenarios may help candidates become more comfortable with the video-based aspects of these reflection activities. Simulations still challenge candidates to make decisions, try strategies, and problem solve with the goal of leading to new awareness of teaching. These simulations can take place in higher education classrooms where candidates teach to their peers playing the role of students (e.g., Nagro & Monnin, 2022), at home with a family member or neighbor (e.g., Peeples et al., 2019), or in virtual environments where candidates interact with avatars of students (e.g., Dieker et al., 2017). The benefits to simulated teaching include the ability to stop and restart at any point, the option to jump directly to a target portion of a lesson without having to move through the normal lesson progression, and to test a new teaching approach without practicing on real students.

During simulated teaching, candidates can use the same four phases of reflection (describe, analyze, judge, apply) introduced during the building understanding phase of this sequential approach to create a sense of continuity and familiarity around reflection activities. For example, candidates typically learn about explicit instruction within their methods courses, but rarely have an opportunity to practice using explicit instruction until they are in their student teaching field experiences if their mentor teacher supports their use of this type of instruction. During coursework, candidates can learn about and then practice using explicit instruction by selecting from Archer and Hughes' (2011) sixteen elements of explicit instruction. Depending on the goals of the class activity, candidates or their instructor can choose a small subset of the explicit instruction elements that focus on teacher behavior such as (a) setting clear expectations for learning; (b) modeling procedures through think alouds; (c) using clear and precise language with age appropriate vocabulary; (d) providing a range of examples and non-examples; and (e) asking frequent questions that require responses in varied forms (Archer & Hughes, 2011). Figure 2 includes these elements of explicit instruction in a graphic organizer, referred to as a reflection matrix, that can be used to structure the *record, review, reflect, revise* simulated video analysis activities in this phase. In this example, teacher candidates describe how they set clear expectations for learning, analyze their reasoning for why the learning goals were important, judge the success of their lesson introduction by pointing to student or lesson outcomes, and applying these insights for future teaching opportunities. This same process is repeated for each element in the reflection matrix. Building these connections between planning, teaching, and tracking student outcomes during this predictable yet relevant process strengthens the notion of teacher as change agent in the classroom.

Drawing Connections Parameters

The simulated teaching experiences used during this drawing connections phase are not intended to replace authentic classroom experiences because as Chuanjun and Chunmei (2011) explained, teaching experiences that fall short of authentic classroom experiences are by design, artificial and limited. Recognizing the limitations of simulating teaching, this type of low-stakes environment can still serve as a valuable intermediary step towards developing reflective ability. The simulations do not have to be lengthy to be meaningful. Five minutes of recorded role-play offers candidates plenty of data to analyze. In fact, remaining narrow in scope is helpful to the overall learning objectives. Candidates can focus on learning to analyze video evidence of their teaching and reflect on targeted teaching choices without having to simultaneously differentiate between relevant and irrelevant information captured in a lengthy teaching video. Candidates can teach to a whole group or small group of their peers while capturing this teaching on video. Then, candidates can watch back their own video evidence to reflect by focusing on a specific element of teaching that may be the topic of discussion in each class or specified target

FIGURE 2: Reflection Matrix with Explicit Instruction Focus

Focus Items	**Describe** what happened by detailing the specific teaching choice you made	**Analyze** by explaining the reasons why you made the teaching choice	**Judge** the success of your specific decision by noticing the effect that decision had on students or the lesson	**Apply** insight to create a plan for extending effective or changing ineffective practices in future lessons
Set Clear Expectations for Learning, explain lesson importance, and help students identify learning goals and expected outcomes.				
Model Proficient Performance through think alouds to provide step-by-step procedures and clarify decision-making processes.				
Use Clear and Precise Language with age appropriate vocabulary and sentence structure to be consistent and unambiguous.				
Provide a Range of Examples and Non-Examples to set the scope for when and when not to apply a skill, strategy, concept, or rule				
Ask Frequent Questions that require responses in varied forms (oral, written, action) to help focus and maintain learning engagement				

Note. The focus items for this reflection matrix were adapted from Archer and Hughes, 2011.

behaviors that are long-term goals to be revisited multiple times throughout the semester.

One challenge for teacher educators is structuring meaningful learning opportunities when some candidates may already be classroom teachers returning for additional preparation and other candidates enrolled in the same preparation course have no formal teaching experience. Role-play simulations paired with video analysis have been shown to support the professional knowledge, reflective ability, and instructional skills of candidates with ranging previous teaching experience and at differing points in their licensure programs (Nagro & Monnin, 2022). Thirty to 45 minutes of class time allows for candidates to record, review, reflect, revise in differentiated ways while also learning from one another. Whether acquiring new skills or refining existing skills, teacher candidates can benefit from reflecting on simulated teaching experiences to draw connections, deepen their understanding, and start to identify their strengths and weaknesses as educational professionals.

PHASE THREE: EXAMINING PRACTICE

Once teacher candidates have learned what meaningful reflection is (and is not), and they have gained a level of comfort recording and reviewing their teaching on video, candidates are ready for phase three, examining their practice in authentic settings through video analysis. Video analysis is fundamentally different from other forms of video-based reflection activities. During video analysis, teacher candidates watch video evidence of their own teaching from authentic classroom settings rather than reviewing video evidence of others (phase one) or video evidence captured during role-play (phase two). Video analysis has been shown to result in higher levels of immersion in and motivation for genuine teaching reflection when compared to reflecting on video evidence of others (Seidel et al., 2011) or video evidence from simulated environments (Chuanjun & Chunmei, 2011). Advances in technology have increased the feasibility of capturing video evidence in authentic settings, and there are simple suggestions for improving the learning experience (see Figure 1).

Examining Practice Logistics

Figure 1 includes a checklist for teacher candidates to use as they prepare to engage in video analysis. Despite increased flexibility, key logistical considerations such as setting up the camera to maximize the range of classroom visibility while accounting for microphone capacities are important to discuss with candidates. This checklist can guide practice video-recording sessions to ease nerves and improve the quality of teaching videos used for reflection activities. Video analysis is a meaningful yet challenging activity. Reducing frustration for candidates related to technology and logistics are a worthwhile consideration. Creating inexpensive recording kits to supplement smartphones or other recording devices can drastically improve visual and audio quality without breaking the bank. First, headphone port or Bluetooth microphones can boost sound quality especially when it is important to capture student responses even when student faces are not captured on video. Second, tabletop or spider tripods are affordable and can provide candidates more options when setting up their smartphone for classroom recording. Third, inexpensive, clip-on fish lenses can be positioned over top of smartphone and laptop cameras increasing the range of sight. Capturing more of the classroom may be critically important for analysis activities depending on the focus teaching behaviors.

Beyond camera set-up, having a plan for video sharing and storage should not be overlooked. Unlike the earlier phases of this sequenced approach, where video files were for the candidates' eyes only, the video files captured in phase three may be needed for supervisor observation activities and video analysis activities. Video files are large and cannot be emailed. The confidentiality of P-12 students caught on camera needs to be a primary consideration when planning how and where video files will be shared and stored. Students and their families will want to understand how their identities will be protected. It is important to seek out and follow consent guidelines which are likely to differ by school setting or even potentially from one classroom to the next. Emphasizing that the focus is the teacher candidate and that the purpose is a learning tool for candidates and not intended to put children at risk in any way is also helpful. Regarding privacy, password protected course sites such as Canvas and Blackboard are great options if private folders are created so that each candidate can only see their own video files. Other options such as saving video files on password protected flash drives can work when distance between parties is not a factor. Last, cloud storage such as OneDrive, Dropbox, or Google Drive can work if security procedures are carefully considered.

Video Analysis Parameters

Once camera set-up and file storage logistics are decided, decisions about video analysis parameters should be considered. First, the target video length will need to be determined. Five minutes of recorded-role play may have been sufficient in preparatory activities, but candidates learning to observe their authentic teaching accurately will need to see the broader context of their instruction nested within a dynamic classroom. This requires a bit more time, but the number of minutes may not be the right parameter to set. Pianta and colleagues (2008) conducted a large-scale study with 113 early childhood teachers and found that as the teaching videos increased in time, so did the likelihood of capturing effective teaching practices (Pianta et al., 2008). However, standardizing the number of minutes to video-record, does not necessarily translate across grade levels or classroom contexts where a 10-minute clip could be the entire lesson or just the warm-up activity. Setting the video-recording parameters to allow for teacher behaviors to be observable during video review and keeping the focus on teacher rather than student can help students in ranging contexts all find common ground. Regardless of grade-level, content area, or student population, teacher candidates can focus on capturing a lesson with a beginning, middle, and end (e.g., Nagro et al., 2017) or can plan to capture the teacher led instruction portion of a lesson (e.g., O'Brien et al., 2020). These guidelines will help clarify expectations when setting parameters and maintain flexibility.

Deciding on which teaching behaviors to focus on is another area of flexibility. Even after improving candidates' familiarity with identifying teaching elements using video evidence as well as how to reflect through a scaffolded process, (e.g., maintaining a narrow focus during video analysis) can improve accuracy. Hager (2012) conducted a single case multiple baseline study replicated across teacher behaviors to see if video analysis used to self-evaluate would result in improved instructional skills. The educator self-selected teaching behaviors to monitor and track using video clips. Hager (2012) reported the educator was able to improve in five of the seven self-selected practices: (a) the number and variation of praise statements given during a lesson; (b) the rate of opportunities for student response; (c) the rate of visual scanning of the room; (d) the ratio of praise to redirection statements; and (e) implementation fidelity of all steps outlined in the lesson. Hager's (2012) work demonstrates candidates can benefit from video analysis, but these findings may also suggest an extensive list of

teaching elements can become overwhelming for candidates. Patterns in video analysis research suggest narrowing the focus to between three and five teaching behaviors is best (Nagro & deBettencourt, 2018). Analyzing fewer aspects of teaching during each video analysis cycle makes the process more feasible and allows candidates more time for critical contemplation rather than the review process becoming something more closely related to an implementation checklist (e.g., Hager, 2012). Eventually, teacher candidates can write these video-based reflections in narrative form, especially if credentialing activities require narrative reflections, but beginning early self-reflection activities with a reflection matrix offers candidates a concrete approach to on-topic reflection activities. Including operational definitions in the reflection matrix (Figure 2) reinforces understanding of best practices and directs the teacher candidates' attention to relevant information captured on video during their recorded lesson.

After deciding on camera set-up, length of video, and number of focus teaching elements, the final aspect of examining practice to consider is the frequency of video analysis sessions. The research on video analysis as a teacher education approach does not adequately define the ideal video analysis schedule. Morin and colleagues (2021) conducted a meta-analysis of single-case research on video analysis and concluded that even one recording opportunity was shown to be beneficial for teacher candidates. However, one of the benefits of video analysis is the ability to measure growth across time through both the video evidence and corresponding reflection or self-evaluation activities. Introducing multiple videos allows for growth to be tracked over time and helps both candidates and their P-12 students become more comfortable with the technology and logistics. Scheduling video analysis recording sessions at the beginning, middle, and end of a given field experience seems feasible and allows for measuring growth over time. Additionally, Friday recording sessions are ideal for two reasons. First, field experience expectations include grading student work, analyzing student data, and lesson planning during the week so weekends might offer more time for careful contemplation and self-reflection. Second, although the purpose is not to analyze student performance, timely video review does sometimes allow for this added benefit where teacher candidates can get a concrete sense for students' present levels of performance as they plan for the following week. The ideal video analysis schedule will depend on individual goals, realities of field placements, and acknowledgment of how video analysis can best complement existing preparation activities.

> Introducing structured reflection activities early and often may help candidates see this important practice as a critical part of their preparation rather than one more box to check off before graduation.

Conclusion

Video-based reflection activities are becoming commonplace within teacher preparation field experiences. Formally, more than 600 teacher preparation programs across the United States require video analysis activities as part of their pathway to teacher licensure (Pearson Education, 2014). If video analysis is a required activity for program completion or even licensure, developing an understanding of video observation and reflective processes should not occur at the same time performance is being evaluated. Introducing structured reflection activities early and often may help candidates see this important practice as a critical part of their preparation rather than one more box to check off before graduation.

Using a sequential approach to first build foundational skills of understanding and connecting can help to demystify expectations when teacher candidates are asked to examine their practice during culminating preparation activities. This sequenced approach can be introduced over several courses leading up to and including culminating field experiences or within one course with thoughtful planning. Introducing preliminary video-based reflection activities before asking candidates to engage in video analysis will help to address the learning curve associated with these corresponding technologies as well as this type of critical reflection. Upon program completion, the goal is for teacher candidates to understand the importance of reflective practice as well as the utility of video-based reflection activities. Reflective practitioners can rely on examining their practice as an approach to refining their professional style well after they move on from formal preparation if the groundwork is established early. New teachers can use video-based reflection activities in peer mentoring groups or individually to support their own induction and retention efforts.

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Selecting and Integrating High-Quality Videos into Teacher Education

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ABSTRACT

High leverage practices (HLPs) in special education are 22 critical skills related to collaboration, assessment, social/emotional/behavioral, and instructional domains. These practices are supported by research and recommended for use in PK-12 classrooms serving students with and without disabilities. Given the vast instructional modalities used within teacher education (i.e., face-to-face, online synchronous, online asynchronous, or hybrid flexible), it is important to have an array of resources that support teacher candidates' knowledge of HLPs, in addition to providing a glimpse at HLP implementation in authentic contexts. Videos are an advantageous option for achieving both goals; however, there are important considerations for maximizing the effectiveness of this learning support. Therefore, the aim of this article is to provide teacher educators with guidance on selecting and integrating videos to address critical HLP content. With a focus on leveraging effective design elements, this article describes the benefits of using video to address HLP content in special education teacher preparation programs, and offers guidance on integrating video within coursework through the use of a multimedia instructional tool called Content Acquisition Podcasts (CAPs).

KEYWORDS

Content acquisition podcasts, high leverage practices, Mayer's multimedia design, teacher education, videos

Teacher preparation programs aim to provide high-quality instructional training for teacher candidates entering the workforce, as an expectation of novice teachers is to successfully improve student outcomes upon entering the field (Nagro, 2020). However, teacher preparation is often insufficient, with novice teachers reporting feeling inadequately prepared to serve the diverse needs of students with disabilities (Gunpinar & Mackin, 2020; Tygret, 2018). To address this issue and improve novice teachers' early-career practice, scholars in the field of special education teacher preparation developed extensive policy recommendations for teacher education programs (McLeskey & Brownell, 2015). These recommendations include the development of an instructional framework, referred to as High Leverage Practices (HLPs; McLeskey et al., 2019), which offers guidance on key practice priorities for special education teacher preparation coursework.

The HLP framework comprises 22 instructional strategies divided across four domains: collaboration, assessment, social/emotional/behavioral, and instruction (McLeskey et al., 2019). To appropriately address students' wide range of academic (e.g., decoding, problem-solving) and behavioral (e.g., organization, social skills) needs upon entering the field, special education teacher educators must prepare teacher candidates to apply HLPs across a variety of settings (e.g., general education classroom, resource room), disability categories (e.g., emotional behavioral disorders, traumatic brain injury), grade levels (e.g., elementary, secondary),

and content areas (e.g., reading, math). Though recommended that all special education teacher preparation programs instruct teacher candidates in using HLPs to ensure they are equipped with fundamental skills necessary for supporting students with disabilities in K-12 learning environments (Riccomini et al., 2017), consideration of the variety of modalities in which teacher preparation occurs may impact this goal is a must.

Teacher educators may deliver teacher preparation instruction through face-to-face, online synchronous, online asynchronous, or hybrid flexible (i.e., hyflex) modalities. Face-to-face consists of the traditional instructional approach, wherein teacher educators train teacher candidates in a physical classroom, providing live lectures and opportunities to apply new knowledge through whole-/small-group discussion and other activities (e.g., role play). Most closely related to face-to-face instruction is online synchronous instruction, which occurs in real-time, allowing teacher candidates and instructors to interact in a virtual digital platform. Learning methods may include live lectures, small-group breakout discussions, and whole-group discussions utilizing chatbox features (Day & Verbiest, 2021). Asynchronous online instruction occurs in a specific digital platform but not within a particular timeframe. Instead, course participants may access pre-recorded video lectures, participate in independent activities (e.g., responding to a discussion board prompt), or collaborate through document-sharing platforms (Day & Verbiest, 2021). Lastly, the hybrid flexible (hyflex) option combines online and face-to-face instructional modalities and methods. The goal of hyflex is to serve all students with a limited set of resources (e.g., time and space), providing flexible setting options that meet varying participation needs (Beatty, 2019). Some hyflex models require course participants to switch between settings, while others ask participants to select one setting for the course duration.

“One powerful tool that combines explicit instruction and video to promote teacher candidates’ knowledge and implementation of HLPs and other evidence-based practices is content acquisition podcasts for teachers with embedded modeling videos (CAP-TVs).”

Unfortunately, teacher educators face challenges with providing instruction across these various modalities (Evmenova et al., 2021). For example, considering the various contextual factors (i.e., setting, grade level, disability groups, content area) that special educators must account for when implementing HLPs, it can be challenging to explicitly describe or provide instructions for efficacious implementation. Further, while field placements offer an opportunity to view the realities of the classroom, teacher candidates are individually assigned to many different placements, making it challenging to provide a common understanding of HLPs discussed in coursework.

One way to provide shared learning experiences centered around HLPs in special education teacher preparation is through the use of videos. Videos can be used as a vehicle to support teacher candidates’ conditional or contextual understanding of HLPs. However, explicitly teaching steps involved with HLP implementation as a preface to showing videos helps ensure that teacher candidates are receiving the declarative and procedural knowledge necessary for implementing HLPs with efficacy. One powerful tool that combines explicit instruction and video to promote teacher candidates’ knowledge and implementation of HLPs and other evidence-based practices is content acquisition podcasts for teachers with embedded modeling videos (CAP-TVs). The following sections describe the benefits of using video in special education teacher preparation and offer guidance on accessing or developing CAP-TVs to support video integration across various course modalities.

Videos in Teacher Education

Videos are a research-supported strategy in teacher education as they provide an authentic, immersive experience as a means for learning, viewing, and exploring instructional and behavior management strategies (Beerer, 2017; Leko et al., 2015). Specifically, videos help teacher candidates ‘see’ into a classroom and view instructional practices in action, making the nuances of daily classroom interactions more visible to teacher candidates (Budin et al., 2020; Brunvand, 2010; Vernon-Dotson et al., 2014). Using videos as an instructional tool, teacher candidates can view and reflect on real classroom situations from a diverse range of settings (Hixon & So, 2009). Stockero (2009) found that integrating video into preservice mathematics curriculum developed skills that prompted students to be more focused with their observations and reflective on student thinking. Moreover, videos offer shared experiences for large groups

TABLE 1: Ready-Made CAP-TVs for Use in Special Education Teacher Preparation Courses

CAP-TV TITLES	ACCESS LINK
High-Leverage Practices (HLPs) in Special Education	
HLP Series Intro Video	https://youtu.be/y0iGKOq8UXk
Clarifying the Relationship Between HLPs and EBPs	https://youtu.be/gYys-uuIeMI
HLP #7: Establish a Consistent, Organized, and Respectful Learning Environment	https://youtu.be/F-y48KAijbE
HLPs #8 & #22: Provide Positive and Constructive Feedback to Guide Student Learning and Behavior	https://youtu.be/N0T5zoIYri4
HLP #11: Goal Setting	https://youtu.be/A07qcWXjme0
HLP #12: Systematically Design Instruction Toward a Specific Learning Goal	https://youtu.be/vqD_GpYJ2rY
HLP #13: Make Adaptations	https://youtu.be/JYxfJTf39CY
HLP #14: Use Cognitive and Metacognitive Strategies	https://youtu.be/jPmBztMkVeQ
HLP #15: Use Scaffolded Supports	https://vimeo.com/625515844
HLP #16: Use Explicit Instruction	https://youtu.be/ESFVNzihOZ0
HLP #17: Use Flexible Grouping	https://youtu.be/WmFz-1PXo8k
HLP #18: Use Strategies to Promote Active Student Engagement	https://youtu.be/_pI7cD3e0aQ
HLP #19: Use Assistive and Instructional Technologies	https://youtu.be/BlvcdB70aE0
HLP #20: Provide Intensive Instruction	https://youtu.be/hHYD9nYE8aI
Effective Vocabulary Instruction	
Student-Friendly Definitions	https://vimeo.com/444031616
Using Examples and Non-Examples	https://vimeo.com/448122821
Teach Morphological Word Parts	https://vimeo.com/448389509
Provide Demonstrations	https://vimeo.com/448730569
Evidence-Based Practices for Supporting Students with ASD	
Reinforcement	https://vimeo.com/480346574

of teacher candidates, as they can view and discuss classroom interactions and instructional practices together (Hixon & So, 2009; Marsh & Mitchell, 2014; Youens et al., 2014). Discussing new understandings as a collective group with videos can also promote more reflective and focused observations, as candidates build deeper connections between the pedagogy they engage with through coursework and the various contextual factors involved with implementation (Coffey, 2014; Youens et al., 2014). Compared to written descriptions, videos also provide a more concrete example of the intended outcomes for implemented strategies (Hiebert et al., 2002). With video, a teacher candidate can watch classroom events or instruction unfold and view the scenario as many times as needed to better understand a strategy (Snoeyink, 2010). Essentially, teacher candidates observe expert teachers implementing a practice, use mental models to reconstruct their newly-acquired practical knowledge in the context of their own classroom, and then reproduce that practice in their own classroom context (Bandura, 1977).

Though video provides many possibilities for teacher education, it must be noted that not all instructional videos are created equally. Teacher educators should leverage high-quality videos in conjunction with explicit instruction to best support teacher candidates' HLP knowledge and skill development. One tool that comprises these necessary components is Content Acquisition Podcasts for teachers with embedded modeling videos (CAP-TVs).

CONTENT ACQUISITION PODCASTS FOR TEACHERS WITH EMBEDDED MODELING VIDEOS (CAP-TVS)

CAP-TVs are multimedia instructional vignettes developed to support

teacher candidates' factual and conceptual understanding of evidence-based instructional practices (Kennedy et al., 2017). Each CAP-TV begins with a concise introduction to the instructional practice of focus—including a brief research-based explanation of why teachers should learn about and use the practice—offering the declarative knowledge that helps teachers understand what the practice is. Next, teachers are provided with procedural knowledge, or the how of a practice, as the components required for efficacious implementation are explicitly defined. Finally, to better understand when a strategy should be used, every CAP-TV concludes with an embedded video clip of an expert teacher implementing the practice in an authentic context, providing some conditional knowledge that teacher candidates need to begin implementing it themselves. Examples of CAP-TV content include HLPs, vocabulary instruction, and other instructional practices (see Table 1).

Design and Delivery of CAP-TVs

Undergirding the design and delivery of CAP-TVs are core elements of explicit instruction (Archer & Hughes, 2011) and a set of multimedia instructional design principles associated with Mayer's (2021) Cognitive Theory of Multimedia Learning (CTML). Further, a video clip of an expert teacher implementing the target practice in an authentic context is embedded at the end of a CAP-TV, drawing upon Bandura's (1977) social learning theory. These theoretical and applied components comprising CAP-TVs work in tandem to make new information transparent to learners while promoting engagement throughout the learning process. Provided below is a detailed description of the three CAP-TV components.

Explicit Instruction. Explicit instruction within the context of HLPs is "an approach to instruction that is systematic, direct, engaging, and success-oriented" (Riccomini et al., 2017, p. 22). In other words, explicit instruction is a framework comprising research-based instructional strategies which are used in combination when designing and delivering a lesson to reduce ambiguity or complexity of new information and keep learners actively engaged throughout the learning process (Archer & Hughes, 2011; Hughes et al., 2017).

Further, explicit instruction constitutes one of the HLPs for inclusive classrooms (HLP #16: *Use Explicit Instruction;* McLeskey et al., 2019) that should be incorporated into teacher preparation coursework. The various elements of explicit instruction can be organized into three general categories—content, design, and delivery (Hughes et al., 2017). While every CAP-TV may not include all explicit instruction elements found across these three categories, there are several key elements that should always be incorporated in either case.

When designing CAP-TVs, teacher educators should optimize instructional time by (a) developing organized and focused lessons, (b) sequencing the presentation of practices in a logical manner, (c) segmenting complex skills into smaller steps, (d) focusing on the most critical components of each skill, and (e) providing examples of practice implementation to help contextualize the presented information. In general, teacher educators should keep a brisk pace and use clear, consistent, and concise language throughout CAP-TV instruction. Further, a video clip is incorporated at the end of a CAP-TV lesson, showing teacher candidates how expert teachers implement the target practice in an authentic context. Teacher educators may also incorporate opportunities to respond (OTRs) throughout the presentation to promote active engagement. Incorporating certain types of OTRs can also offer a scaffold for candidates' learning. Questioning that incorporates cognitive routines (e.g., "How is this s*imilar to or different from* other practices we've learned about?"), for instance, helps learners to organize information into their preexisting schemas. These core elements of explicit instruction further align and work in tandem with the CTML and its associated design principles (Mayer, 2021).

Cognitive Theory of Multimedia Learning (CTML) and Associated Design Principles. A set of design principles for multimedia presentations, described in the CTML (Mayer, 2021), are used as technical guidelines for the formatting of CAP-TVs. The CTML posits that creators should develop instructional presentations utilizing multimedia in a way that limits the amount of extraneous auditory and visual information being conveyed and interpreted to reduce learners' cognitive load. To elaborate further, as teachers provide instruction using multimedia tools, they typically share information verbally while displaying some combination of text and imagery on a board or through a projector. This multimodal information enters and is processed through visual and auditory channels connected to the brain before reaching the working memory system for further processing. Once in the working memory system, students mentally sort and connect the new information with prior related content for eventual storage in and later retrieval from their long-term memory (Smith et al., 2016). However, the CTML posits that the presentation of too much text, imagery, or verbal content at once may overwhelm a students' information processing system, and critical concepts can get lost in

FIGURE 1: Instructional Design Principles of Mayer's (2021) Cognitive Theory of Multimedia learning

DESIGN PRINCIPLE	DESCRIPTION	PRINCIPLE CHECKLIST
Reduce extraneous processing		
Coherence (N = 18; ES = 0.86)	Avoid irrelevant or extraneous information from the material	☐ All text is necessary. ☐ Avoid distracting background noise
Signaling (N = 15; ES = 0.69)	Cues are added that highlight the organization of content.	☐ Headings are used to start new sections. ☐ Emphasize keywords visually and vocally. ☐ Graphic organizers are integrated.
Redundancy (N = 5; ES = 0.72)	In fast-paced lessons, graphics and narration are preferred to graphics, narration, and text.	☐ Text is presented only when the speaker is not narrating a graphic
Spatial contiguity (N = 9; ES = 0.82)	Corresponding words and images are presented near one another.	☐ Text is placed near the corresponding image if it is used for emphasis.
Temporal contiguity (N = 8; ES = 1.31)	Corresponding words and images are presented simultaneously.	☐ Text matches what is being said. ☐ Images match what is being said.
Manage essential processing		
Segmenting (N = 7; ES = 0.67)	Presentations are broken into smaller parts.	☐ Content is appropriately chunked. ☐ One new understanding is presented at a time.
Pre-training (N = 10; ES = 0.78)	Background knowledge needed for understanding new concepts is reviewed.	☐ Material is previously introduced. ☐ Acronyms are defined prior to being used. ☐ Referenced people are introduced.
Modality (N = 18; ES = 1.00)	Pairing images with spoken words are preferred to printed words.	☐ All text with pictures is necessary. ☐ Picture captions are read aloud.
Foster generative processing		
Personalization (N = 13; ES = 1.00)	Speech should reflect a conversational style rather than a formal style.	☐ The tone of the speaker is casual. ☐ The speaker uses a clear and not monotone voice.
Voice (N = 6; ES = 0.74)	A human voice is preferable to a computer-generated voice.	☐ The speaker is a human voice.
Embodiment (N = 16; ES = 0.58)	If using on-screen characters to present material, these characters should embody human characteristics to support learning.	☐ Visual of the speaker incorporates movement. ☐ If the visual is a cartoon, there should be human-like movement. ☐ First-person perspective is used
Multimedia (N = 13; ES = 1.35)	The combination of related words and pictures benefits learning more than words alone.	☐ There is a visual provided for text
Generative activity (N = 37; ES = 0.71)	Knowledge retention is supported through generative learning activities during multimedia lessons (e.g., summarizing, drawing).	☐ Speaker encourages viewers to pause and complete activities

Note. N = the number of tests conducted for each principle; ES = the median effect size found for each principle.

translation.

Nearly 300 studies were conducted and informed the development of multimedia instruction since 2001, resulting in the associated design principles which aim to maximize learning and comprehension (Mayer, 2021). There are 13 multimedia design principles broken down into three overarching categories centered around information processing: reducing extraneous processing, managing essential processing, and fostering generative processing. Five design principles are associated with reducing extraneous processing, three are associated with managing essential processing, and five are associated with fostering generative processing. Figure 1 provides information about the number of tests conducted and the median effect sizes for the 13 design principles. A checklist related to these design principles is also provided in Figure 1 to support teacher educators in identifying high-quality videos and developing their own CAP-TV lessons.

Research Evidence in Support of CAP-TVs

Several researchers have demonstrated the use of CAP-TVs to support teacher candidates' and in-service teachers' knowledge and implementation of evidence-based practices and HLPs. Regarding evidence for teacher candidates, an initial study conducted by Ely and colleagues (2014) utilized CAP-TVs to instruct teacher candidates in elementary-level, evidence-based vocabulary practices. Results indicated that this tool supported significant increases in teacher candidates' knowledge ($d = 0.72$) and implementation ($d = 1.14$) of vocabulary instructional practices when compared to candidates who learned about the same practices through readings. In a follow-up study, teacher candidates demonstrated increased fidelity with implementing vocabulary instructional practices, as observed instructional behaviors increased from 27-40% at baseline to 71-88% at post-intervention (Ely et al., 2015). For in-service teachers, the combination of CAP-TVs about classroom management practices with a coaching session, Kennedy et al. (2017) found that high school teachers implemented significantly more than those who received instruction through a traditional in-person PD session. This was true for all three practices taught, including behavior-specific praise statements ($d = 1.67$), opportunities to respond ($d = 2.03$), and precorrection prompts ($d = 1.99$; Kennedy et al., 2017).

In the next section, we explain how to select and embed videos (with a focus on CAP-TVs) into teacher education coursework to strengthen teacher candidates' understanding and use of HLPs. We divided the content into three sections: before instruction, during instruction, and after instruction, with the goal of helping teacher candidates acquire knowledge about HLPs.

CONSIDERATIONS FOR INTEGRATING VIDEOS INTO TEACHER EDUCATION COURSEWORK

Before Instruction

The first step is to review the course content and focus on identifying videos. Prior to the start of a new semester, teacher educators often spend time reviewing course content and updating their course syllabus, making this the ideal time or selecting videos that support course content. Selecting topics and readings is also an excellent time to review video repositories. We encourage teacher educators to check out the existing, ready-made CAP-TVs available for immediate use in courses, provided in Table 1.

Once videos have been identified, the next focus is on the quality of the video. When evaluating the quality of a video, consider the design elements of the video to determine whether it aligns with the associated design principles of the CTML (Mayer, 2021; see Figure 1). For example, when watching a video the teacher educators might ask themselves: "Do text and images presented in this video match the conveyed content?" or "Does the narrator use a clear tone of voice?" Further, teacher educators should consider whether the video meets accessibility standards set forth by website accessibility guidelines and their university's policies. Programs such as Universal Design Online Content Inspection Tools (UDOIT) scan multimedia objects to see whether they have alternative text equivalents (e.g., transcripts, captions). The CAP-TVs that discuss HLPs and their implementation (see Table 1 or The CEEDAR Center website) provide a video transcript. In addition, you can turn on closed captioning through video platforms such as YouTube or Vimeo.

If a video is unavailable on your topic, or the existing videos do not align with CTML, or accessibility standards, you can create a CAP-TV that covers the content you would like to address. Carlisle and colleagues (2021) provide a detailed description of the steps for developing CAP content. Although the Carlisle et al. (2021) article focuses on CAPs for students (CAP-S), the steps outlined are relevant to CAPs for teacher candidates; thus, we have adapted their procedures. In particular, we offer and describe below the three main segments of CAP-TV (see Figure 2). In addition, a downloadable CAP-TV template can be accessed through the following link: https://tinyurl.com/captv-template. Directions and other considerations for creating a CAP-TV lesson can be found in the slides' notes

FIGURE 2: Checklist ofr Designing CAP-TV Lessons

CAP-TV SEGMENT	Design Components
☐ First Segment: *Introduction* Introduce the instructional practice of focus, including a brief overview of evidence supporting its use. • Teachers should understand why learning about this practice will benefit them (and their students) when implemented in an authentic context.	*Explicit Instruction Elements:* Focus on critical content; State the goal of the lesson; Design organized and focused lessons; Use clear and concise language; Use a brisk pace *Associated Design Principles of CTML:* Coherence principle; Redundancy principle; Spatial and Temporal Contiguity principles; Segmenting principle; Modality principle; Personalization and Voice principles; Multimedia principle
☐ Second Segment: *Defining the Practice* Clearly define the practice, explicitly describing each step teachers should follow to implement the practice with fidelity. • Begin with a statement defining the practice (e.g., "Opportunities to respond are questions that provide chances for students to actively engage with and make sense of new information"). • Then provide a list of the steps involved with the practice and clearly describe each step thereafter.	*Explicit Instruction:* Focus on critical content; State the goal of the lesson; Design organized and focused lessons; Segment complex skills; Logically sequence skills; Use clear and concise language; Use a brisk pace; Provide examples and non-examples *Associated Design Principles of CTML:* Coherence principle; Redundancy principle; Spatial and Temporal Contiguity principles; Segmenting principle; Modality principle; Personalization and Voice principles; Multimedia principle
☐ Third Segment: *Video Model/Closure* After defining the practice and each necessary step involved in implementation, provide closure by: • Embedding a video recording of an expert teacher implementing the practice in an authentic context.	*Explicit Instruction:* Provide Demonstrations *Associated Design Principles of CTML:* Coherence principle; Signaling principle; Redundancy principle; Segmenting principle; Modality principle; Voice principle; Embodiment principle **Social Learning Theory*

Note. By incorporating pauses for comprehension opportunities to respond following each segment, course instructors provide access to the Generative Activity principle (Mayer, 2020) and the elements of explicit instruction that relate to practice opportunities (e.g., guided and distributed practice; Archer & Hughes, 2011).

section included within the template.

As shown in Figure 2, the first segment introduces the HLP content. Providing an anchor image of the practice helps teacher candidates make a connection to the upcoming content. The segment may also include the goals of the CAP-TV (e.g., "In this video, you will learn…"). An explicit cue slide at the end of the segment lets candidates know OTRs are coming. The slide can include icons such as a question mark.

The second segment presents the defining characteristics of the practices, describes the critical features or steps in greater length, and highlights the steps for implementing a practice with fidelity. This segment uses the same anchor image from the first segment when redefining the practice. It is important to provide critical content while limiting the amount of text presented on each slide by focusing on keywords and phrases necessary for teacher candidates to remember. Text shown on the screen should also match the verbalized narration with each necessary step of the practice on a separate slide. OTRs should be cued before being narrated. The format for OTRs can be open-ended or multiple choice.

The third segment includes a video model of an expert teacher, providing an example of the implemented practice. This is one of the most important pieces of the CAP-TV. Teacher educators can pre-record a teaching segment using a video camera or a classroom recording device such as a SWIVL recording robot. A SWIVL recording robot follows whoever is wearing the tracking microphone device and can pair multiple microphones placed around the room. It is essential that the device selected has a good microphone and is able to track the speaker. Placing a camera on a tripod and recording a teaching segment often falls short as it misses a great deal of the interactive nature of instruction. To assist candidates in learning the skills, technical aspects of video production should be considered; this includes a steady camera, crisp focus, and audible speaking. To support learning and access, provide voice-over narration (as appropriate) and closed captioning (Hirsch et al., 2019).

When creating or selecting modeling videos for CAP-TVs, video design guidelines such as those created by Brunvand (2010) support the cognitive processing of preservice teachers. For example, explicit prompts point out a relevant part of a practice or segment (e.g., *Now watch this clip of a teacher provide behavior specific redirections. In the segment, you will see the teacher explicitly state the corrected behavior, then the teacher says the expected behavior along with the context in which the expected behavior occurs. The teacher concludes by inviting the student to attempt the desired behavior*). Commentary enhances the candidate's ability to notice important or relevant content. Given many candidates have limited exposure to classrooms, providing multiple examples of an HLP from different perspectives can help the candidates make connections between authentic situations and their existing knowledge (Brunvand, 2010; Ely et al., 2014, 2015). The segment concludes with a brief recap of the information. After the video segment, reflection questions (i.e., OTRs) can also be included.

During Instruction

Once a video is selected or created, the next step is incorporating it into your instruction. To facilitate easy access, an option would be to place a direct link to the video into your course syllabus as well as in the applicable lesson module located on your course's learning management platform (i.e., Canvas, Blackboard). Posting or including links to the CAP-TVs that correspond with your course content on the learning management platform and/or syllabus, ensures that these resources are available beyond the time you have together in your course, promoting repeated access and exposure to the course content.

If teaching a face-to-face or online synchronous course, you may choose to show a CAP-TV to teacher candidates during the regularly-scheduled class meeting. While viewing the CAP-TV, pause the video and provide opportunities for the teacher candidates to respond to the presented information. Opportunities could include higher-order, "deep" OTRs that require open-ended responses (e.g., *Why is it important for teachers to re-teach classroom expectations despite being taught previously?*) or rote, closed-ended OTRs (e.g., *What are two metacognitive strategies to support memory, attention, and self-regulation?*). For asynchronous instruction, the CAP-TVs can be assigned as a weekly activity. For example, embedding the CAP-TVs into a video analysis tool allows teacher candidates to interact with the CAP-TV. Tools such as EdPuzzle or VoiceThread offer interactive features prompting teacher candidates to respond to open-ended or fixed choice OTRs.

Regardless of instructional format, teacher educators need to engage candidates in critical reflection and discussions around the teacher models in the videos embedded at the end of a CAP-TV. If sharing the content in a synchronous environment, you might ask teacher candidates to separate into small groups (either in the classroom or using a breakout room feature) to discuss what they noticed, what they thought went well, and what they felt the teacher model could have done differently. If candidates are engaging with the content asynchronously, you might ask them to respond to similar prompts on a discussion board. Importantly, make sure to give all teacher candidates the opportunity to share their responses with the whole group to co-construct understandings related to the conveyed course content.

After Instruction

Regardless of the modality, CAP-TVs provide rich content and concrete examples of HLPs. However, it is important to evaluate whether the CAP-TV is effective by reviewing course data (e.g., assessments, observations). Teacher educators may compare data with prior knowledge measures (i.e., pretest or baseline data) or previous courses' data. When first piloting CAP-TVs, it is ideal to collect and review teacher candidates' feedback on the material. A brief anonymous survey can ask the students to rate the quality of the CAP-TVs and share their thoughts on the content they learned from the videos. For example, CAP-related social validity questions can be found in two articles from Hirsch et al. (2015, 2020). After watching CAPs for teachers on functional behavioral assessment (FBA) content, teacher candidates were prompted to respond to five items using a 6-point Likert-type scale (1 = strongly disagree to 6 = strongly agree). Across both studies, teacher candidates rated the CAP-TVs favorability

Items included:

- The format of the FBA activity worked well for my learning preferences.
- Most teachers would find this activity appropriate for learning about FBAs.
- I would suggest the use of this FBA activity to other students.
- Following the activity that you completed, I am confident in my entry-level knowledge of FBAs.
- The format of last week's instruction was an effective way for me to learn new content.

As the social validity items in these studies pertained to CAP-Ts—a type of CAP that does not include a video of a teacher modeling the practice at the end—add items that ask candidates to provide input on the video model. In addition to quantitative survey data offered by the Likert items, qualitative

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data in the form of narrative, open-ended responses could provide more detailed insights into teacher candidates' perceptions of the CAP-TVs. Furthermore, depending on the learning management system, instructors may be able to view data related to teacher candidates' interactions with CAP-TV content. For example, some platforms provide data indicating the length of time the candidate spent interacting with the video or the number of times they viewed it. Together, these data can inform future iterations of the CAP-TV content or the course map.

FINAL CONSIDERATIONS

CAP-TVs can be used with teacher candidates to support their knowledge and application of HLP content. In this article, we presented the multiple types of modalities that teacher preparation programs provide and explained how video can enhance teacher candidates' learning experience. Though video integration comes with many noted benefits, the video creator's design choices play a critical role in the success of an instructional video. Moreover, when developed with Mayer's (2021) design principles and CTML, learners are more likely to gain new knowledge and foster a deeper understanding of the presented concept. As such, teacher educators should keep these principles in mind while selecting and integrating videos within their courses.

We hope that using the checklists, integration tools, and strategies provided herein support teacher educators in identifying or creating videos that will effectively support teacher candidates' knowledge of and ability to implement HLPs upon entering the field. To prepare highly-qualified special education teachers, we must make the nuances of classroom practice visible to teacher candidates, and instructional videos designed with evidence-based features are essential to this goal.

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A Guide to Integrating Mixed-Reality Simulation in Initial and Advanced Special Education Programs

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ABSTRACT

Mixed-reality simulation (MRS) is an innovative and promising approach in teacher preparation programs. While the use of MRS as a practice-based learning opportunity (PLO) in special education teacher preparation and professional development continues to grow, integrating this novel technology can be daunting for faculty members and school leaders. The purpose of this practitioner guide is to further explain the utility of MRS, provide detailed explanation and resources for integrating this technology as a PLO in teacher preparation, and illustrate an example of how MRS can be used in special education coursework.

KEYWORDS

Mixed reality simulation, professional development, special education, technology, teacher preparation

Teacher preparation programs face limited time to address the full range of skills educators must master, a problem that is magnified in special education. Preservice special education teachers must learn how to teach culturally, linguistically, and academically diverse students while enrolled in their preparation programs. Once in the field, special education teachers are tasked with effectively supporting the academic and socio-emotional needs of students with disabilities (SWD). Such skills include the ability to monitor student progress, identify students needing intensified instruction and intervention, provide intensified instruction and intervention as appropriate, and collaborate with parents and/or guardians and school professionals (i.e., co-teachers, paraprofessionals, physical and occupational therapists, etc.) in addition to planning instruction for multiple content areas each day.

The level and range of content needed to effectively prepare preservice teachers to work with SWD is vast, especially considering the limited time available in both traditional and alternative pathways to certification. One response to this challenge involves embedding high leverage practices (HLPs; McLeskey, et al., 2017) in teacher preparation. HLPs are a set of specific teacher practices that are likely to improve student outcomes. HLPs are defined as "tasks and activities that are essential for skillful beginning teachers to understand, take responsibility for, and be prepared to carry out in order to enact their core instructional responsibilities" (Ball & Forzani, 2009, p. 504). Specifically, HLPs are a common core of professional knowledge, classroom practices, skills, and behaviors that can be taught to preservice teachers using highly structured and well-supervised opportunities where feedback is essential to field experience (McCray et al., 2017). Integrating HLPs in teacher preparation programs can improve the instructional practices of teachers that lead to higher student academic achievement and social outcomes (Akalin & Sucuoglu, 2015; Ball & Forzani, 2009; Cohen, 2015; Grossman et al., 2009; McLeskey & Brownell, 2015).

It is critical for preservice teachers to

have opportunities to practice teaching through structured, scaffolded, and supervised experiences (Leko et al., 2015). High quality teacher preparation programs provide numerous opportunities for deliberate practice, performance feedback, and targeted coursework (Scheeler et al., 2016). The Collaboration for Effective Educator Development, Accountability and Reform (CEEDAR) Center and researchers in the field of teacher preparation (Ball & Forzani, 2011; Grossman et al., 2009; Lampert, 2010; McDonald et al., 2013; Windschitl et al., 2012) have urged teacher preparation programs to provide deliberate practice that is strategically sequenced and calibrated for preservice teachers to develop mastery of HLPs. McLeskey and colleagues (2017) suggest "HLPs can become the foundation of a cohesive, practice-based teacher education curriculum that incorporates repeated, scaffolded, effective opportunities for special education teacher candidates to practice" (p. 9). Integrating HLPs in teacher preparation programs includes planning for when and how knowledge, skills, and understandings will be introduced, practiced, and assessed. Teacher educators are increasingly focused on creating practice-based learning opportunities (PLOs) to provide meaningful practice on HLPs, particularly before preservice teachers apply their learning in the field.

Effective PLOs are scarce and often limited to inauthentic role-plays and scenarios that do not reflect the complexities and challenges of a classroom environment. One innovative and promising tool emerging in the field of education to provide such practice is the use of mixed-reality simulation (MRS). MRS is an innovative technology that merges human knowledge with artificial technology. Mursion™ is a MRS platform that evolved from technology developed out of the University of Central Florida (e.g., TeachLivE™). Software like Mursion™ provide simulated environments to practice skills essential for classroom teaching (Dawson & Lignugaris-Kraft, 2017; Dieker et al., 2016; Pas et. al, 2016; Peterson-Ahmad, 2018; Underwood et al., 2015; Vince Garland et al., 2016). These simulated environments are realistic settings where a trained human interactor digitally puppeteers a variety of avatars displayed on a screen visible to participants (Dieker et al., 2008).

One innovative and promising tool emerging in the field of education to provide such practice is the use of mixed-reality simulation.

The purpose of this practitioner guide is to further explain the utility of MRS, provide detailed explanation and resources for integrating this technology as a PLO in teacher preparation, and illustrate an example of how MRS can be used with HLPs in a capstone special education course. Throughout this guide, several terms will be used to explain and illustrate. A *facilitator* (e.g., faculty member, teacher educator, clinical or field supervisor, principal, instructional coach, or teacher leader) is the individual(s) who plans to implement MRS in their coursework or teacher preparation program. A *participant* (e.g., undergraduate/graduate student, preservice teacher, inservice teacher) is the individual(s) who engages in the simulation. The *lab* refers to the behind-the-scenes technology including the mixed reality lab director, lab administrative support staff, and simulation specialist.

MIXED REALITY SIMULATION IN TEACHER PREPARATION

The use of simulation is a well-validated approach for students in numerous fields outside of education, such as military and medical training (McGaghie et al., 2010). Just like pilots use flight simulators before ever taking flight; the same concept is applied to MRS in education. This interactive technology merges artificial intelligence with human knowledge and interaction created by an actor referred to as a simulation specialist. Merging the two constructs of artificial intelligence and human interaction creates a "human in the loop" paradigm. The fields of computer science and engineering use this well-known term to describe how humans play an important role in influencing a simulation through integrating their own actions, thoughts, and words (Cranor, 2008). When using the Mursion™ platform, the simulation specialist, who is trained on the operating software, puppeteers the avatars to create a more realistic experience for the participant. These interactions capture the simulation specialist's movements, speech, and thoughts; thus, allowing the avatars to interact and respond with the participant in real time, creating a more authentic and real experience.

Simulated practice is a PLO that allows participants to learn and master new skills in an environment that does not put others (e.g., K-12 students) or relationships at risk, by eliciting participant thinking and adjusting to real-time responses during interactive teaching (Dieker et al., 2014). This enables preservice teachers to practice decision-making and receive feedback on decisions through virtual respons-

es and peer observers (Zimmer et al., 2020). The facilitator and the lab work collaboratively to design a simulation scenario. Participants receive a participant-facing, shortened version of the scenario that includes the learning objective to help prepare and guide them during the simulation (see Figure 1). Key information is purposefully omitted from the version of the scenario participants receive, and the full scenario shared between the facilitator and lab.

The simulation specialist observes the participant(s) in real time through a webcam and can hear their speech through built-in microphones within the technology. From the participants' end, the simulated environment (e.g., avatars within a classroom or an adult within an office) are portrayed on a large television screen or a laptop. The classroom simulation appears like any other classroom with desks, chairs, a whiteboard, and students. The technology allows for a natural conversation that is personalized to the participants within the simulation. Participants are situated in authentic classroom scenarios, with a variety of experiences occurring (e.g., on or off task behavior) based on the participants behavior (e.g., engaging lesson, poor planning; Hudson et al., 2018; Nagendran et al., 2014).

LITERATURE REVIEW ON MRS IN TEACHER PREPARATION

Novice teachers often state that they do not feel they are adequately prepared to enter the classroom (DeMonte, 2015). Novice teachers require more practice with newly acquired pedagogical skills; thus the need to provide preservice teachers with deliberate opportunities to practice important skills (Leko et al., 2015). Given the limitation of teacher preparation programs (e.g., time, effective field placement, and opportunities to practice effective pedagogy), paired with the fact that SWD are increasingly served in the general education classroom, well-designed simulation experiences that integrate purposeful practice of HLPs is one promising solution to prepare preservice teachers.

When participants interact within the simulation, both the mind and body are immersed in a simulated experience where the authenticity and relevance are high while the cognitive load is appropriate (Calandra & Puvirajah, 2014). MRS offers the opportunity for preservice teachers to practice with the safety net of being able to make mistakes, reflect on what went wrong, and continue to practice without putting anyone at risk (Calandra & Puvirajah, 2014; Dieker et al., 2016). Preservice teachers are allowed the opportunity to hone their skills in a safe environment, to learn from their mistakes, and receive real time instructor feedback before ever entering the classroom setting (Dieker et al., 2016). The implementation of MRS in teacher preparation programs also provides the opportunity for preservice teachers to practice various HLPs such as opportunities to respond (OTR), which supports the learning of students with and without disabilities (Dawson & Lignugaris-Kraft, 2017).

In addition, the use of MRS also affords the opportunity for participants to receive individualized coaching. For example, there have been studies that focus on preservice teachers receiving coaching from their instructor and/or peers to improve their classroom management skills through the use of MRS scenarios (Dawson & Lignugaris-Kraft, 2017; Pas et. al., 2016; Peterson-Ahmad, 2018; Zimmer et al., 2020).

Recent studies have focused on embedding HLPs in teacher preparation programs using MRS as the practice component, before or coinciding with, students entering their field placements. For example, Driver et al.(2018) examined the effects of embedded MRS to prepare preservice teachers for collaborative environments. Preservice teachers learned specific communication skills within their coursework, then practiced in a variety of simulated collaborative settings (e.g., co-teaching, paraprofessional, parents, and administrator). Each setting had a scenario which created an environment in which the participants were able to practice the communication skills they learned. Results showed significant shifts in perceptions of readiness to work in a collaborative environment.

Zimmer and colleagues (2020) examined the effects of providing preservice teachers a PLO to embed several instructional and behavior HLPs within a lesson plan. Preservice teachers were given a scenario in which they were asked to create a lesson plan that embedded evidence-based strategies and teach the lesson three times over the period of the instructional course. Findings showed that the use of performance feedback and deliberate practice within a controlled environment resulted in positive shifts in preservice teachers' use of targeted HLPs.

Furthermore, Walters et al. (2021) conducted a randomized control design to investigate the effects of MRS within their special education program to prepare preservice teachers on how to implement a system of least prompts. Results suggested that preservice teachers in the group that had both MRS and coaching, significantly improved the implementation of the prompting sequence, compared to the control group. Overall, the use of MRS as a PLO is an innovative and effective educational tool to use with preservice teachers to develop the skills and expertise needed to create a successful and inclusive classroom.

TABLE 1: Lab Communication Hits and Misses

Target behaviors for simulation/role play: The below "hits" represents strategies that we would like to see the teachers display. The below "misses" refer non-preferred teacher behaviors.	
When teachers…	Classroom students will…
HIT	***HIT***
Provide scaffolds and supports students can become more engaged and respond. ▪ Explicitly teaching vocabulary ▪ Frequent questioning ▪ Provide scaffold supports ▪ Provide positive and constructive feedback to guide students' learning and behavior ▪ Use strategies to promote active student engagement ▪ Embed and use students' cultural, religious, family, intellectual, and personal experiences and resources during instruction ▪ Checking student understanding during and at the conclusion of lesson ▪ Building respectful relationships with students	You will be a typical upper elementary/middles school (3rd or 6th grade) classroom with typical behaviors (i.e., off task behaviors, calling out, yawns if lesson is not engaging, inattentive, etc.) One student has a disability. As teachers clearly introduce content and attempt to engage students meaningfully, student avatars will respond with interest.
Miss	***Miss***
If teacher candidate is not engaging and/or is not prepared, acting out and rude comments are appropriate. Play off the participant – as they develop their teaching strategies.	If the teacher candidate is creating a welcoming environment and engaging students in the lesson, the avatars can be on task with the occasional calling out, distractibility, and typical elementary school behaviors. If teacher candidate is not engaging and/or is not prepared, acting out and rude comments are appropriate. Play off the participant – as they develop their teaching strategies.

HOW TO INTEGRATE MRS IN TEACHER PREPARATION COURSEWORK

While the use of MRS is a promising approach in teacher preparation (Driver et al., 2018; Walters et al., 2021; Zimmer et al., 2020), it can feel overwhelming for first time users. As with any new technology integration the more an individual engages in the process, the more comfortable and familiar they become with the tool. The following recommendations are intended as a starting point for faculty to begin to plan this immersive experience within teacher preparation program and coursework.

Design a Scenario

The facilitator is the person that will plan and lead the simulation session. It is their job to ensure that the simulation runs smoothly from the instructional side and answer any questions that the participants may have. Many participants will have questions about what they will experience and typically feel uneasy about their first MRS session. The facilitator can reassure these feelings are normal and encourage participants to prepare as they would for a real educational environment. Facilitators are encouraged to support the suspension of disbelief by calling the avatars by their names, referring to their interest and likes, and by limiting information shared about the behind-the-scenes technology with the lab. This helps keep "the magic alive"; the more the facilitator buys into the realism of the simulation, so will the participants. In addition, the facilitator works collaboratively with the lab to establish the

FIGURE 1:
Sample MRS Scenario

HLP #16: Use Explicit Instruction

Synopsis

3rd or 6th Grade Classroom

Learner Challenge

You are either a 3rd or 6th grade teacher preparing to teach a reading comprehension lesson to a diverse group of students in an inclusion classroom. Several of your students have high-incidence disabilities. The lesson will focus on a literacy standard. See attachment for additional details and instruction.

Objective

Participants will integrate HLP #16 (explicit instruction) in a lesson they create. Then they will teach an explicit instruction lesson that incorporates evidence-based strategies.

To hit this objective teacher candidate will:

- *Make content, skills, and concepts explicit by showing and telling students what to do or think while solving problems, enacting strategies, completing tasks, and classifying concepts.*
- *Choose examples and non-examples and language to facilitate student understanding, anticipate common misconceptions, highlight essential content, and remove distracting information.*
- *Model and scaffold steps and/or processes needed to understand content and concepts, apply skills, and complete tasks successfully and independently.*

Materials to Submit to Lab and/or Facilitator

- *Teacher created lesson plans & accompanying documents (i.e., graphic organizers, PowerPoint, etc.)*

Scenario Guide

Scenario Overview

Teacher candidate will teach an explicit reading comprehension lesson.

Ideal Simulation Configuration: Classroom

Elementary -OR-Middle School Avatars

Learner Audience

- *Pre-service Teachers/ Teacher candidates*
- *Non-credentialed Teachers*
- *Novice Teachers*

Note. Scenario for HLP #16 Explicit Instruction Simulation.

TABLE 2: Sample MRS Session Schedule

Less Than 10 Participants in a Session		**10 - 18 Participants in a Session** You can use the <10 schedule and assign co-participant to teach each lesson together (or engage in simulation).	
0 - 10 min	Participant A	0 - 10 min	Participant A & Participant J
12 - 22 min	Participant B	12 - 22 min	Participant B & Participant K
24 - 34 min	Participant C	24 - 34 min	Participant C & Participant L
36 - 46 min	Participant D	36 - 46 min	Participant D & Participant M
48 - 58 min	Participant E	48 - 58 min	Participant E & Participant N
58 - 1:10 min	*Break/Debrief*	*58 - 1:10 min*	*Break/Debrief*
1:12 - 1:22 min	Participant F	1:12 - 1:22 min	Participant F & Participant O
1:24 - 1:34 min	Participant G	1:24 - 1:34 min	Participant G & Participant P
1:36 - 1:46 min	Participant H	1:36 - 1:46 min	Participant H & Participant Q
1:48 - 1:58 min	Participant I	1:48 - 1:58 min	Participant I & Participant R

Note: TRTP Mixed Reality Simulation (MRS) Guidance Document (Zimmer & Driver, 2021)

MRS session outcomes and objectives and the specific skills or actions participants should practice (Figure 1).

Practice the Session with the Simulation Specialist

Before participants engage in the simulation, the facilitator first schedules a practice session with the lab to review the objective of the session, the "hits and misses" (i.e., how the avatars should react to certain behaviors shown by the participant; Table 1), and the level of behavior (low, medium, or high) you want your avatars to display. It is recommended to start all sessions on a low behavior. This will help ease participants into the scenario and create a safe and welcoming environment. As the session progresses, you can contact the simulation specialist to change the behavior level of the scenario if you so desire. Practicing the simulation not only allows the facilitator to have a greater understanding of what to expect from the experience, but also helps the lab ensure the experience reflects the desired outcomes and environment needed to elicit the behaviors participants should practice.

Have Participants Engage in an Introductory Session

It is recommended that if this is the participant's first time using MRS, the facilitator provides an introductory session. An introductory session has three primary purposes: 1) to get the participants familiar with how the simulation operates, 2) to boost participants' comfort levels, and 3) allow participants to get to know the avatars' personalities. The last purpose is valuable for participants that are creating and teaching a lesson plan. Participants can integrate what they have learned about the avatar students into creating engaging lessons. For online courses, it can also be helpful for the facilitator to record a brief video interacting with the avatars so participants have a point of reference.

Create a Participant Schedule

Once the scenario is designed, the facilitator works with the lab to schedule MRS sessions. MRS sessions can be scheduled as an entire group, where participants take turns engaged in simulated practice while peers watch, or as individual sessions within a block of time (see Table 2). It is helpful for the facilitator and/or participants to decide the participant order prior to the session time. This helps to avoid the awkward waiting for volunteers, helps nervous participants mentally prepare for when they will be called on, and makes for more efficient use of lab time.

For large groups, a fishbowl strategy approach works best. During the MRS session, the facilitator would select five to ten participants (depending on time) to engage in the scenario, while the rest of the group listens, watches, and takes

TABLE 3: Capstone Course Syllabus Snapshot

Module 2: High Leverage Practices	
Module Objectives 2.1 Provide baseline data on your understanding of high leverage practices 2.2 Identify the alignment between the special education and general education HLPs with the SEPO and TKES observation tools 2.3 Select one HLP from each of the four areas: collaboration, assessment, instruction, and social/emotional/ behavior for targeted growth 2.4 Prepare for upcoming Mixed-Reality Simulation (MRS) Session	**Module Assignments** · M2 A1: HLP Pretest (2.1) · M2 A1: HLP Alignment Matrix Part II (2.2) · M2 A2: HLP Professional Growth Plan Part II (2.3) · M2 A3: Submit 3-5 questions you will ask the student avatars (2.4) · M2 A4: Schedule your "meet the students" MRS simulation (2.4)
Module 3: Preparing for Practice	
3.1 Establish an evidence base for selected HLPs 3.2 Engage in MRS Session 3.3 Reflect on the MRS Experience	· M3 A1: Locate at least one evidence-based journal articles for each of your four selected HLPs (3.1) · M3 A2: Introduce yourself in the MRS setting via Zoom and collect information on your "students" (3.2) · M3 A3: Submit an initial reflection on the MRS experience, what you have learned and what you will integrate into future lessons (3.3)
Module 4: Explicit Instruction	
4.1 Engage in Explicit Instruction Webinar 4.2 Analyze Explicit Instruction Video Resource 4.3 Prepare for upcoming MRS Session	· M4 A1: Complete Explicit Instruction Webinar (4.1) · M4 A2: Explicit Instruction Video Analysis (4.2) · M4 A2: Submit Explicit Instruction Lesson Plan I (4.3)
Module 5: Purposeful Practice I	
5.1 Engage in MRS Session 5.2 Reflect on the MRS Experience	· M5 A1: Teach Explicit Instruction Lesson Plan I in the MRS setting via Zoom (5.1) · M5 A2: Watch recorded video and score yourself using the SEPO (5.2) · M5 A3: Reflect on the experience, what you did well, and what you would like to improve on. Comment on your specific HLPs of focus (5.2)
Module 6: Collaboration	
6.1 Analyze the evidence base and implementation of the Collaboration HLPs 6.2 Debrief and reflect on the MRS Experience 6.3 Prepare for upcoming MRS Session	· M6 A1: Engage in Collaboration Discussion board and comment on two peer posts (6.1) · M6 A2: Watch partner video and provide constructive feedback (6.2) · M6 A3: Review instructor SEPO and peer feedback and submit plan of action (6.2) · M6 A4: Revise Explicit Instruction Lesson Plan I based on feedback (6.3)

notes. After the scenario is complete, everyone debriefs, creating an engaging and participant-centered experience for the entire group. Please note we recommend keeping the number of participants in a session to 30 or less to maximize engagement and create a sense of community when possible.

Debrief the Session

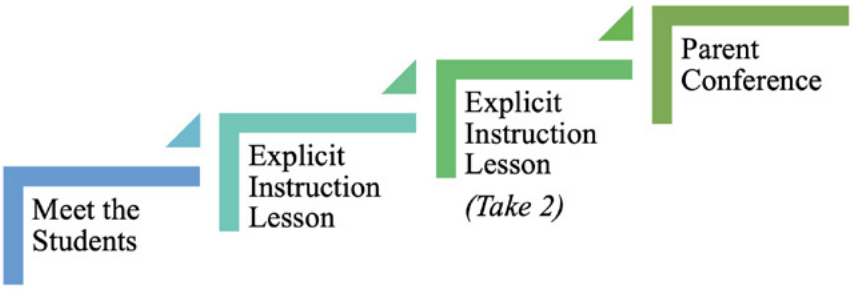
It is important to provide time and space for meaningful feedback and discussion on the simulation session. This allows participants to discuss what went well, areas of strengths, improvement, and how they may improve. A key aspect of any PLO is the ability for participants to reflect and learn from experience. Sample debrief questions might include: *a) What went well? Name three specific examples; b) What is an area to improve upon? List one specific example and explain why. Provide a suggestion for next steps to grow in this area; c) What was your overall take-away from watching this video/live session? Identify something that stood out to you and will influence your practice.*

EXAMPLE OF MRS AND HLPS IN SPECIAL EDUCATION TEACHER PREPARATION

The next section will illustrate an example of how MRS can be used to address numerous HLPs in a preservice special education course. The following example demonstrates how MRS was embedded in a culminating capstone course at the end of a two-year, fully online Master's in Education special education program. This example is relevant for both initial and advanced certification programs in special education.

In the capstone course, participants were asked to apply and synthesize their learning and demonstrate a comprehensive understanding of how HLPs should be integrated into their teaching practice. At the start of the semester, participants created an alignment matrix between HLPs, the statewide teacher observation rubric, and program key assessment observation rubric (e.g., SEPO). Next, participants used their alignment matrix to identify individual areas of strength and growth to focus on throughout the course (see Table 3). All participants were prompted to focus on HLP #16 Explicit Instruction, and to identify one additional growth HLP from each of the four domains of collaboration, assessment, instruction, and social/emotional/behavior. Throughout the remainder of the semester, participants sought out and shared research on their focus HLPs through discussion forums and reflective assignments.

FIGURE 2: Capstone Course MRS Simulation Sequence



Simulated Capstone Practice

Simultaneously, participants engaged in four 10-minute MRS sessions across the semester (Figure 2). The first MRS session was a "Meet the Students" scenario, where participants asked questions to either the elementary or middle school avatar students to learn about their unique personalities. The purpose of this first introductory session is two-fold. As noted in the "how-to" section, this allows participants to become comfortable interacting with the technology and avatars without the pressure of delivering content. The facilitator communicated instructions for how to log in to the Zoom sessions, and assured participants the avatar behavior would be set at a "low". Second, this introductory session allows participants to practice logging in via Zoom and trouble shoot video and sound issues early in the semester. These sessions were not recorded or used for course assignments, which also helped to alleviate participant nerves.

For the second MRS session, participants planned an explicit instruction lesson plan in any content area and taught their lesson in individual Zoom sessions. The session was recorded using Zoom software and shared with the participant and facilitator following the session. Participants watched their recording, scored themselves on the program key assessment observation tool, and reflected on their strengths and areas of growth in relation to the HLPs. Participants shared their video link with a peer for additional feedback and received facilitator feedback from the recorded session. Participants used the feedback to revise their explicit instruction lesson plans and re-teach the same lesson with modifications for the third MRS session. The same recording and reflective process occurred after the third session. Participants shared their video links with the same peer and the facilitator for additional feedback after implementing changes.

A unique aspect of MRS is the

TABLE 4: Capstone Course Syllabus Snapshot

Name of Scenario	Parent Conference: COVID-19
Synopsis	A parent of a student in your class has requested a meeting to discuss how the change in instructional format (virtual) has impacted their child's learning. This parent had concerns with their child's academic performance prior to schools moving virtual due to the COVID-19 pandemic.
Learner Objective	You have scheduled a 10-minute meeting with a student/avatar's parent to check in on overall well-being, emotional and social concerns, identify any technology concerns or needs, share specifics on their plan for instruction, and answer any questions the parent might have.

ability to adjust and adapt based on participant needs. In this capstone course, the fourth MRS session was originally planned as a parent conference to discuss hypothetical student data. However, in March 2020 the final parent conference scenario was altered due to the onset of the COVID-19 pandemic. The facilitator recognized the immediate needs of participants, and the K-12 students they taught, and shifted to navigating remote learning for the first time. The facilitator and lab worked together to adapt the fourth MRS scenario to be a meeting with a student's (i.e., avatar) parent/guardian who was concerned with their child's academic performance prior to schools moving virtual due to the COVID-19 pandemic. Participants were told the parent/guardian requested a meeting to discuss what this change in instructional format will mean for their child and to share concern about the impact of the loss of instructional time on their child, and what that might mean for their educational progress and individualized education plan (IEP). In the scenario the parent/guardian was overwhelmed with navigating remote instruction for their child with limited technological devices at home (Table 4).

After engaging in the conversation, participants watched the recording of their session and scored themselves on a communication rubric and reflected on the interaction. Then, participants called their actual students' parents/guardians to engage in a similar conversation at the start of the pandemic. Participants reflected, "I enjoyed my conversation with [avatar's] mother via Zoom. I am so thankful of the MRS experience this semester; it was so coincidentally timely and applicable to my practice. Without having knowledge of Zoom and feeling comfortable enough having Zoom meetings, I would have had a lot of ground to cover regarding my own students, parents, and colleagues…" The communication rubric and additional resources for integrating a parent conference MRS scenario in teacher preparation are available at https://ceedar.education.ufl.edu/portfolio/using-simulation-environments-for-hlp-3/

CONCLUSION

Simulated practice is an innovative and impactful resource available to teacher educators and leaders supporting novice special educators as they develop skill and expertise. The depth and breadth of scenario potential is expansive. Novice learners can practice a single scenario more than once, with a focus on feedback and improving targeted skills, or engage in a series of scaffolded scenarios building in complexity each time. Critical aspects of implementing MRS in teacher preparation include not only planning for the scenario and technical integration, but also designing meaningful opportunities for feedback, reflection, and debrief. Simulated environments provide an opportunity for purposeful practice of novel skills, allowing the instructor a degree of control and manipulation of the experience. The ongoing interaction between the facilitator and the lab allows for modification and enhancement of the scenario in between each session (e.g., feedback on avatar responses and behavior, clarity on lesson plans).

MRS is not intended to replace traditional field experiences, but instead supplement coursework and learning to refine preservice teacher skills prior to working with students in the field. Simulations can also be used as a professional learning tool to provide additional practice on targeted areas once teachers are in the field (e.g., introducing and implementing consistent classroom procedures, providing opportunities to respond, engaging in difficult conversations with a parent). Research on MRS

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as a means to provide purposeful practice is promising and continues to advance how the field prepares and supports special education teachers' development of expertise.

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Practice with Feedback Makes Permanent: eCoaching Through Online Bug-in-Ear During Clinical Experiences

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ABSTRACT

Federal mandates (e.g., Every Student Succeeds Act [ESSA], 2015) require special educators to use evidence-based practices (EBP) when working with K-12 students. However, for this expectation to become a reality, teacher educators must make changes in educator preparation program (EPP) curriculum, policy, coursework, and clinical experiences (Kolb et al., 2018). The need for changes in EPP clinical experiences has been underscored by the Council for Exceptional Children's (CEC's) shift from knowledge to practice-based standards for special educators (CEC, 2020). Real-time performance feedback (PF) delivered via online bug-in-ear (BIE) technology is an EBP (Sinclair, 2020) for coaching and supervising during early, mid, and late clinical experiences. In this article, we offer a rationale for making widespread, digital-age changes to coaching and supervising, through online BIE; provide an overview of relevant research; and offer guidance and recommendations for successful online BIE integration during EPP clinical experiences.

KEYWORDS

eCoaching, online BIE, teacher preparation, technology-enabled learning, virtual coaching

The special education workforce faces longstanding shortages and attrition rates (Billingsley & Bettini, 2019), which directly impacts the existing, often inequitable, post-school outcomes of youth with disabilities (Horn, 2021; Mazzotti & Plotner, 2016; Rock et al., 2016). To better serve future teachers and students, it is essential to examine current practice in educator preparation programs (EPP) and offer research-informed recommendations to optimize the learning outcomes of pre-service special education teachers, referred to synonymously as teacher candidates. Although EPP coursework increases the knowledge of teacher candidates, less clear is how to effectively facilitate generalization and sustainability of acquired instructional and behavioral practices in P-12 classrooms (Horn, 2021; McLeskey et al., 2017; 2019; Scheeler, 2008). According to Scheeler (2008), mastery of coursework may not be predictive of teaching effectiveness. That means, in part, there is a need for continued growth and improvement in traditional approaches to pre- and in-service special education teacher learning and development (Scheeler, 2008), particularly during clinical experiences.

Traditionally, clinical experiences have been "poorly defined and inadequately supported" and "the most ad hoc part of teacher education in many programs" (National Council for Accreditation of Teacher Education, 2010, p. 4). Although over a decade of reform has ushered in some improvements, Burns et al. (2016) confirmed more attention and greater resources are warranted, particularly in coaching and supervision. In special education teacher preparation, Nagro and deBettencourt (2017) identified five specific areas for strengthening clinical experience: establishing the scope, identifying target teaching practices, specifying required products, assessing pre-service teachers, and providing ongoing feedback.

TABLE 1: Performance Feedback Delivered through eCoaching using Bug-In-Ear Technology

	EXAMPLE	
Type of Feedback	**Running Commentary**	**Key Words and Phrases**
Encouraging	"Super! Nice job using a think-pair-share partner strategy to engage all the students in generating an example of using fractions, in the real world, for problem solving."	"Excellent response!"
Questioning	"How have you stimulated students' prior knowledge about what they have been learning?"	"Did you praise Jaylen?"
Instructing	"Remember to wait 3-5 seconds when using constant time delay before prompting."	"Keep monitoring him."
Corrective	"Correcting students who are not meeting the expectations is reactive. To establish and maintain a respectful, positive classroom climate for learning and prevent students' challenging behaviors, let students know how you would like them to respond before correcting them."	"Be specific."

Note. Adapted from Rock (2019) and Scheeler et al. (2010). Feedback approaches (e.g., running commentary, key words and phrases) may vary, depending on coach, supervisor, and/or pre-service teacher preferences and response.

Fortunately, advances in technology have enabled researchers to establish a growing body of empirical support centered on technology-based applications used effectively by teacher educators to address these issues and improve EPP clinical experiences (Dieker et al., 2014; Rock et al., 2009; 2017). One such technology-based application, *e*Coaching, centers on coaching and supervising pre-service teachers during real-world and simulated clinical experiences (Dieker et al., 2014).

Rock and colleagues (2014) defined *e*Coaching broadly as "a relationship in which one or more persons' effective teaching skills are intentionally and potentially enhanced through online interactions with another person" (p. 162). Considered a vital component of effectively coaching and supervising pre-service teachers during clinical experiences, performance feedback (PF) increases the likelihood of learning transfer to the classroom (Kretlow & Bartholomew, 2010; Sinclair et al., 2020). In what follows, we describe relevant literature and offer recommendations for strengthening EPPs by embedding real-time PF, delivered through *e*Coaching with bug-in-ear (BIE) technology in early, mid, and late clinical experiences.

Overview of Performance Feedback Provided Via *e*Coaching with Bug-in-Ear Technology

Shute (2008) defined PF as "as information communicated to the learner that is intended to modify his or her thinking or behavior for the purpose of improving learning" (p. 154). In EPPs, the learners are preservice teachers; the coaches and/or supervisors are those who leverage technology to provide PF to preservice teachers. Over the last decade, research on real-time PF with BIE technology (i.e., *e*Coaching) has become more prevalent in the special education literature (e.g., Horn et al., 2020; Horn et al., in press; Rock et al., 2012; 2014; Rosenberg et al., 2020; Scheeler et al., 2018). BIE refers to the audio earpiece worn by the coachee (e.g., pre-service teacher) while receiving immediate, 1:1, in-ear coaching (Scheeler & Lee, 2002). Bluetooth earpieces afford EPP coaches and/or supervisors the opportunity to provide PF online (i.e., remotely from a distance). Conversely, wired and/or wireless FM-based earpieces require the coach and/or supervisor to be on-site to provide PF (Rock, 2009; 2019).

To date, a series of systematic reviews have been published evaluating the methodological rigor of empirical investigations whereby researchers measure the effects of PF, including PF delivered via onsite or online BIE technology (e.g., Cornelius & Nagro, 2014; Fallon et al., 2015; Sinclair et al., 2020; Solomon et al., 2012). Solomon et al. (2012) conducted a meta-analysis of single-case literature on PF, hypothesizing that immediate PF would be more effective in shaping teacher behavior compared to delayed feedback. However, results indicated otherwise; immediate PF and feedback delivered within 24 hours were equally effective (Solomon et al., 2012). By contrast, Fallon et al. (2015) reported that PF is an EBP and found the immediacy of feedback

delivery to contribute directly to a larger effect size. Most recently, Sinclair and colleagues (2020) extended the extant literature on real-time PF by using the CEC's *Standards for Evidence-Based Practices in Special Education* to examine investigations on technology-delivered PF while including gray literature (CEC, 2014). Their findings confirmed immediate technology-delivered PF is indeed an EBP for improving instruction (Sinclair et al., 2020).

Researchers (Scheeler et al., 2004) have also called attention to the quality, consistency, and immediacy of PF delivery provided via BIE as all are critical dimensions of feedback provided during effective *e*Coaching (see examples in Table 1). Scheeler et al. (2004) also stipulated that PF should be specific, corrective, and positive. Importantly, coaches and/or supervisors need to attend to the dimensions and types of PF during clinical experiences if they are to strengthen pre-service teachers' understanding and use of a target instructional, social, emotional, and/or behavioral practice(s) while simultaneously encouraging self-reflection (Cornelius & Nagro, 2014). In short, providing teacher candidates with opportunities to receive individualized, BIE coaching during early, mid, and late clinical experiences encourages transfer of newly learned pedagogy, including evidence-based practices (EBP).

Facilitating Transfer Learning of Evidence-Based Practices

Federal mandates, such as the Individuals with Disabilities Education Act ([IDEA], 2004), ensure students with Individualized Education Plans (IEPs) receive a free, appropriate public education that includes individually-designed, effective, and meaningful instruction; whereas, more recent legislation, such as the Every Student Succeeds Act [ESSA] (2015) requires special educators to use EBPs. EBP is defined as multi-step process that includes the selection, implementation (with fidelity), and assessment of an instructional practice that is deemed to be effective by a sound body of research evidence (Cook & Cook, 2016).

Closely related to EBPs are High Leverage Practices (HLPs) and practice-based evidence (PBE). Based, in part, on EBPs, HLPs include core instructional practices "that have the 'highest leverage for increasing the capacity of novice teachers to improve student outcomes and reach ambitious learning goals" (McLeskey et al., 2019, p. 331). Recognizing that not all EBPs or HLPs work for all students with disabilities, practice-based evidence emerged as the need for "evidence derived from real-world settings and practitioners" (Cook & Cook, 2016, p.144). To facilitate practical application of these practices, a central mission of EPPs involves preparing future special educators to implement EBPs, HLPs, and PBE when they enter the P-12 classroom as beginning teachers.

Scheeler (2008) posited that true mastery of a [teaching] skill is observed through generalization to the natural environment (e.g., classroom). This assertion begs the question: How might teacher educators ensure pre-service special educators not only increase their knowledge of EBPs, HLPs, and PBE through traditional or online coursework, but also generalize and apply their recently gained knowledge and skill, with fidelity, when working in simulated and real-world classrooms with P-12 students? Though some may presume this transfer of learning occurs naturally, research indicates otherwise (e.g., Ericsson et al., 1993; Rock et al., 2017; Scheeler, 2008). For this reason, it is timely and essential to offer teacher candidates opportunities to engage in deliberate practice of EBPs, HLPs, and PBE, during real world and simulated clinical experiences while receiving real-time, 1:1 PF via *e*Coaching with BIE technology.

Supporting EBP, HLP, and PBE Use Through *e*Coaching with Online BIE Technology

In special education EPPs, Scheeler and Lee (2002) and Scheeler et al. (2006) investigated the effects of using BIE to provide on-site, corrective feedback to preservice teachers, and their findings were positive. Intrigued by the potential benefits online BIE could bring to teacher education, Rock and her colleagues (2009) not only pioneered the development of online BIE but also published a foundational study measuring its effects with preservice special education teachers. Their study addressed many of the limitations highlighted in earlier BIE research and introduced an affordable, easy-to-implement, remote method for providing effective PF during clinical experiences (Rock et al., 2009).

Embedding online BIE in EPPs enables teacher candidates to engage in repeated, application-based learning opportunities while receiving immediate PF; thus, promoting practical application and continued use of recently studied EBPs and HLPs (Rock et al., 2014, 2017). Moreover, integrating technology, such as online BIE, during EPP clinical experiences may lead to special educators' sustained use of technology-enabled learning applications beyond initial exposure (Rock et al., 2017). In other words, as preservice teachers embrace technology during clinical experiences, benefiting from the positive effects first-hand, they may be more inclined to turn to technology for professional learning and development in the future. Furthermore, enhanced practice leads to optimal student learning outcomes, and perhaps, simulta-

neously improves special education teacher retention (Horn, 2021).

Improving classroom-based generalization of EBPs, HLPs, and PBE while accounting for fidelity and sustainability strengthens special educator preparation and development (McLeskey et al., 2017). In accord with pioneers of today's technology-based era, making important changes and moving EPPs forward requires teacher educators to accept "widespread adoption of comprehensive 21st century models of teacher development" and embrace the *digital age* (Rock et al., 2016, p. 103). Because the COVID-19 pandemic has added urgency to addressing chronic teacher workforce issues (Will, 2020), while also affording opportunities for digital age change in EPPs (Keefe, 2020), we assert the time is right for expanding major changes underway in EPPs, namely those aimed at improving pre-service teachers' instructional, social, behavioral, and emotional practices (McLeskey et al., 2019) through PF provided via BIE technology (i.e., *e*Coaching), during clinical experiences.

Incorporating *e*Coaching with BIE into Personnel Preparation

In December 2016, personnel in the U.S. Department of Education, Office of Educational Technology, released a groundbreaking brief entitled, "Advancing Educational Technology in Teacher Preparation." In that policy brief, authors issued this clarion call for action:

> The U.S. Department of Education believes it is important that all programs responsible for pre-service teacher training prepare all graduates to effectively select, evaluate, and use appropriate technologies and resources to create experiences that advance student engagement and learning. We call upon leaders of teacher preparation programs to engage in concerted, programmatic shifts in their approach to pre-service teacher preparation (p.4).

Changes of this magnitude, however, take time, money, motivation, and *know how*. Not surprisingly, teacher educators have struggled to integrate technology into EPPs for several reasons, chief among them are time, apathy, incentives, and competing demands, compounded by lack of vision and know how (Kolb et al., 2018). That said, these challenges are not insurmountable.

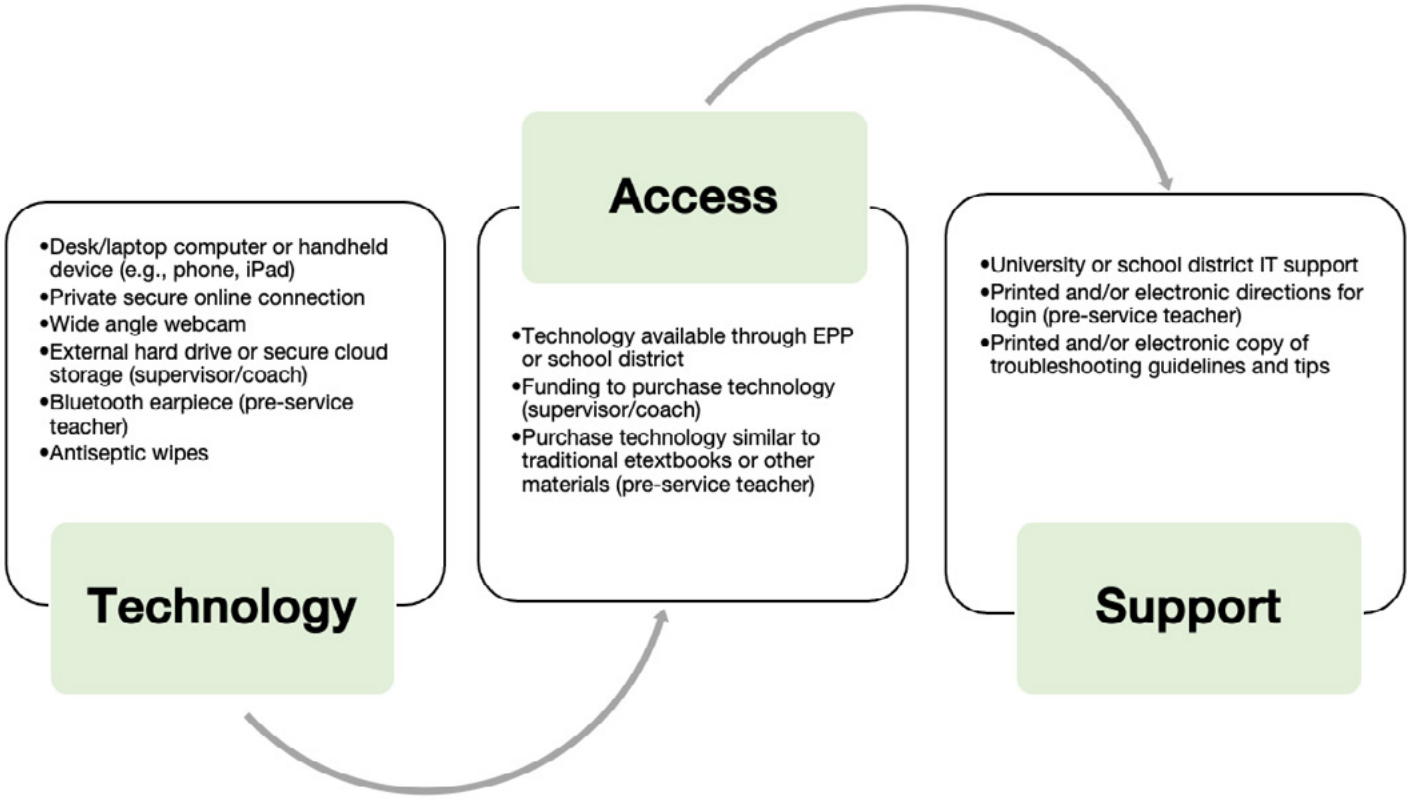
To redesign and improve technology integration in EPPs, Rock and her colleagues (2017) describe a modern vision guided by four principles rooted in technology-enabled learning. The first principle, embedded innovations, refers to using current technology-based methods in special education EPPs. Doing so creates a rich and individualized learning environment where special education teacher candidates receive PF and support based on their individual needs (Rock et al., 2017). The second principle, applied technologies, encompasses various practice-based learning opportunities whereby special education teacher candidates engage in technology-enabled learning with repeated and authentic implementation opportunities (Rock et al., 2017). Examples of technologies include video modeling and mixed-reality classroom simulation (e.g., Mursion™) to provide opportunities for practice and inquiry in a safe, supportive environment (Rock et al., 2017). The third principle, sustained applications, refers to the extent to which special educators' preparation experiences prepare candidates for continued technology-focused learning and improved instruction (Rock et al., 2017). To demonstrate, providing feedback in real-time via *e*Coaching with online BIE technology has been shown to improve instructional practice in pre- and in-service teachers (e.g., Plossel & Rock, 2014; Rock et al., 2009; 2012; 2014) and paraeducators (e.g., Horn et al., 2021; Horn et al., in press) while simultaneously increasing student engagement (Horn et al., in press; Rock et al., 2009; 2014). Finally, the fourth principle, theoretical frameworks, details how theory expands learning by providing a practice-based framework coupled with critical reflection and inquiry (Rock et al., 2017).

For the preceding calls and visions (Rock et al., 2017; U.S. Department of Education, 2016) to become a reality, teacher educators must make changes in EPP curriculum, policy, coursework, and clinical experiences (Kolb et al., 2018). Although all are important changes for teacher educators and researchers to consider, the need for changes in EPP clinical experiences has been underscored by CEC's shift from knowledge to practice-based standards for special educators (CEC, 2020), the American Association of Colleges for Teacher Education's (AACTE's) clarion calls to make clinical practice the center of educator preparation programs (AACTE, 2018), and the Council for the Accreditation of Educator Preparation's (CAEP's) emphasis on high quality, partnership based clinical experiences (i.e., Standard 2; CAEP, 2022).

Outcomes Resulting from BIE Coaching

In this section, given researchers have established real-time PF delivered via online BIE technology as an EBP (Sinclair et al., 2020) for coaching and supervision during early, mid, and late clinical experiences, we offer examples of teacher improvements that have been achieved through practice-based learning opportunities with feedback. Online BIE has been shown to increase practical application of EBPs and improve specially designed instruction not only

FIGURE 1: Technology and Support Needed to Bring Coaching and Supervision into the Digital Age



Note. EEP = educator preparation program; IT = instructional technology.

with K-12 special education pre-service teachers (e.g., Rock et al., 2009; 2012; 2014; Scheeler et al., 2012), in-service teachers (e.g., Cheek et al., 2019; Horn et al., 2020; Ploessl & Rock, 2014), and paraeducators (e.g., Horn et al., in press; Rosenberg et al., 2020; Scheeler et al., 2018) but also early childhood special education pre-service teachers (e.g., Coogle et al., 2020). Notably, the ease and effectiveness of online BIE coaching has been demonstrated across instructional settings as well (e.g., general education classroom, self-contained classroom, community-based setting, mixed-reality classroom simulation; Coogle et al., 2020; Dieker, Rodriguez et al., 2014; Horn et al., 2020, in press; Ploessl & Rock, 2014; Rock et al., 2009; 2012; 2014; Scheeler et al., 2018). Moreover, empirical evidence indicates *e*Coaching with online BIE technology contributes to improvements in P-12 student outcomes.

P-12 Student Outcomes Resulting from BIE Coaching

Overall, qualitative and quantitative data suggest online BIE is beneficial to children and youth. Interestingly, early, site-based BIE research failed to reveal a significant impact on students (Scheeler et al., 2006). That is, the percentage of correct student responses did not reflect significant improvements when pre-service teachers received immediate feedback via BIE on completion of three-term contingency trials (Scheeler et al., 2006). Conversely, findings from Rock and her colleagues (2009; 2014) revealed that student engagement increased as *e*Coached classroom instruction improved (Rock et al., 2009; 2014). In fact, academic engagement continued to improve over time (Rock et al., 2014). Teachers documented changes in student behavior, crediting online BIE for both improved instruction and student engagement (Rock et al., 2009; 2014). More recently, Cheek et al. (2019) used an online module + BIE PF through *e*Coaching to strengthen special educators' use of a text comprehension strategy during literacy instruction. Results from single case research confirmed students with severe intellectual disabilities improved not only their engagement but also their listening comprehension. Rosenberg et al. (2020) investigated the effects of an intervention package whereby paraeducators were trained to use incidental teaching to teach self-advocacy statements while receiving online BIE coaching. Student performance data indicated that all four K-12 students independently used target self-advocacy statements as a result of the intervention (Rosenberg et al., 2020). Horn et al. (2020) measured stu-

dent performance as a special education teacher received online BIE coaching in a community-based setting. Findings showed all student participants reached acquisition as a result of the teacher receiving online BIE coaching while implementing an EBP.

Horn et al. (in press) examined social and communicative responses to praise in students with autism spectrum disorder (ASD) as paraeducators received online BIE coaching on their use of behavior specific praise (BSP). Student response data indicated that as paraeducators increased the percentage and rate of BSP, the occurrence of eye contact, changes in facial expression (e.g., smile), and verbalizations/vocalizations increased in students simultaneously. Coogle and colleagues (2020) also reported improved expressive communication in preschoolers with ASD. In sum, researchers have clearly demonstrated positive outcomes for children and youth when online BIE coaching is used to increase use of EBPs, HLPs, and PBE in P-12 classrooms.

BIE BENEFITS AND CHALLENGES

Integrating online BIE in EPPs to provide pre-service special education teachers with PF during early, mid, and late clinical experiences yields several distinct advantages.

Cost-Effective Advantages

BIE technology has been described as affordable, easy-to-implement, and applicable across geographic locations (Horn, 2021; Rock et al., 2009). Advancements in technology have decreased expenses associated with online BIE and aided in the ease of implementation. For instance, BIE once required FM radio technology with restricted transmitting abilities that required on site (or in person) use (Scheeler & Lee, 2002; Scheeler et al., 2006). Now, online BIE allows for remote PF to be provided via mobile and web-based technologies (Horn et al., 2020; Rock et al., 2009, 2014). These revolutionary developments to BIE technology have enabled teacher educators to provide coaching and supervision to more pre-service teachers during early, mid, and late clinical experiences.

Rock and colleagues (2011) provide a detailed breakdown of the inexpensive technology needed for online BIE coaching. Importantly, the technology has changed little and remained affordable. The online BIE technology needed by pre-service teachers includes a Bluetooth earpiece (approximately $20), a handheld device with a built-in camera that has live-stream capabilities (e.g., iPad Mini®; approximately $300), and a tripod or similar device to secure the camera (approximately $25). eCoaches, supervisors, and mentor teachers require a computer or handheld device (e.g., iPad®) with built-in speakers (approximately $400) and a headset with a built-in microphone (approximately $30). As reported in Figure 1, the low-cost equipment required for practical application can be purchased online, similar to the cost of a textbook or other required materials, in campus bookstores, or, better yet, technology may be readily available for check out and use through universities or school districts. For those pre-service teachers who live or work too far from the university to check out necessary technology, we have had success with and recommend mailing the necessary components. If universities or school districts are under-resourced and cannot purchase the necessary technology, we have had success with and encourage personnel to apply for small and/or large grants as well as work with development personnel to secure dedicated funds.

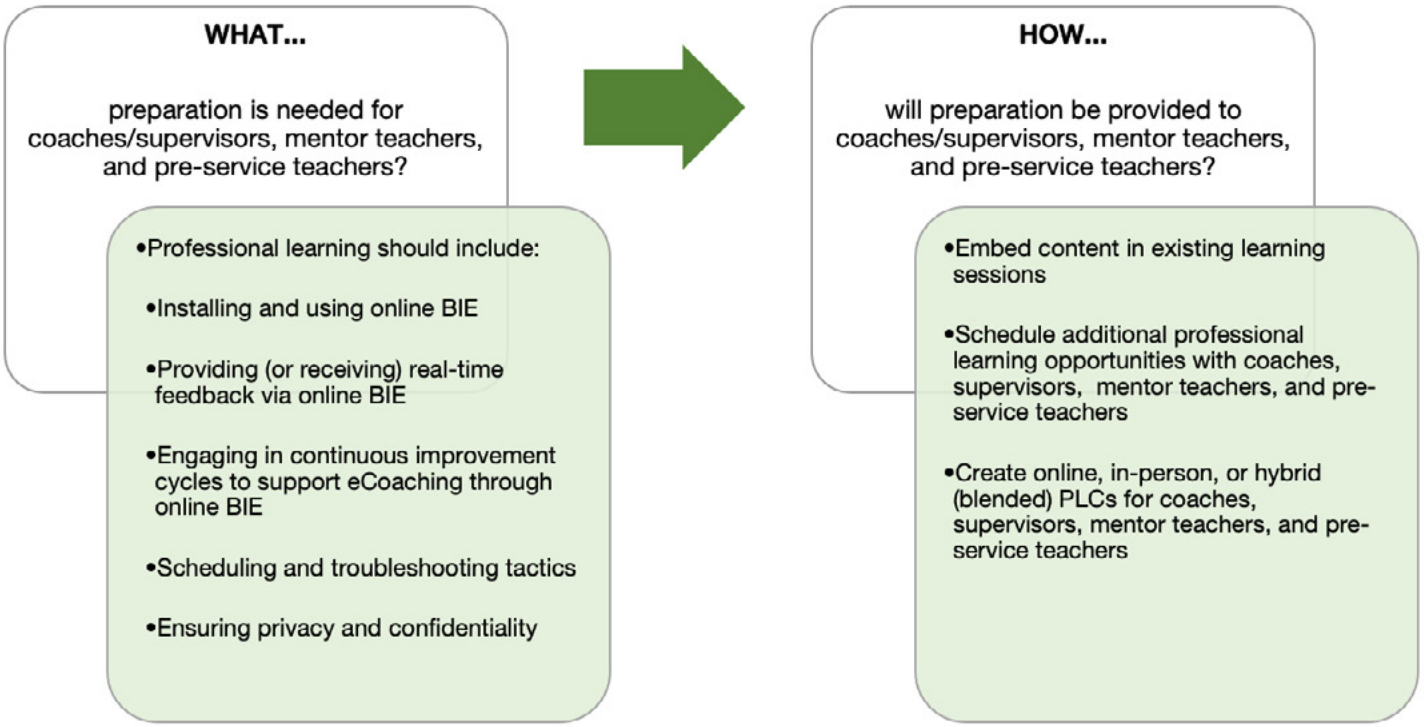
In addition to overall affordability, offering technology as a means for a coach or supervisor to provide PF to pre-service teachers from a remote, online location is cost-saving (Rock et al., 2009, 2014). Traditionally, classroom observations during clinical experiences involve in-person site visits from a coach or supervisor, which requires time and travel. A considerable amount of time is spent in the car driving from school to school, and mileage and gasoline expenses accrue (Rock et al., 2009). By contrast, online BIE technology affords EPP coaches and supervisors an opportunity to provide empirically-supported feedback without leaving their home or office (Rock et al., 2009, 2014). Cutting out or substantially reducing extensive time and travel expenses enables coaches/supervisors to provide feedback to preservice teachers during clinical experiences in an economically-friendly, efficient manner.

Pedagogical Benefits

Given not only the longstanding achievement gaps between students with disabilities and their peers (National Center for Education Statistics, 2019) but also the alarming suspension and expulsion disparities experienced by preschoolers (Zeng et al., 2020) and school-age children and youth with disabilities (United States Government Accountability Office [GAO], 2018), it is essential for special educators to enter the classroom prepared to meet the academic, social, emotional, and behavioral needs of today's increasingly diverse P-12 population. Thus, as teacher educators make substantive changes to EPP curriculum, it is vital they include science-backed approaches aimed at improving preservice special educators use of EBPs, HLPs, and PBE.

According to Ericsson et al.'s (1993) foundational research across various disciplines, effective approaches for improving professional knowledge and practice center on providing deliberate,

FIGURE 2: Digital Age Content and Pedagogical Preparation with Online BIE Technology



Note. BIE = Bug-In-Ear; PLC = professional learning community.

systematic, and ample opportunities to practice specific skills or learning activities with feedback. Integrating online BIE in EPPs during early, mid, and late clinical experiences reflects Ericsson's (1993) findings in that it transforms static, after-the-fact approaches to coaching and supervision into dynamic, immediate, deliberate practice opportunities. Consequently, improved learning is not only observed in preservice special educators but also the P-12 children and youth with disabilities whom they teach. Integrating online BIE in this way during clinical experiences also helps to connect methods courses and clinical experiences in EPPs (see Figure 2). In short, by no longer leaving the development of pedagogical skills to chance (McLeskey et al., 2019), *e*Coaching through online BIE holds promise for future and current special educators by offering an innovative, yet easy-to-implement method for increasing practical application of EBPs, HLPs, and PBE.

Social Validity Benefits

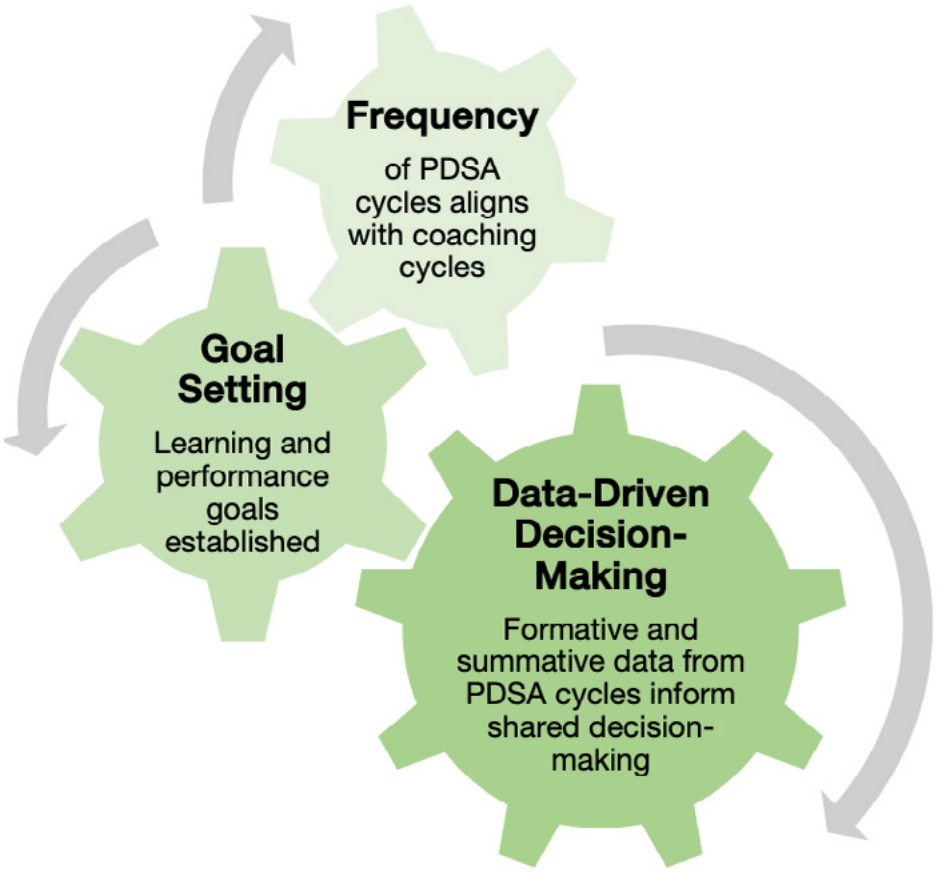
Across P-12 online BIE studies (e.g., Coogle et al., 2020; Horn et al., 2020; Horn et al., in press; Rock et al., 2009; 2014; Scheeler et al., 2006; 2018; Wake et al., 2017), social validity data indicate *e*Coaching with BIE is perceived favorably by all involved. Dating back two decades, Scheeler and Lee (2002) reported teacher participants viewed immediate feedback delivered via BIE to be valuable and unintrusive to instruction. Similarly, social validity reports in the Scheeler et al. (2006) investigation echoed earlier findings and all participants found BIE to be beneficial. As online BIE technology has evolved, social validity reports have become more prevalent in the literature and remain positive (e.g., Horn et al., 2020; Horn et al., in press; Rock et al., 2009; 2014; Scheeler et al., 2018; Wake et al., 2017). Those who participate in live streamed (e.g., Skype, WebEx, Zoom) online BIE coaching sessions have consistently professed the intervention to be effective, as measured by improving teaching behavior; efficient, as measured by the rate of acquisition of the target teaching behavior; and feasible, as measured by classroom applicability (Horn et al., 2020, in press; Rock et al., 2009; 2014; Scheeler et al., 2018).

Digital Divide Constraints

Davis et al. (2007) defined digital equity as "equal access and opportunity to digital tools, resources, and services to increase digital knowledge, awareness, and skills" (p. 9). Willems (2019) expanded digital equity to include the distribution of technology-related resources (e.g., equipment, Internet, unbiased, uncensored content) based not only on need but also on the awareness, skills, and knowledge required to use technology for educational purposes. According to the 2018 Horizon Report (Adams Becker et al., 2018), digital inequities continue to impede the adop-

tion of digital technologies in higher education, including EPPs, and other professional learning spaces (Willems, 2019). For these reasons, when moving coaching and supervising in EPPs from in person to online or hybrid (blended) formats, the digital divide must be considered and addressed not only for pre-service teachers, clinical coaches/supervisors, teacher educators, mentor teachers, but also their respective EPPs (i.e., Institutions of Higher Education, school districts, community providers). This includes considering geographic location (e.g., urban, suburban, rural) and access to BIE technology and the Internet. Failure to do so will likely ensure that deeply rooted digital inequities remain intact in EPPs.

FIGURE 3: Implementing Continuous Improvement Cycles with Online BIE Coaching



Note. EPP = educator preparation program; PDSA = Plan-Do-Study-Act.

The Challenges of Online BIE Technology Reliability and Breakdowns

To facilitate widespread adoption of online BIE in EPPs, it is essential to be aware of the pitfalls, while also recognizing advancements in online BIE technology. Rock and her colleagues (2012) were successful in overcoming tech-related obstacles encountered during the pioneering Rock et al. (2009) online BIE investigation. Specifically, when the eCoach shifted from a PC (Rock et al., 2009) to a Mac (Rock et al., 2012), there were fewer disruptions due to technology issues, and audio and video recordings were more reliable. Changes in the physical location of the eCoach were also considered in the Rock et al. (2012) study to mitigate poor bandwidth. Horn et al. (2020) relied on Mac devices for recording and coaching during online BIE sessions and minimal issues related to low bandwidth were reported. By contrast, Horn et al. (in press) used a Mac device (iPad mini) for those receiving online BIE coaching while the eCoach was logged in via live stream from a PC. Bandwidth issues were not reported, and there were few to no technology related disruptions. Clearly, advances in technology over the years have improved reliability of online BIE.

The Challenge of Acclimating to Online BIE and Improving Instructional Practice

Researchers have confirmed that transfer learning rarely occurs through traditional, didactic-based training methods (Joyce & Showers, 2002). However, online BIE holds promise in terms of effectively improving the occurrence and fidelity of EBPs and HLPs in the classroom context. Like anxiety experienced during on-site classroom observations, it is not uncommon for those involved in BIE coaching to feel apprehensive initially (Korner & Brown, 1952; Rock, 2019). Based on Korner and Brown's (1952) early work, Rock (2019) also found it can take three to four sessions for individuals to process multiple sources of incoming auditory stimuli and overcome initial anxiety.

Increasing the level of comfort while also improving instructional practice is largely contingent on the quality of PF received via online BIE technology. Rock (2019) offers recommendations for eCoaches, all of which are designed to be individualized and facilitate a successful online BIE coaching experience, such as scaffolding. Scaffolding allows the coach or supervisor to offer immediate, deliberate, systematic feedback that incrementally improves the special

educators' use of EBPs, HLPs, and/or PBE while he, she, or they are teaching (Rock, 2019), rather than talking about it after the fact. Not only does the feedback provided through online BIE provide invaluable support for learning transfer (Coogle et al., 2020; Horn et al., 2020; Ploessl & Rock, 2014), it also prompts a cycle of in-action reflection that contributes to immediate and longer-term improvements in their instructional practice (e.g., Rock et al., 2009, 2012; 2014). Over time, the result is often increased confidence and effectiveness and decreased frustration and anxiety.

Cultivating Successful Wider Spread Adoption of Online BIE in Educator Preparation

Over a decade ago, pioneering participants who received online BIE coaching called for its widespread adoption in EPPs (Rock et al. 2009). Although the COVID-19 pandemic resulted in increased opportunities for pre-service teachers' participation in virtual clinical experiences (Bouffard, 2020), widespread use of online BIE coaching and supervising has remained elusive in EPPs. Aligned with practice-based and clinical experience initiatives, such as the CEEDAR Center and CEC's High Leverage Practices initiative (Benedict et al., 2016), CEC's Practice Based Standards for Special Educators (CEC, 2020), CAEP Standard 2 (CAEP, 2022), and AACTE's call to unite EPPs through clinical practice (AACTE, 2018), promoting widespread integration of coaching and supervising through online BIE, during clinical experiences, in EPPs is timely and necessary. To support teacher educators and stakeholders in this endeavor, we suggest using continuous improvement cycles while engaging in *e*Coaching (Rock, 2019) with online BIE technology (see Figure 3). As the name implies, this cyclical process involves collaborative, data-informed decision-making, routine goal setting, and ongoing reflection aimed at incrementally strengthening pre-service teachers' use of EBPs, HLPs, and PBE, during early, mid, and late clinical experiences.

Additionally, we encourage teacher educators and stakeholders to make use of the step-by-step guide developed by Regan and Weiss (2020). Step 1 emphasizes the importance of training the eCoach prior to transitioning to Step 2, which involves training special education teacher candidates alongside eCoaches, supervisors, and mentor teachers. Step 3 highlights the need to have at least one observation session (i.e., a baseline session without delivering PF), followed by a post-observation conference, wherein the eCoach and pre-service teacher (preferably with the mentor teacher as well) have an opportunity to debrief about the session, build rapport, and establish goals. Step 4 centers on the online BIE coaching experience, which includes the process in its entirety from logging in to connecting online, providing/receiving real-time feedback, to collecting data on instructional, social, emotional, and behavioral teaching practices. Step 5 includes the debriefing process that either follows the online BIE session immediately or takes place within 24 hours (Regan & Weiss, 2020).

Because many faculty in EPPs have often floundered when integrating technology into EPPs (Kolb et al., 2018; U.S. Department of Education, 2016), they will likely need support that extends beyond step-by-step guidelines. The comprehensive approaches needed for technological and pedagogical improvements include dedicated release time, necessary technology resources, effective professional learning, and ongoing peer support teams (Kolb et al., 2018) –all of which come with various costs. Yet, as Kolb and colleagues (2018) pointed out, there are no clear-cut guidelines available for EPP investments in technology and professional development. That means teacher educators and other EPP stakeholders need to develop budgets based, in part, on public school guidelines (e.g., approximately $1,000 annually per student for technology and 60 hours of professional learning and development; see Kolb et al., 2016; Odden & Picus (2011).

eCoaching with BIE Technology-in-Action: A Vignette

In this section, drawing on over a decade of professional experience and research providing PF to pre-service teachers though BIE technology in EPPs, we offer a vignette to further illustrate and facilitate application.

Faye, a pre-service special education teacher, was thrilled to begin her clinical placement at a local high school. She had excelled in her coursework throughout her EPP and felt confident entering the classroom and working with secondary students with disabilities. However, during the third week in her placement, Faye became discouraged. She struggled to keep students engaged while she was teaching, quickly realizing that it was more challenging than she expected to apply acquired skills when working with actual students. Faye's cooperating teacher, Ms. Brooks encouraged Faye to provide more opportunities to respond (OTR) and use behavior specific praise (BSP), as both have been shown empirically to increase student engagement. Despite Faye's best efforts, she continued struggling, and the frequency and intensity of off-task student behaviors increased.

Fortunately, Faye's clinical supervisor was scheduled to offer eCoaching support. That is, advanced technology enabled Faye's clinical supervisor, Dr. Crimmins, to provide immediate feed-

back while she was actively teaching. Faye wore a Bluetooth earpiece, which facilitated two-way communication, and an iPad mini was positioned in the classroom to live-stream her lesson. Dr. Crimmins logged in during the scheduled time and provided corrective feedback and praise from her university-based office located 40 miles away. Faye and Dr. Crimmins discussed some of her current challenges and target skills she wished to improve. Through her coursework, Faye demonstrated her understanding of OTR and BSP, the challenge was applying these skills in the classroom. Faye was nervous initially, but Dr. Crimmins assured her she was there to support her, not simply evaluate her. Throughout the session, Dr. Crimmins prompted Faye to increase her rate of both OTR and BSP. Faye quickly realized that she was giving high rates of praise, albeit it was not specific. Instead, Faye said "good job" to students frequently. It wasn't until she received immediate feedback, prompting her to "be specific" or questioning her (e.g., "Good job what?") that she realized this.

Faye's performance improved during the very first session, but there was more work to be done; she needed more practice with feedback. Dr. Crimmins eCoached Faye for approximately 15 minutes a day, and naturally scaffolded the prompting (e.g., increasing and decreasing feedback in accord with teacher and student performance, during instruction). Within two weeks, Faye was using OTR and BSP accurately and with high fidelity. Faye's cooperating teacher was amazed not only by her progress but also by her students' increased engagement, which confirmed the importance of providing OTR and using BSP. Providing immediate feedback via online BIE proved to be effective in terms of supporting pre-service teachers' transfer learning and having a positive impact on K-12 students. Moreover, the approach was efficient, as the clinical supervisor provided all feedback from her university-based office as opposed to traveling to make site visits. Reductions in travel time allowed her to provide more pre-service teachers with PF through online BIE technology.

Conclusion

Since the 1950s, coaches, supervisors, and researchers, have used in person and online BIE technology effectively to prepare pre- and in-service education professionals (Horn et al., 2020, in press; Rock et al., 2009; 2012; 2014; Rosenberg et al., 2020; Scheeler et al., 2002; 2006; 2018), including special education teacher candidates. Based not only on the growing body of literature in online BIE coaching and supervising, but also on alignment with CEC's practice-based standards for special educators (CEC, 2020), AACTE (AACTE, 2018) and CAEP's Standard 2 (CAEP, 2022) emphases on clinical experiences, we proffer it is time to promote widespread integration of online BIE use in digital age EPPs. Rather than accepting digital inequities and/or ignoring the roles digital technologies play in 21st century work, life, and learning, teacher educators and researchers should embrace technology-enabled learning in EPPs in ways that foster optimal outcomes for pre- service special educators and the students whom they serve.

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Streamlining Observations, Feedback, Reflection, and Professional Development: Are You Ready to be COACHED?

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ABSTRACT

Special education teacher preparation programs vary in their usage of practices (e.g., modeling and performance feedback) that have consistently been shown to effectively coach pre-service teachers to sustain high-quality implementation of teaching practices. Research even suggests that some pre-service special education teachers may not receive any of these coaching practices during their field experiences. In this article, we describe a feasible multimedia coaching option for teacher educators and teacher candidates to use to streamline the observation and coaching process using effective coaching practices and improved consistency. Specifically, this multimedia tool can be used to document pre-service teacher practice, generate feedback, deliver targeted instruction, and provide the opportunity for structured self-reflection.

KEYWORDS

Coaching, multimedia, preservice teachers, special education

A well-prepared and qualified special education teacher is one of the most important school-related factors for increasing academic achievement for students, including those with disabilities (Darling-Hammond & Berry, 2006; Harris & Sass, 2011). Teacher use of high-quality practice is a key component impacting students' academic success (Kane et al., 2011; Stronge et al., 2011). Evidence suggests that (a) teacher preparation programs impact what practices teachers use during their teaching career (Maheady et al., 2013), and (b) teachers will, to a large extent, use the same practices and strategies they use during their first year of teaching throughout the rest of their career (Griffin & Kilgore, 1995).

The use of practices within teacher preparation programs such as observation (Stormont & Reinke, 2012), modeling (including video modeling; Brock et al., 2017), performance feedback (Cornelius & Nagro, 2014), and self-reflection (Nagro & deBettencourt, 2019) have shown in a range of empirical studies to be effective for supporting pre-service teachers' learning and implementation of high-quality practices (Cusumano & Preston, 2018; Stormont & Reinke, 2012). However, research suggests that pre-service teachers do not consistently receive the type of practice and feedback required to acquire skills to implement high-quality practices (Grossman et al., 2009; Scheeler et al., 2016). In fact, special education teacher preparation programs vary significantly in how, and how often, they employ essential coaching practices (e.g., Mathews, 2021; Nagro & deBettencourt, 2017).

To illustrate, when Nagro and deBettencourt (2017) reviewed the literature (i.e., 36 publications including 107 teacher preparation programs) about field experiences for special education teacher candidates, they documented that special education preparation programs differed in practices used during teacher candidates' field experiences. Specifically, Nagro and deBettencourt reported how each program assessed and guided their teacher candidates. Although some programs noted that supervisors would

use modeling as a strategy for candidates, it was not reported as a strategy used during candidates' field experiences for most programs. Further, some programs reported using feedback forms to deliver verbal and/or written feedback to their candidates. Some programs noted that they provided verbal and/or written feedback to their candidates but did not mention using a specific/standardized form. Yet other programs did not mention providing any specific or organized feedback to candidates during field experiences. In sum, there was limited consistency of practices reported across the various programs.

Research suggests that one barrier for many university supervisors utilizing effective coaching practices is a lack of time (Hobson et al., 2009; Vertemara & Flushman, 2017). For example, university supervisors have reported that the geographic locations of teacher candidates' placements impede their ability to conduct as many observations as they would like during clinical supervision (Range et al., 2013). After conducting observations and analyzing observational data it is important to promptly provide feedback. The immediacy of feedback is critical for candidates (Burns et al., 2016), yet with supervisors facing difficulties with time, this may not always be possible. In sum, in addition to barriers such as time and money, there is a lack of consistency in the type of coaching practices and feedback teacher candidates receive (Grossman et al., 2009; Mathews, 2021; Nagro & deBettencourt, 2017).

Although special education teacher preparation programs do not need to be the same, there is a need for consistency in each program. Specifically, programs should focus on utilizing effective coaching practices to support teacher candidates' use of evidence-based teaching practices with fidelity and to sustain the usage of these practices throughout their teaching careers (Brownell et al., 2010). The technology-based tool discussed in this article called Capturing Observations And Collaboratively sHaring Educational Data (COACHED) was designed to be an efficient way to address these core components of effective coaching to enhance pre-service teachers' implementation of evidence-based practices (EBPs) and other high-quality practices (Kennedy & Kunemund, 2020, Kunemund et al., 2021).

COACHED is intended to address many barriers encountered by teacher preparation programs and personnel. Described in more detail below, COACHED houses a library of self-reflection matrices and multimedia professional development (PD) videos with embedded modeling. COACHED also generates automated yet editable feedback which is intended to save time by removing the task of writing detailed feedback about specific practices. In the following sections, we introduce the individual components of COACHED that are intended to ease many of the obstacles faced by teacher preparation programs.

Welcome to COACHED

COACHED is a web app with evidence-based tools designed to provide practice-based feedback and PD to teacher candidates (https://coachedweb.azurewebsites.net/). COACHED has five key components that can function together or separately to provide PD:

1. The classroom teaching (CT) scan observation tool
2. Automated coaching feedback form
3. Content acquisition podcasts (CAPs)
4. Self-reflection matrices
5. A data dashboard

The CT Scan is an observational tool used to capture data-based information on teacher practices, classroom context, and student actions (Kennedy et al., 2017). After completing an observation, users receive an automatically generated but editable coaching feedback form that includes all data captured using the CT Scan. Embedded within the feedback form are multimedia PD vignettes called CAPs which supervisors (e.g., faculty member or instructor) can refer or assign candidates (e.g., teacher candidates, pre-service teachers) to watch if needed (Kennedy et al., 2016a; Kennedy et al., 2016b). Within the feedback form, supervisors can also assign candidates self-reflection forms known as matrices to engage in deep reflection opportunities (Nagro et al., 2020). Finally, all these components are accessible through the main data dashboard hub where users can choose to view data and feedback, access the CT Scan to conduct an observation, or upload videos to their account or, if they are a supervisor, to the accounts of the candidates under their supervision. The COACHED app can be used to observe candidates in K-12 settings and across content areas. Supervisors and candidates can create free individual accounts linked to their institution by visiting and register at https://coachedweb.azurewebsites.net/.

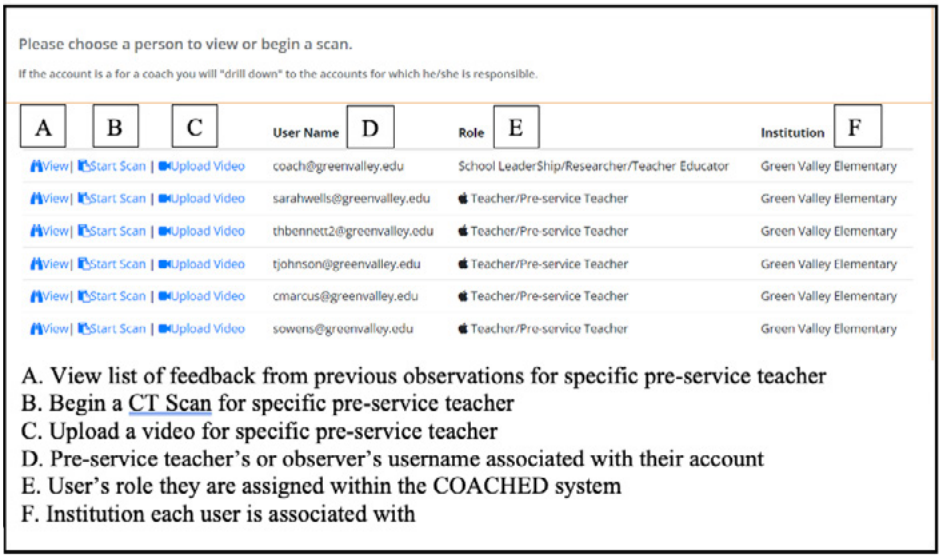
There are several ways COACHED can be leveraged within teacher preparation programs to provide feedback and PD to candidates, such as a) supervisors can complete an observation cycle of the candidate; b) the candidate can complete a self-observation cycle; or c) the supervisor and candidate can complete an observation cycle together. In the next sections, we describe these components in detail and then review options for using COACHED in teacher preparation.

COACHED TOOLS AND EVIDENCE

Data Dashboard

The first component of COACHED is the data dashboard which serves as the central hub through which users can access data and feedback, conduct a CT Scan observation, and upload videos. Within COACHED, users can have

FIGURE 1: Data Dashboard



different roles which allow them different levels of access. To illustrate, a supervisor would have a *University Faculty/Staff* account and a candidate would have a *preservice teacher* account. The main difference is that the supervisor could see all their candidates' accounts and data while the candidate could only view their own account and data. In a University Faculty/Staff-level data dashboard (see Figure 1) the supervisor can locate the specific candidate they would like to observe on their dashboard and begin an observation or select an existing feedback form to view or edit. A preservice teacher-level data dashboard allows the user to start a CT Scan self-observation, view existing feedback, or upload an observation video.

Classroom Teaching (CT) Scan

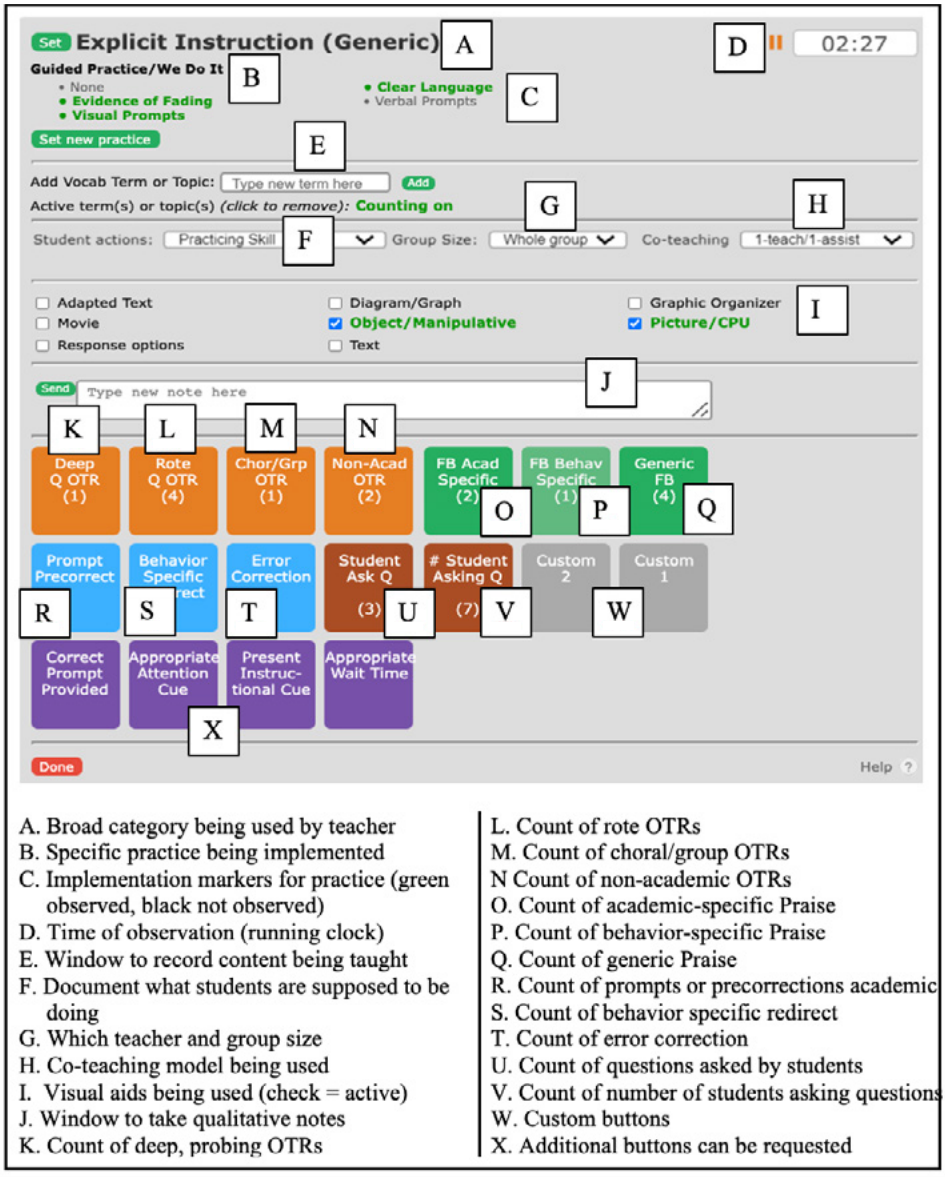
Developed by Kennedy (2017), the CT Scan observation tool enables COACHED users to capture discrete instructional practices of the candidate across multiple content areas, student actions, as well as relevant contextual information (e.g., instructional grouping). The CT Scan is a low inference observation tool in the behaviorist tradition of process-product and attempts to document teacher practice with precision without forcing the observer to generate an overall quality score or within specified domains. In other words, an observer uses this tool to document, not evaluate, teaching. The resulting data can be used to identify areas of strength and improvement. The CT Scan is flexible and can be used to capture data on live or recorded observations. Additionally, supervisors can conduct an observation of a candidate, or the candidate can complete a self-observation from a recorded video.

Categories. The CT Scan captures several levels of information related to the type of instruction the candidate is providing. First, the observer (i.e., university supervisor, teacher candidate) selects the broad category of instruction such as explicit instruction or vocabulary instruction the candidate is using at any given moment. The category can change multiple times within a lesson. For example, the candidate may begin with classroom management, then switch to general content instruction, and then to vocabulary instruction. There is no limit to the number of times the observer can change categories – they follow where the lesson leads. To change the category, the observer would click "set" in the top left corner. While instructional categories are helpful because they give a general idea of the type of instruction the candidate is providing, it is not specific enough. To capture how the candidate is providing instruction, the observer next needs to determine the specific practice being used.

Practices. Each broad category (e.g., classroom management, vocabulary instruction, mathematics instruction) has a unique set of specific instructional practices that can be selected. Thus, once the observer decides about the broad category, they continue to watch the lesson to determine what specific practice is being used. The individual practices that make up the broader categories come from the literature related to that content area. The observer clicks "set new practice" in the top left-hand corner of the interface. For example, within the broad category of vocabulary, the candidate may be using a student-friendly definition, an example, having a discussion, or a demonstration. Once the category and practice are selected, the CT Scan tracks how long it is being used, and the observer can switch between practices and categories at any time. Therefore, at the end of the lesson, CT Scan data will report how long (to the second) each practice was used, overlaid with the other data being captured (see below). Lists of categories and practices are also customizable within COACHED.

Implementation Markers. Once the observer has determined the broad category of instruction and specific practice, the observer can capture the quality practice use. Each practice has a distinctive set of implementation markers (IMs) or quality indicators that the observer should look for. For example, the IMs for "modeling/I do it" are *clear and concise language, demonstrate skill, involves students, provides several models,* and *think aloud.* As IMs are observed and selected, they turn green, IMs that are not selected (i.e., not observed) remain black. IMs serve as the foundation for the

FIGURE 2: CT Scan Interface



A. Broad category being used by teacher
B. Specific practice being implemented
C. Implementation markers for practice (green observed, black not observed)
D. Time of observation (running clock)
E. Window to record content being taught
F. Document what students are supposed to be doing
G. Which teacher and group size
H. Co-teaching model being used
I. Visual aids being used (check = active)
J. Window to take qualitative notes
K. Count of deep, probing OTRs
L. Count of rote OTRs
M. Count of choral/group OTRs
N Count of non-academic OTRs
O. Count of academic-specific Praise
P. Count of behavior-specific Praise
Q. Count of generic Praise
R. Count of prompts or precorrections academic
S. Count of behavior specific redirect
T. Count of error correction
U. Count of questions asked by students
V. Count of number of students asking questions
W. Custom buttons
X. Additional buttons can be requested

automated feedback sentences generated within COACHED following an observation. The IMs for each practice are also customizable by users.

Contextual Information. After the observer determines the instructional category and practice, they can focus on capturing contextual data that serves to provide a rich and detailed picture of the instructional session. By selecting from drop-down menus and checkboxes (see Figure 2) the observer can indicate: Student actions (e.g., answering questions, group discussion), instructional grouping size (e.g., small group, whole group), co-teaching model, visual aids (e.g., graphic organizer), and the vocabulary term/topic being taught. Each of these items can be changed and updated throughout the observation to reflect what is occurring in the classroom. There is a field in which the observer can type qualitative notes to capture any additional information. Numerous high-leverage practices (HLPs) can be documented using these options. For example, HLP 17, *Use Flexible Groupings*, can be captured using the group size feature.

Counter Buttons. Below the contextual items are a series of counter buttons that track frequencies of different events. The observer can track the type and number of opportunities to respond (OTRs) provided: Deep OTRs, rote OTRs, choral OTRs, and non-academic OTRs. When a candidate provides feedback to students, the observer can keep count of the number and type of feedback statements provided (academic-specific, behavior-specific, and generic) and redirects and corrections (i.e., behavior redirect, error correction, and precorrections). Additionally, the observer can track the number of questions students ask throughout the lesson and how many students are asking these questions. To use this feature, the observer simply clicks the button indicating the type of event (e.g., behavior-specific OTR), if they made a mistake they can hover over the button until they see a "-" symbol and click to subtract an instance of the event. Each question, feedback statement, and other information is time synced at the second of occurrence and overlaid with the category and practice being used. To illustrate, the supervisor and candidate will be able to see the candidate taught a student-friendly definition for 3:45 seconds and provided 5 deep questions, 10 rote questions, 2 academic-specific feedback statements, and 7 generic feedback statements during that time.

Data Outputs. Data from the CT Scan generates two main outputs that the observer can use to provide feedback to the candidate: The CT Scan Timeline and the coaching feedback form. The CT Scan Timeline displays the observation in a rich visual format that allows the candidate and supervisor to see how various practices and other captured items co-occur with one another during the observation. Each data point captured

(e.g., practice) by the CT Scan is included on the CT Scan in a timeline format that shows the order in which events occurred overlaid with co-occurring items (e.g., student actions). For example, a candidate could easily view how many OTRs a candidate used when modeling a new skill and how many OTRs the candidate followed up with feedback. The feedback form is discussed in detail in the following section.

Automated Coaching Feedback Form

A barrier to many supervisors and candidates is time, as analyzing observational data and generating meaningful feedback is not a quick (or easy) task. Fortunately, COACHED does substantial work to get the observer started. As each practice is observed the COACHED app generates a "practice box" that provides detailed information about the practice and what was occurring when it was observed. Specifically noted are when and for how long the practice was used as well as which IMs were observed. The IMs are used to generate automated feedback sentences to the right of each practice box. COACHED maintains a database of multiple feedback sentences for each IM and whether it was observed and will pull randomly from these to create detailed narrative feedback. Each sentence was written to reflect best practice in delivering feedback by not only acknowledging whether the IM was observed but also providing corrective feedback about using that specific practice and IM (Cornelius & Nagro, 2014). For example, when using modeling during explicit instruction, if a candidate did not use the IM "think aloud", feedback would read: "Providing modeling to students is a terrific use of time, and I was glad to see you doing so today. When you model, be deliberate in terms of explaining what you are doing and why you are doing it so students can hear your expert thinking and they can replicate when it is their turn to do the task. This is hard to do because so many of the tasks we demonstrate we are able to do automatically but think back to when you first learned to do this task and break it down orally for your students."

Each practice box displays the frequency and types of OTRs, feedback statements and corrections, student actions, visual cues, and any qualitative notes the observer took. For example, if the supervisor notices that the candidate was not following up student responses to OTRs with feedback they may add a note "Nice work providing students with plenty of OTRs, make sure to follow up student responses with some specific feedback to let them know what they got right or correct any misconceptions." Once the CT Scan observation is saved, COACHED automatically generates a detailed yet objective coaching feedback report. Kennedy and colleagues (2017; 2018) found that this type of objective data-based feedback is preferred by those receiving the feedback.

In addition to the data displayed in each practice box, an associated multimedia PD vignette is automatically loaded to the right (Content Acquisition Podcasts – see below). For example, if the candidate was observed using "modeling," the modeling vignette would be loaded to the right of the practice box. At the bottom of the coaching feedback form, the observer can write a brief narrative report of the observation as well as goals for the candidate to focus on. Here the observer can also assign the self-reflection matrix, determine how the candidate will access the feedback form (e.g., emailed link, printed PDF), and view the timeline. Once the feedback is edited and complete, the observer can save the form.

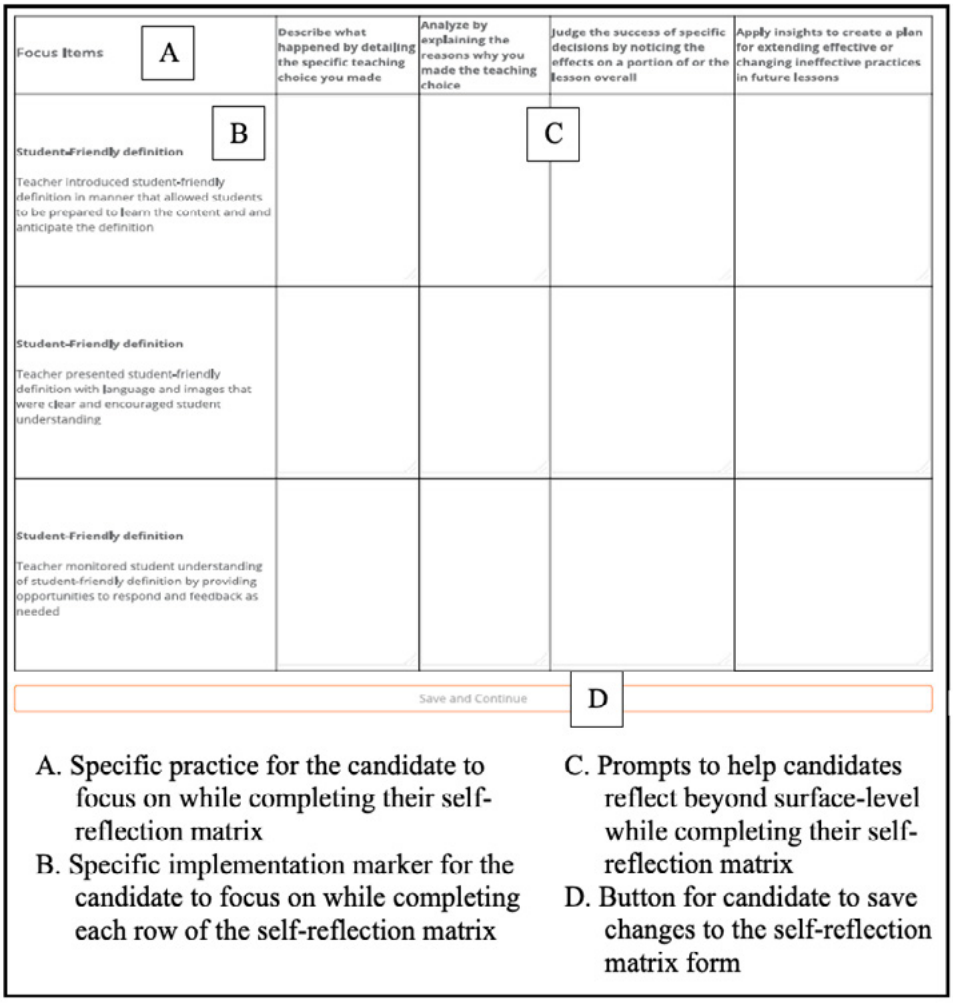
Use of the CT Scan and resultant coaching feedback reports has been associated with increased use of targeted evidence-based explicit instruction among candidates (Peeples et al., 2018). Specifically, candidates who received feedback from the CT Scan used more explicit vocabulary instruction practices compared to their peers who did not receive CT Scan feedback (Peeples et al., 2018). Kennedy and colleagues (2017, 2018) found that this type of objective data-based feedback is preferred by those receiving the feedback.

CAPs Multimedia Vignettes

Content Acquisition Podcasts (CAPs) are multimedia PD modeling videos embedded within the coaching feedback form that provide instantaneous and targeted PD to users (Kennedy et al., 2016a; Kennedy et al., 2016b). Centered around Mayer's (2020) cognitive theory of multimedia learning (CTML), CAPs are designed to minimize cognitive load (DeLeeuw & Mayer, 2008) while maximizing learning and knowledge acquisition. Over the last decade CAPs have repeatedly been demonstrated to be effective in improving the declarative, procedural, and conditional knowledge of candidates across various instructional strategies within special education (Daley, 2020).

CAPs typically follow the same general format designed to maximize knowledge acquisition while reducing cognitive load. Each brief video begins with an explanation of the practice and direct instruction on using that practice followed by a modeling video of a teacher using that practice with high-quality in a classroom setting (Kennedy et al., 2016a; Kennedy et al., 2016b). The specific format of the CAPs is intended to build the candidate's declarative knowledge through direct instruction while the modeling segment provides an initial step in forming both procedural and conditional knowledge (Alexander, et al., 1991; Kennedy, Rodgers, et al., 2017). Hirsch and colleagues (2015) provide additional information about how CAPs can be used.

FIGURE 3: Self Reflection Matrix



Self-Reflection Matrix

Self-reflection activities are common in teacher preparation (Nagro & deBettencourt, 2017), and for good reason. Candidates will be expected to reflect on their decision-making in every teaching role they transition into because teaching is an iterative process. Meaningful self-reflection goes beyond surface-level summarization of a lesson and includes recognizing pertinent teaching choices, analyzing why such choices were made, judging the success of these choices based on student outcomes, and applying these insights to decision-making in future lessons. Meaningful self-reflection is challenging, and candidates benefit from structure and guidance during reflection activities (Nagro et al., 2017).

Self-reflection activities can include the use of a graphic organizer to help candidates organize their thinking. One such graphic organizer is the reflection matrix (see Figure 3). This matrix includes both approaches and topics for self-reflection. The four approaches to self-reflection, describe, analyze, judge, apply (Nagro, 2020) can be combined with any focus topics for reflection such as (a) elements of asking open-ended questions (e.g., O'Brien et al., 2021), (b) elements of communicating with students (e.g., Nagro et al., 2017), (c) elements of promoting expressive language in students (e.g., Coogle et al., 2019), and (d) elements of classroom management (e.g., Nagro et al., 2020). A reflection matrix does not take as long as an essay style self-reflection to complete and candidates are more on topic with their reflective practice (deBettencourt & Nagro, 2019; Nagro, 2020). The graphic organizer is laid out in a matrix so that candidates can describe an occurrence of each focus item, analyze why they made the described teaching choice, judge the strength of their choices by using student outcomes as evidence of success, and then apply these insights to plans for increasing, decreasing, or maintaining the described choice. Although the four approaches to reflection stay the same, the focus items can change as candidates shift their professional goals or can remain the same so that candidates can notice growth in their teaching decisions over time.

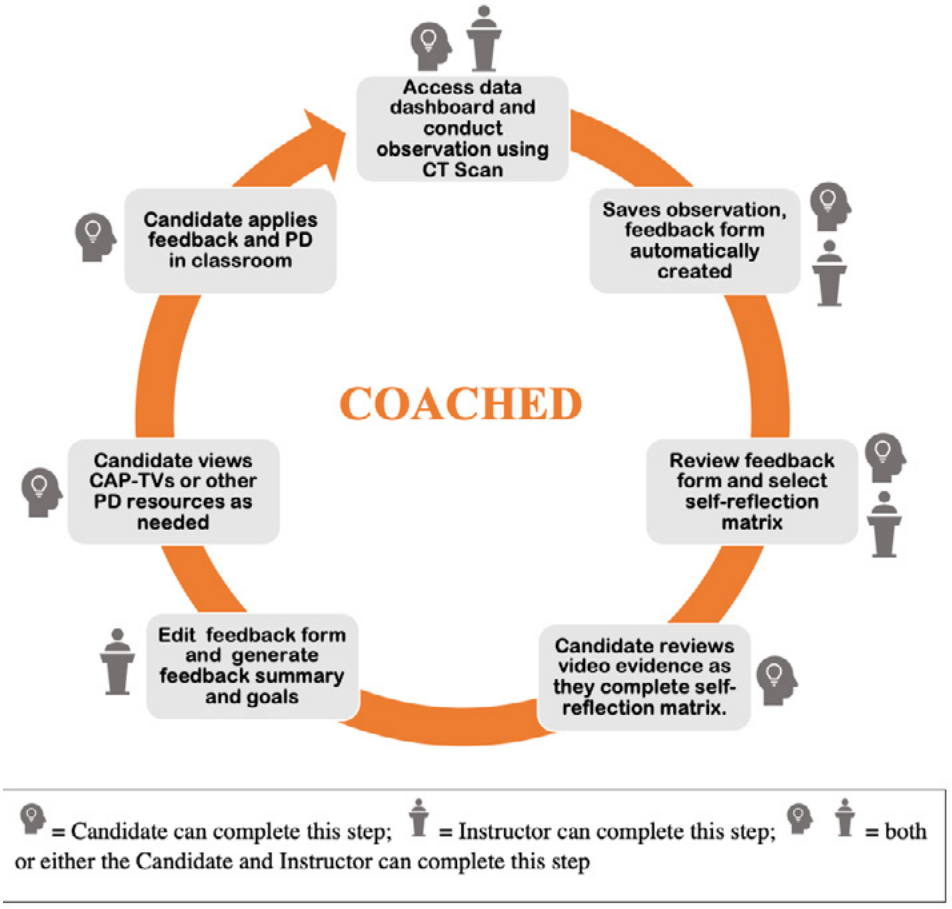
Candidates can use video evidence to review their instructional decision-making and complete a reflection matrix. Using video evidence helps candidates reflect with concrete data rather than relying on memory alone. Memory-based self-reflections tend to be feelings driven (i.e., it felt good when…I felt frustrated when…) rather than evidence driven (i.e., I asked seven close-ended questions, but no open-ended questions.). Nagro's *record, review, reflect, revise* video analysis cycle (see Nagro et el., 2020) fits well within the larger COACHED model because candidates can review video evidence they have uploaded into COACHED to reflect using the integrated reflection matrix all with the goal of refining their practice. The additional supports built into COACHED compliment the video analysis process by including additional data, feedback, and content acquisition all aimed at a seamless learning experience.

COACHED MODELS IN TEACHER PREPARATION

Supervisor feedback, self-observation, and self-reflection are powerful tools for improving candidate practice (Benedict et al., 2016). One of the strengths

of COACHED is that it can be used in several ways to provide a flexible option for observing and providing feedback. COACHED can be used to complete any of three coaching models: traditional model, self-observation model, or co-observation model. Figure 4, on the next page, demonstrates how different components of a coaching cycle (e.g., observation) can be completed by either the candidate, instructor, or both to accomplish a full coaching cycle. Below, we describe in detail how each of these cycles can be completed dependent on the user.

FIGURE 4: Flexible Coaching Model



Traditional COACHED Model

Supervisor observations of candidates during field experiences have long been a hallmark of teacher preparation. Traditionally, the supervisor would observe the candidate in the classroom or by viewing a recorded video, use a rubric or other instrument record notes and data, and then translate this recorded data into meaningful feedback for the candidate. Yet, often, candidates do not receive the high-quality feedback necessary (Grossman et al., 2009; Scheeler et al., 2016). The *Traditional COACHED Model* follows the same basic premise in terms of the supervisor completing the observation and providing feedback.

In the traditional COACHED model, the observation cycle begins with the supervisor conducting a CT Scan observation either live or using a candidate self-recorded video. Once the observation is complete, the supervisor saves the data, and the customizable feedback form is automatically generated. The supervisor opens the feedback form, reviews the quantitative data and automated feedback sentences, and uses this information to select a self-reflection matrix to send to the candidate. For example, the supervisor may have noticed that during the explicit instructional practice of "modeling" the candidate was only observed using two of the implementation markers. Therefore, the supervisor would select the "modeling" self-reflection matrix. Once the candidate logs into COACHED and completes their self-reflection matrix, the supervisor uses this information to finalize their narrative feedback summary and goals. Using the narrative summary, goals, and other data, the supervisor may also choose to assign the candidate a CAP-TV or other PD video to watch. Once the candidate reviews their feedback and PD, the goal is for them to apply this knowledge into their teaching and improvement will be noted in future observations. The traditional COACHED model is beneficial in that the supervisor can provide their expertise to the candidate when giving feedback. Although the candidate can complete a self-reflection matrix, in this model, the candidate does not have the opportunity to collect data on their own practice as part of the process.

Candidate Self-Observation Model

COACHED can be leveraged by the candidates and used without direct supervisor interaction by completing a video self-observation. The *Candidate Self-observation Model* not only saves the instructor's valuable time and enables candidates to receive more frequent feedback, it also provides quality learning and reflection opportunities. Video self-observation is a powerful tool; in observing their own teaching, candidates learn how to recognize practices they used, areas of needed improvement (Gaudin & Chaliès, 2015; Kleinknecht & Gröschner, 2016), and promote in-depth self-reflection of their own teaching (Nagro et al., 2017). Prior to beginning the instructional session, the candidate can also refer to the

CT Scan menu as a scaffold to determine which implementation markers should be used for specific practices. By scanning the menu ahead of time, the candidate can familiarize themselves with markers that make up a high-quality instructional practice.

To begin a COACHED self-observation cycle, the candidate records their lesson and then logs into their data dashboard to upload the video. Once the video is uploaded, they complete a CT Scan observation. COACHED enables the user to pull the uploaded video up on the same screen alongside the CT Scan. Not only does the CT Scan serve as a scaffold for candidates prior to the observation but it also gives candidates an opportunity to view and reflect on their own implementation of instructional practices by determining which IMs were and were not used. Once the observation is complete the candidate returns to the data dashboard and selects a self-reflection matrix based on their needs or supervisor direction and reflect on their lesson prior to viewing the video. The candidate then views their automated feedback form, resultant data, and views the CAPs or other PD for practices that had few or no IMs observed. With the self-observation model, the candidate can benefit from watching their own instruction and collecting data on the practices and IMs, noting which IMs they did not use. However, this model lacks the expert feedback of the supervisor. Yet, because the supervisor does not need to be directly involved in the observation, this is a great way to save already limited time.

Co-Observation Model

In the third COACHED observation model, the supervisor and candidate work together to complete an observation cycle. With the *Co-observation Model*, the candidate benefits from both the expert feedback and self-observation. Self-observation alongside expert feedback in teacher preparation is an effective strategy for improving candidate's knowledge and practice (Nagro et al., 2017). When engaging in a co-observation cycle communication between the candidate and supervisor is essential; the candidate will receive the most benefit from the cycle if they look at their own observation feedback alongside that of the instructor.

Once the candidate has uploaded their video to COACHED the first step of the co-observation cycle is for both the candidate and supervisor to complete the CT Scan observation separately. As in the traditional observation cycle, the supervisor will use the automatically generated feedback form to determine which self-reflection matrix to send the candidate. The candidate completes the matrix, the supervisor finalizes their feedback form and submits it to the candidate. The supervisor should also assign either the embedded CAPs or other relevant PD to the candidate at this time. It is important to note that the supervisor can also rely on the CT Scan as a scaffold when completing observations. No one person is proficient in every content area across all grade levels; the CT Scan and its list of practices and associated IMs offer a guide during the observation, telling the observer what to look for. Next, the candidate reviews both the instructor's and their own feedback forms prior to engaging with the PD and applying their new knowledge in the classroom. The co-observation model combines the best of both worlds, in that the candidate can benefit from their self-observation and the supervisor's feedback.

Due to the flexible design of COACHED (i.e., three coaching models, ability to select components) it can easily be incorporated into teacher preparation field experiences. For programs engaging in more frequent coaching cycles (e.g., monthly) the ability to upload observation videos into COACHED reduces the time commitment and travel for supervisors. However, for less frequent coaching cycles, live observations are beneficial in that you can capture more nuanced information using the CT Scan (e.g., student off-task behavior). Additionally, for preparation programs that may be completely online, the video upload capability along with the virtual CAPs videos, enable supervisors to engage in quality coaching.

CONCLUSION

Teacher preparation programs play a key role in preparing special educators for entering the workforce. In fact, when it comes to factors associated with academic performance for students with disabilities, high-quality and prepared teachers are key (Aaronson et al., 2007; Darling-Hammond & Berry, 2006). Research suggests observation (Stormont & Reinke, 2012), feedback (Cornelius & Nagro, 2014), opportunity for self-reflection (Nagro & deBettencourt, 2019), and modeling (Brock et al., 2017), are associated with increased teacher candidate use of quality instructional practices in the classroom (Cusumano & Preston, 2018; Stormont & Reinke, 2012). Despite this knowledge, there is an inconsistency in the type of training and feedback teachers receive in preparation programs (Nagro & deBettencourt, 2017). Moreover, teacher educators often do not have the time to consistently provide high-quality and meaningful data-based feedback to candidates. Fortunately, with COACHED candidates and their supervisors can engage in quality and time-saving observations, feedback, self-reflection, and modeling.

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The Integration of Information and Communication Technology in Education: A Review of Policies and Practices in Angola, South Africa and Zimbabwe

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ABSTRACT

The use of Information and Communication Technologies (ICT) in education has expanded significantly worldwide. Many countries develop Educational ICT policies to promote national agendas for economic, social, and political growth. The implementation of ICT in education is designed to prepare students to assimilate into the global market, attain equal access to education, and to be technologically prepared citizens. Many African governments are therefore developing ICT policies to expand integration of ICTs in primary and secondary education. However, successful integration of ICTs requires concerted efforts across stakeholders, as well as consistency in policy implementation and evaluation. Although several Southern African countries have ICT policy blueprints for education, not much is known about the implementation of the policies on the ground. This study reviews educational ICT policy implementation, successes, and challenges in three Southern African countries: Angola, South Africa, and Zimbabwe.

KEYWORDS
Digitalization, educational policy, information and communication technologies, Southern Africa

The use of Information Communication Technologies (ICTs) in education has increased significantly during the last two decades. Educational ICT is paramount in transforming global education for both students with and without disabilities (Chaidi et al., 2021; Iniesta-Bonillo et al., 2013; Khetarpal, 2014). As educators and employees across the globe advocate for students to train with 21st-century skills, it is necessary to institute reforms in teaching and learning that prepare learners with these requisite skills (Ra et al., 2016). One way to increase students' academic outcomes is to increase their engagement in learning processes and encourage them to search for information as part of the knowledge creation process. ICTs serve as a good platform for students to search and find information. Through the use of educational ICTs, people with special needs are able to alleviate the challenges associated with accessing information.

For a long time now, there has been a big disparity in academic achievement between students with and without disabilities. According to Chitiyo and Wheeler (2004), children with disabilities in most African communities were historically marginalized from both social and learning activities, and in most cases, there was little to no advocacy to address these societal norms. The growth of ICT became a tool for social inclusion for these children. The continued growth of ICT has created a "culture of accessibility" that promotes educational inclusion for students with special needs/disability and prepares them to assimilate into the ever-changing technological world (Medina-García et al., 2021).

To help students prepare to assimilate into the economic, social, and political activities that incorporate technology,

most countries are consistently developing and re-evaluating national educational ICT policies. In Europe, the development of educational ICT policy is seen as a way to increase the integration and learning of students in both primary and secondary education (Ottestd & Guðmundsdóttir, 2018). Since the beginning of the COVIID-19 global pandemic, most face-to-face healthcare and educational services were suspended and transitioned to online platforms. In education, classes were increasingly conducted online. However, most students with special needs were negatively affected since several technological accommodations they would need were not available. In less developed countries (e.g., Southern Africa), several students with special needs were completely left out due to lack of necessary technological tools to accommodate them. The integration of assistive ICT is therefore critical for increasing the participation and inclusion of students with disabilities in learning (Chaidi et al., 2021).

Research on the development of educational ICT policies in Africa indicates little information on how students with special needs are addressed in these policies. What seems evident are the legal frameworks developed for education in general, but with no adequate reference to special needs education. To increase the inclusion of students with disabilities in national activities, Angola, Zimbabwe, and South Africa have developed national education policies with the underlying assumption that all students will benefit from the incorporation of technology into the education system. This assumption can be premised on the recommendations of the World Bank and the United Nations, that the use of ICT in the world's poorest countries will support development in economic and social spheres of life (Kozma, 2008). Research findings suggest that as ICTs are integrated into society, they allow for greater access to knowledge, inclusion, and independent living among people with disabilities (Khetarpal, 2014).

> The implementation of ICT in education is designed to prepare students to assimilate into the global market, attain equal access to education, and to be technologically prepared citizens.

In 2006, education ministers from African countries adopted a 10-year plan that promoted science, technology, and improved learning outcomes (Nhema & Zinyama, 2016; Tilya, 2008). More importantly, the promotion of technological integration in schools in African countries was aligned with the United Nations (UN) Strategic Development Goals on education (Tilya, 2008). One of the UN's eight National Development Strategy goals pertains to universal primary and secondary education for urban and rural learners. Although the goal does not specifically mention anything regarding expanding technology in education, the integration of ICT into learning across the world calls for equality in learning for all students and improved access to education for all. Not only will ICT improve learning outcomes, the integration of ICT can also offer support to learners from disadvantaged backgrounds and bridge the digital divide between learners in urban and rural areas (Naidoo, 2003).

Implementation of ICT Policy

One major aspect researchers seem to agree on is that digital technologies transform the ways in which people think about teaching and learning (Collins & Halverson, 2009). ICTs can improve education availability and accessibility, thereby helping to reduce educational gaps between urban and rural students, and students with and without disabilities (Dondofema & Shumba, 2018; Khetarpal, 2014). This paper focuses on the implementation of educational reforms in three Southern African countries: Angola, South Africa, and Zimbabwe. These three countries have developed policies and strategies to increase the integration of technology in schools. The following section presents a brief history of special education in these countries, the steps taken in developing their policies and strategies, and current efforts in place to ensure that ICTs are being used in teaching and learning.

HISTORICAL CONTEXTS

Angola, South Africa, and Zimbabwe all have frameworks that support the learning of students with disabilities. These countries share some similar characteristics regarding special education practice. For example, research shows that special education across the three countries is still in its infancy, and there is under-establishment of teacher preparation programs to teach special needs students (Chitiyo &Wheeler, 2004).

Zimbabwe

In Zimbabwe, the government established the Department of Special Education at the United College of Education in Bulawayo in 1983, and the University of Zimbabwe started offering a Bachelor of Special Education degree in 1994 (Chitiyo & Wheeler, 2004). In recent years, the Great Zimbabwe University joined in, offering a similar

degree in Special Education. The main objective is to increase the number of teachers trained in special needs education. Research indicates that since 1994, the number of children with disabilities educated in regular schools has significantly increased (Majoko, 2019). The Ministry of Primary and Secondary Education (MoPSE) has a School Psychological Services and Special Needs Education (SPS & SNE) Department that helps with children's disabilities diagnosis and places students in schools in consultation with teachers, parents, and other stakeholders (Majoko, 2019). The Zimbabwean government mandates the inclusion of children with disabilities in regular schools. However, until now, there is still a large gap in special education provision in Zimbabwe.

Zimbabwe started to implement a number of initiatives to promote the use of ICT in education in the late 1990s. Like the trends in Europe where schools took advantage of the advent of computers for learning, private schools in Zimbabwe acquired computers and introduced computer courses for students. Since then, students started taking the Cambridge examinations in Computer Science. The government later expanded promotion of ICT use in education by developing a computer science exam and engaging in many projects across the country. Among the notable projects by the Zimbabwean government was the school's computerization Programme launched in 2000, Zimbabwe's Education Sector Strategic Plan of 2016-20, the Presidential e-Learning Programme of 2011, and the Electronic Ministry Application Platform introduced in 2016 (Dondofema & Shumba, 2018; Nhema & Zinyama, 2016). Some of these projects were partnerships between the government and other stakeholders like the non-governmental organizations.

The government of Zimbabwe produced its first national ICT policy in 2005, which highlighted the need to promote ICT in education (Rajah, 2015). The policy was informed by a number of general sector policies, such as the Nziramasanga Commission Report of 1999 and the national science and technology policy of 2002 (Musarurwa, 2011). A revised version of the ICT policy only passed into law in 2016. The revised policy was a key enabler for development in all sectors of the economy. Part of the policy noted that there was a 45% penetration of internet in the country by 2015, which is an indication of growth (Government of Zimbabwe, 2015). In 2016 the government also produced the Education Sector Strategic Plan that reiterated the government's desire to provide access to high quality and relevant education to all children (Nhema & Zinyama, 2016). The strategic plan highlighted the need for the creation of a new curriculum that integrated ICT and with labs built in schools to host the ICT equipment. Like in Europe, ICT was initially offered as a subject to students before efforts were redirected to make it part of the teaching pedagogy (Ottestd & Guðmundsdóttir, 2018). Between 2016 and 2019, the Zimbabwean government also got support from the UNESCO-Korean Funds-in-Trust (KFIT), which supported the development of e-schooling, and ICT policy development (Rudhumbu, 2021).

> "Research findings suggest that as ICTs are integrated into society, they allow for greater access to knowledge, inclusion, and independent living among people with disabilities (Khetarpal, 2014).

To promote the efficient use of ICT in education, the Ministry of Primary and Secondary Education of Zimbabwe developed a comprehensive ICT policy for primary education (2019-2023) (Dzinotyiweyi & Taddese, 2020). This is viewed as an avenue to enable learners to achieve their full potential and become productive and responsible citizens. The Ministry of Primary and Secondary Education (MoPSE) website yielded little information on the contents of the policy. In 2018, MoPSE signed a memorandum of understanding with Microsoft that sought to assist efforts to modernize classrooms with technology. In March 2021, the government approved the National e-Learning Strategy for schools, a smart education program that would complement traditional learning forms, increase internet connection, and train teachers on the use of Information Communication (Chronicle, 2021). However, as Nyarufuka (2018) notes, there was no clear road map dedicated to the implementation of ICTs. The absence of the plan seems to suggest that the government and the ministry believe that once adequate hardware and software are available, integration would be successful. A search into the literature and the government website does not provide a clear pathway on how ICT in education will be implemented.

Angola

Angola was embattled in a three-decade civil war that stretched from 1975 to 2002 after the Portuguese colonization. The war destroyed the education system and infrastructure in the country (Bondo, 2015). Angola was the last to gain independence among the three countries. Traditionally, disability was viewed as a curse in the family, and

the country did not have policies that supported students with special needs. The 1975 civil war resulted in several people getting injured and developed different types of disabilities (Antonio et al., 2021). As a result of the disastrous human and material damage, there was a severe lack of teachers and schools to guarantee educational inclusion. The post-war periods characterized the subsequent inclusion-oriented special education policies (Mendes & González, 2021). A National Institute for Special Education (INEE) was established to promote the building of Special Education Schools whose goal was to educate the population with disabilities (Antonio et al., 2021). In terms of education policies, the INEE was linked and dependent on the Ministry of Education and had a legal responsibility to support all administrative roles. Over the years, the department has evolved with the current primary focus on children with visual and hearing impairments (INEE, 2006).

In 2002 the Angolan government created the National Commission for Information Technology (Isaacs, 2007). Despite the absence of an ICT policy then, a number of organizations provided support for the use of technology in schools and for learners. Examples include the Schlumberger Excellence in Education Development (SEED), which supported the building of computer rooms and providing network connections at two schools in the country (Isaacs, 2007). According to Isaacs, initiatives related to ICTs in education were implemented through the AngoNet, Discovery Channel Global Education Fund, Quality Primary Education Project, Education Managememtn Information System (EMIS), SchoolNet Angola, and Catholic University in Angola. Most of these projects sought to provide computer centers that allowed teachers and students access to technologies and resources that helped increase engagement.

In 2002, the country created the National Commission for Information Technology which was tasked with the development of a plan on ICT implementation for the country. The commission's initial task was to develop a plan on how technology would be integrated into the country to promote economic growth. A Strategy for the Development of Information Technology 2000–2010 was produced by the commission. The government produced an ICT development white paper, which aimed to stimulate the development of a knowledge society in Angola (Isaacs, 2007). In 2013, the Government of Angola created the National Plan of Informational Society (PNSI), which oversaw the implementation of the Action Plan of Informational Society 2005-2010. The Action Plan had education as one of its strategic pillars with the following lines of action: a) To reinforce ICT's competencies; b) To reinforce ICT's use in the Teaching and Educational System; c) To increase the access to education and contents; d) To promote research and development (PNSI 2013, p. 3).

The government updated its national policy—the National Development Plan (PDN) 2018-2022—which among its priority actions focused on the promotion of remote education and e-learning. A new System of Basis of Education and Teaching Law proposed future educational modalities where the teaching and learning process happens with ICT resources (Barbante, 2021). A number of projects were implemented by the government and partnerships were established. One example of the projects by the government was Escola Meu Kamba, created in 2014, which is being implemented in partnership with a private company run under the National Development Plan 2013-2017 (Barbante, 2021). This project was also renewed under the current National Development Plan. The Escola Meu Kamba pursues the integration of informatic equipment in public schools and the Primary Education Subsystems. They noted that governments would need to partner with private sectors to increase the integration of ICT in education.

Private initiatives have also been implemented in the country in support of bringing equality in education through the use of technology. The Escola ProFuturo project was launched in the country to capacitate teachers on using technology in their teaching and enable students to acquire abilities and competencies for their personal and professional future (Barbante, 2021). Furthermore, the Escola ProFuturo seeks to reduce the gap in educational quality between boys and girls. Not only does the country suffer from a digital divide between the urban and rural communities, but also a divide by gender (Bondo, 2015). Besides the private initiatives, the government partnered with Huawei Technologies Co. Ltd, where the company will provide support in training teachers to use ICT, supply, install, and maintain computer equipment in schools (Barbante, 2020).

South Africa

Special education for South Africa dates back further compared to that of its counterparts. A Vocational Education and Special Education Act was passed into law in 1928 (Vergottini & Weyers, 2020). Prior to 1900 children with special needs were excluded from formal education. After the establishment of the Act, special schools were built to cater to the needs of these students. However, these schools accommodated children classified as White (Department of Education, 2001). At the end of the Apartheid rule, there were few teachers qualified to teach students with special needs as education became inclusive to all (i.e., people of all races). The growth of regular school education was rapid but that

of special education was confined to the margins of educational concern (Department of Education, 2001). As a result of the discrepancy in the development of regular school education and special education, a white paper–White paper 6– was written addressing these challenges (Government of South Africa, 2001). The findings of the white paper resulted in the development of district-based support teams to introduce strategies and interventions that assisted educators in the regular school system to cope with a diversity of learning and teaching needs. Each district in the country established at least one full-service school to serve as a resource center for ordinary and full-service schools (Department of Education, 2001). It can be noted, just like Zimbabwe, the country encourages inclusive education, with only students with severe special needs attending exclusive special education schools.

South Africa is rapidly implementing ICTs as part of its economy and education and is seen as an outlier within the SADC (Southern African Development Community) region. In 1994 South Africa became an inclusive and democratic political system ending years of apartheid (Blignaut et al., 2010). The country established the National Department of Education, which combined nine newly created Provincial Departments of Education (PDE) and incorporated the Bantustans (see Chisholm, 2018) into the education departments. Since the end of apartheid rule, the government has developed a number of legislations that govern and mandate the delivery of education. Three overlapping principles regulate access to education in the country:Education needs to be accessible to everyone without discrimination; accessibility of education to all; and affordability (Blignaut et al., 2010). In 1995, an E-education White Paper was written that paved the way for developing the Technology Enhanced Learning Initiative (TELI; Jopp, 2020). The TELI was a culmination of research that identified projects that would be used to promote the effective use of technologies in South African education and training (Ntombenhle, n.d). In 2001, the president established the Presidential National Commission in Information Society and Development (PNC on ISAD), whose main goal was to act as an advisory group to the government on challenges regarding ICT development in South Africa and how best to address these challenges (Lesame, 2013). In the following year, the act was established to spearhead all ICT initiatives and develop a five-year national e-strategy.

A paper entitled, "Transforming Learning and Teaching through Information and Communication Technologies" (ICTs) was produced in 2004 and acted as the official governing policy on e-Education in the country (Isaacs, 2007). The policy supported reforms in pedagogical, curricular, and assessments to facilitate improvements in the use of educational resources such as ICT. The policy's goal was to have every learner in the Primary and Secondary school sectors ICT capable by 2013. To ensure the goal was achievable, the ICT policy promoted the establishment of supportive environments in which educational decision-makers were able to make effective decisions that allow technologies to be introduced into teaching and learning. In 2013, a new e-Education Strategy was unveiled which served as the plan for the implementation of e-Education in the country. The implementation of the plan was guided and informed by the 2004 paper. In support of the government's drive to promote ICT in teaching and learning, local companies such as MTN SA Foundation partnered with Mindset Network to roll out an innovative broadcast learning to 29 secondary schools. The program included training and support for Mathematics, Science Technology, and Language Literacy educators (MTN Foundation, 2020).

In 2015, the South African government piloted the digital classroom in seven schools (Ntombenhle, n.d). The schools received internet connections, and each student was given a tablet to use for their education. A total of 17 billion Rands was set aside by the government to roll out the project throughout the nine provinces in the country. The implementation of the project is spearheaded by the country's Provisional Departments of Education (PDE). According to McNulty the Western Cape Education Department (WCED) and Gauteng Department of Education (GDE), are moving forward with ambitious digital education plans. The project in WCED saw the installation of 5,300 smart classrooms (i.e., classrooms equipped with a variety of teaching and learning methods that use technology) in 2021 with a target of 7,300. The GDE has distributed 64,000 tablets to learners, refurbished classrooms, and trained 6,000 teachers in using ICT in the classroom. It would be noted that the South African government creates the national education policy with the Provincial Departments of Education tasked with the implementation of these policies, frameworks, guidelines as they relate to education.

Challenges with ICT policies Implementation

Research on the challenges of the implementation of ICT policies differs amongst countries. The success of ICT implementation is an intertwining of different variables working together. Among the common factors that pose challenges to ICT implementation include infrastructure, policy deployment, and maintenance. Infrastructure combines broadband connections, radio and television transmission, smart classrooms, internet access points, computer

labs, to mention a few. On the other hand, policy deployment will include implementation methods, curriculum development, government and private partnerships, and financing. Once the policy has been put into action, there are measures that need to be taken to maintain the infrastructure and continued implementation of ICT integration. The maintenance will include financing the equipment, repairs, professional development for the educators, and research and development of new technologies being introduced into the market. Each of these three stages can be associated with their own challenges and can hinder the successful integration of ICT into education, as would be intended by the policy.

Most developing countries, including Angola and Zimbabwe, have limited access to resources that allow for the integration of ICTs. Indications show that most rural schools in Africa do not have access to electricity which is a key component to power most technologies. Zimbabwe's electricity access is a mere 40%, with only 16% of the rural population having electricity access. What makes the situation worse is that 67% of the population is based in rural areas. Like Zimbabwe, Angola's electricity access is only 46%, leaving most of the country without power (World Bank, 2021). Besides electricity challenges, most rural areas have poor radio and television transmission, making it difficult to implement Radio-assisted instruction (RAI) and Television-assisted instruction (TAI). There is an unequal distribution and access to ICT infrastructure for teachers and learners in rural and urban areas (Dondofema & Shumba, 2018). For teachers in urban areas, where electricity is available, the lack of computers and adequate material is reported as a hinder to successful ICT integration (Emprica, 2006; Zindi & Ruparanganda, 2011).

In most developing countries, it is difficult to implement technology in education because of the substantial funding required from the government (Mndebele, 2013). Governments such as Zimbabwe have been limited with budgetary constraints to support the implementation of ICT in all schools across the country (Mndebele, 2013). There is a greater need for governments to set up partnerships with the private sector. These partnerships call for a clear framework of implementation. As noted earlier, there is a need for the removal of politicking government activities that deters any meaningful supports. Where partnerships are successfully developed, the challenge comes when the funding ends and the schools take over (Ottestad & Gudmundsdottir, 2018). Parents have the potential for resistance when the cost of maintaining the equipment and internet connection is passed to them. Internet subscriptions are expensive in Angola and Zimbabwe, and it would be difficult for schools to pass the cost to the parents. For South Africa, the cost of internet subscriptions is far cheaper than all the other countries in the region. Although the Zimbabwean government has tried to avert this challenge by developing an internet for schools, the connection has been reported to be slow and unreliable (Nyarufuka, 2018). It would be integral for internet providers and coverage which reduces the subscription costs to be in place for successful adoption of internet by schools. The cost and access to internet will have the potential to bring together students with and without disabilities together, and its lack can also leave people behind (Medina-García et al., 2021).

The successful implementation of ICT in the curriculum requires the development of positive teachers' perception of ICTs being implemented as part of their teaching (Woodrow, 1992). Teachers' attitudes combined with the inherent resistance to change have been noted as significant challenges when trying to integrate technologies in education (Becta, 2004; Cox et al., 1999; Schoepp, 2005). Research indicates that one of the challenges with ICT integration into the classroom is a lack of confidence and appreciation of educational technologies by teachers. This challenge is not unique to any country, including our three countries of focus, but affects both developed and developing countries.

The implementation of a new curriculum into the educational setting will call for changes in perception from both the teachers and learners. Students and teachers will need to have easy access to ICT facilities and be presented with reasons why such technologies would be important to them. Training of teachers would need to be geared towards pedagogical implementation rather than technical issues as this is one of the reasons teachers fear integrating technology in their classrooms (Hattangdi & Ghosh, 2008). It is important that the government remember that the end-users and implementors of the educational policy are the educators and the learners. According to Khetarpal (2014), the success of ICT development in this regard, we must keep in mind that it takes commitment and sacrifice to make ICT accessible to persons with disabilities. According to Hattangdi and Ghosh (2008), the success of ICT development depends on many issues, including training, but training should be directed towards pedagogical rather than technical issues. Furthermore, the teachers will need to be supported and guided in implementing these technologies such that they support inclusive education (Becta, 2004; Pelgrum, 2001; Schoepps, 2005).

Discussion

Countries are transforming their education systems to incorporate information technologies, thus affording their

citizens with knowledge of ICT use and supporting inclusive education. To ensure this transformation is attainable, governments are developing educational ICT policies which are reviewed constantly. Most of these educational policies are designed off the national ICT policy, such that the students, as future employees, are prepared to assimilate into the technological business world. In Angola, the government created the National Plan of Informational Society, which established "Education" as one of the pillars of the development of informational society (Barbante, 2021). The Zimbabwe government established a national ICT policy in 2005, which referred to the promotion of ICTs inclusion in education (Isaac, 2007). The country only established its first education ICT policy for primary and secondary education in 2019 with the policy covering the period 2019 to 2023. The integration of ICT in South African education began before the end of apartheid. However, there was no equality of technology access for all learners. Upon gaining independence from apartheid rule, the government began developing education initiatives with technology, a first in Africa, in pursuit of economic development (Vandeyar, 2013). Further, the e-Education policy developed in 2004 solidified the transformation of learning and teaching with ICT included in education.

A challenge with ICT implementation in the countries of focus has been the digital divide between rural and urban schools. Most schools in rural areas do not have easy access to ICT equipment, internet connection infrastructure, electricity, and financial support to maintain computer labs (Botha et al., 2017; van Stam, 2014). Efforts are currently being taken to try to reduce this divide, as noted from the rural computerization programs in Zimbabwe (Masau, 2018) and the distribution of computer tablets to students in rural South African schools (Mwapwele et al., 2019). Teachers in rural schools cite the availability of technology as a significant challenge for integrating ICT into teaching (Botha et al., 2017). Furthermore, others highlight the lack of a support structure to help them set up the equipment (Musau, 2018).

Angola, South Africa, and Zimbabwe are transforming their teacher preparation programs to train teachers to implement technology in their classrooms (Musarurwa, 2011). Teachers are provided with training platforms such as the Meu Kamba project's computer (Barbante, 2021), ICT Essentials Course for Teachers - Zimbabwe (MoPSE, 2021), and the ICT Skills for Teachers Course-South Africa (SchoolNet, n.d). These courses and projects have been developed to provide teachers with the essential knowledge required to integrate ICT into their teaching. Furthermore, efforts are underway in all three countries to integrate technology into teacher preparation programs. Some colleges in South Africa are providing courses to in-service teachers to bring them up to speed with technology integration in their profession. Though results show teachers feel ill-prepared to integrate technology in their profession, steps to support policies in ICT integration into education are being taken.

The inclusion of technology in education marked transformations in the educational curriculum provided in these three countries. Barbante (2021) indicates that the inclusion of technology in education called for new ways of teaching, new ways of learning, and administrative processes. The administrative change will play a key role in how technology will be incorporated and used in schools. Most schools in the three countries have policies that do not allow students to bring their personal digital devices to school (Mwapwele et al., 2019; Zvavahera & Chigora, 2018). School administrators see mobile phones and other digital devices as disruptive rather than useful to the students learning. As a result of such policies by school districts, they run counter to the government's goals of ICT integration.

Recommendations

The use of ICTs is key in facilitating economic growth and reducing the equality of opportunities between people with and without disabilities in many nations. Countries across the globe are calling for a transformation in the education system that will allow all learners to acquire 21st-century skills. Among the commonly noted skills is the ability "to seek new information, think critically and show creativity and problem-solving competencies to meet the challenges of the fast-changing world" (Ra et al., 2016, p. 80).

This paper assessed educational ICT strategies, their implementation, and enhancers in three Southern African countries: Angola, South Africa, and Zimbabwe. We believe that the successful integration of ICT requires rethinking of planning and implementation strategies from all the stakeholders involved. The development of national commissions and policies alone will not improve the integration of technologies into education unless fundamental issues in their implementation are addressed. The development, implementation, and maintenance of ICTs is a holistic process that needs the input of all stakeholders involved. Ra and colleagues (2016) provided important recommendations for the successful implementation of an ICT policy in education. Zimbabwe, South Africa, and Angola can consider using these recommendation in order to ensure that ICT is successfully integrated into education.

1. National ICT in education vision: There is a need for a national shared vision on why and how ICTs will be

used to transform the country.

2. **National ICT in education plan and policies:** Government consults with the stakeholders, plans, and finances resource allocation for the process.
3. **Complementary national ICT and education policies:** This process involves the development of the policies (national and education). The policies are to be complementary and not standalone. Based on the country's long-term vision, the policy should be able to support the realization of this vision.
4. **Access to ICT infrastructure and resources:** There is a need for a national plan for access to ICT infrastructure and resources as they are a key prerequisite for ICT to transform education. This can be done through the provision of ICT equipment, human resources to maintain the infrastructure, and financing resources to support the initial and maintenance of the infrastructure.
5. **Professional development for teachers and education leaders:** Professional development programmes would need to be designed for preparing teachers and education leaders who will implement the technologies into the learning environments. The programmes would need to be continual to help educators examine and transform their practices based on evolving technologies.
6. **Partnerships:** Public-private partnerships are key to aiding the success of the education sector including the implementation of ICTs. There is a need for the development of smart partnerships to enhance the impact of using ICTs in education.
7. **ICT in the national curriculum:** Development of a national curriculum with the potential to incorporate ICTs and enhance the learning environments. Information Communication and Technology would not need to be taken as a subject or support to an existing curriculum but as a pedagogical agent in curriculum development.
8. **Evaluation and Research:** There is a need for continuous research and evaluation of lessons learned from the current implementations to inform future policy amends.

Based on our assessment of three countries, we provide our recommendations for other countries still seeking to implement an ICT policy:

1. *A Holistic approach to infrastructure and resource planning:* Poor infrastructure hinders efficient distribution or access to ICTs. Countries in Africa continue to lag behind in access to electricity, internet, and radio and television transmission especially between rural and urban populations. To ensure success in the integration of ICT, initial investment in infrastructure (consider internet connection through star link) and electricity across the country should be prioritized. The governments need to promote more internet providers (also can be done with partnerships with other countries) to reduce the broadband internet cost. Ra and colleagues (2016) recommend the development of ICT centers with electricity and internet points for rural communities to access.
2. *The Development of ICT framework:* There is a need for a clearly defined vision for the implementation and maintenance of the ICT infrastructures. The development of an ICT policy will not entail its correct implementation by educators. There is a need for a clear plan on how the policy will be implemented in schools and a clear explanation on how its integration will enhance quality and improve equity and efficiency in education (Hew & Brush, 2007). Without a clear framework and explanation of the integration, the implementors would not know the correct ways to do things.
3. *Educator training and professional development:* Research indicates that some teachers did not receive training in the use of ICT during their teacher training. As a new curriculum that promotes the integration of ICTs, educators need to be trained and receive continual professional development. The training programs should be developed around the needs of the teachers and their level of knowledge with ICT use. Also, teacher preparation providers need to adjust their programs to provide opportunities for their training teachers to appreciate the integration of ICT in their classes (Ostrowick, 2018).
4. *Public-private partnership:* There is a need for continued partnership between the public and private sectors in increasing IT integration in education. These partnerships need to be guided by some framework and clearly defined targets. Governments need to develop clear road maps on how projects are to be implemented and how the private and public partnerships will work.
5. *Establishment of refurbishment centers:* Although the cost of technology equipment is going down, most rural schools cannot afford to buy this new equipment. The cost of buying technology is factored into the students' fee structure, as such, high technology cost on the fees may deter parents. The establishment of computer (and its accessories) refurbishment centers will allow disadvantaged schools to buy equipment at affordable prices.
6. *Budget allocation for ICT maintenance:* The Government will need to set up finances to maintain, research, and improve the current policy in place. Through research, the government should be able to develop adopt respectful integration methods that suit their population. Poor infrastructure

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maintenance will result in the government continuously allocating resources to the development process with little progress happening.

Taken together, the authors' recommendations and those provided by Ra and colleagues (2016), one of the key things is for a shared vision when implementing an ICT policy. The development of infrastructure across the country needs to be agreed upon by all stakeholders. As countries have legal frameworks on issues related to people with disabilities, this framework will need to be included when addressing issues of ICT integration into education. The recommendations provided by Ra and colleagues (2016) form the basic components any educational ICT policy need to go through. Added to these recommendations are components most developed countries (i.e., share the same climate with our three countries) would need to consider.

The above recommendations are based on our review of three countries, noting what has been done right and what still needs to be done. Findings from this review show that South Africa has made several achievements in the implementation of its educational ICT policy and seems to be ahead of most Sub-Saharan regions. We believe this comparison and lessons learnt from our three countries can help to inform future educational ICT policy development and reviews. Most countries run parallel policies to include students with special needs in education. Noted in the discussion is that schools are mandated to include students with special needs in their systems. The educational policies developed by governments need to address how integrated technologies will provide equal opportunities for all students. Policies will not need to be developed on the pretext that education in schools is developed to cater for all students needs. The integration of technology has become an important part of the educational systems, as such it will continue to be part of the changes in education. Future research will focus on how developing countries can develop home grown solutions related to technology integration to reduce costs and educational disparities that currently exist.

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