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Success for All: Maximizing Digital Accessibility in Special Education Teacher Preparation Courses through Universal Design for Learning

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ABSTRACT
Digital accessibility has become one of the most critical components for post-secondary student success because accessibility is the first step to learning for the diverse college student population. However, emerging studies show that teacher candidates experience challenges in program completion due to inaccessible course materials or course implementation. Furthermore, teacher educators address the need for more knowledge and skills for designing digitally accessible courses. Despite the demands, few guidelines exist for teacher educators to improve classroom digital accessibility. This article suggests multiple avenues of action for teacher educators to enhance accessibility through the lens of universal design for learning so that all teacher candidates with and without disabilities can succeed. Embedded vignettes illustrate an experience of a practicing teacher educator faced with modifying content with increased demands beyond their own training in special education.

KEYWORDS
Digital accessibility, course materials, course delivery, special education teacher educators, Universal Design for Learning (UDL)

Cindy is a teacher educator for a special education teacher preparation program at a large, 4-year public institution. She has taught undergraduate assessment courses for multiple years and feels confident in preparing teacher candidates. Each semester, Cindy receives accommodation letters for some students who require specific course accommodations from the University's Disability Center. In the past, examples of the primary accommodations included providing a note taker (established by university) or extended time on exams. She has been able to easily provide these accommodations for her students without requiring additional support or making any significant changes to how she prepares her course.

Before starting the fall semester, Cindy received course accommodation requests for multiple students, including Hanna and James, in her face-to-face assessment class. In Hanna's email to Cindy, she disclosed that she is Deaf but uses cochlear implants. The accommodations she is eligible to receive include a copy of any displayed materials (e.g., handouts, assignment descriptions) and PowerPoint (PPT) slides, closed captioned videos, and in-class sign language interpreters.

James disclosed that he is blind, and he is eligible to use a laptop/tablet/phone in class for notes and class assignments. He also may require course materials to be converted into Braille or tactile graphics. All her course materials will need to be converted into Braille or an accessible electronic version. This should be done by university disability services, though little direction was provided. Cindy was concerned that she would have to completely revamp her class and course materials as she uses digital materials and websites. Thinking about how to implement the accommodations her students need to access her class made her feel overwhelmed.

The US Department of Education's Office for Civil Rights (2013) defines the requirements for accessibility as "the person with a disability must be able to obtain the information as fully, equally and independently as a person without a disability". The enactment of federal civil rights laws (e.g., Americans with Disabilities Act [ADA, 1990], Section 504 of the Rehabilitation Act of 1973) guarantees anyone, regardless

of their disability status, to have accessibility to facilities, social activities, employment, or learning. In education, access to information is the first step fo learning, so guaranteeing accessibility in the class materials plays a critical role in making classrooms more inclusive and equitable. Digital accessibility means providing electronic course materials in an accessible manner to students with and without disabilities for their full learning engagement in the classroom (Bhardwaj & Kumar, 2017; Khalid & Pedersen, 2016). The "Dear Colleague" joint letter highlights and reconfirms th requirement of accessible technology used in higher education classrooms for anyone regardless of their disability (U.S. Department of Justice, 2010). Despite these legal documents, few changes have occurred (Putnam et al., 2016).

DIGITAL ACCESSIBILITY IN HIGHER EDUCATION

Since the Higher Education Opportunity Act (2008) emphasized accessible post-secondary education, college enrollment has increased in diverse student demographics. The National Center for Education Statistics (NCES, 2018) report showed that about 18 percent of undergraduates enrolled in education programs during the in 2015 - 2016 academic year self-reported as having one or more disabilities. These disabilities included not only visible disabilities (e.g., physical disabilities, orthopedic or mobility impairments), sensory disabilities (e.g., blindness or visual impairments, deafness and hearing impairments) but also invisible disabilities (e.g., mental, emotional, or psychiatric conditions). Many students with these diagnoses receive accommodations for physical and digital learning needs through university access and accommodation centers.

Regardless of course formats, digital accessibility becomes more critical in higher education courses because of the required use of digital tools, open educational resources, and online learning materials (Keane et al, 2023; Kennedy et al., 2008). Students in higher education use technology to access and navigate course materials (e.g., learning management systems (LMS, EdPuzzle, Teams), participate (e.g., Zoom, Teams), collaborate (e.g., video conference, cloud space, shared drives), conduct field-sp - cific training (e.g., specialized softwar and hardware), and demonstrate learning (e.g., publishing, word processing, assessments). Although past research indicates all students have a learning period with digitial navigation of course materials (Li et al., 2015; Margaryan et al., 2011), additional barriers may exist for students with disabilities.

Past studies show students with disabilities face an inaccessibility in digital spaces because instructors are ill-equipped to plan for and assess (Kent, 2015; Patel et al, 2020). Additionally, instructional designers and digital tool creators also lack training on accessibility (Kearney-Volpe et al., 2019). These barriers are just some of the reasons that teacher candidates with disabilities do not complete programs at the same rate as their non-disabled peers (Cassidy & Draves, 2017). Even within special education, teacher educators often lack the knowledge and skills for designing for accessibility (Bong & Chen, 2021). This complex issue of inaccessibility illustrates inherent ableism, or explicit/implicit denial of services to disabled people, which negatively affects teacher candidates (Dolmage, 2017; Powell, 2012).

High-leverage practices (HLPs) in special education provide a list of effective practices to guide special education teacher candidates to use effective strategies in their classroom. HLP #19 highlights using assistive technologies and instructional technologies in promoting student engagements (McLeskey et al., 2017). Teacher competency in many forms of accessible technology is critical because pre- and in-service teachers are expected to implement inclusive practices in their classrooms (e.g., making accessible materials to students with disabilities, enhancing independent living) and increases inclusivity (Council for Exceptional Children [CEC], n.d., a). Special education teacher educators (i.e., faculty) serve as role models for teacher candidates to create accessible digital spaces and use accessible digital tools to provide opportunities for teacher candidates to exercise those same skills (CEC, n.d., b). In other words, teacher educators need to prepare teacher candidates to be fluent in implementing an evaluating accessible technology. To do so, teacher educators must be equipped with up-to-date knowledge of course material accessibilities (Fichten et al., 2009). In addition, they need to ensure that course planning and implementation are based on multiple aspects, such as individual student needs and contextual factors (Shaheen, 2022). However, most research on digital accessibility has been focused on K-12 teachers' roles for improving accessibility for students with disabilities with less attention being paid to another important player in making this possible; teacher educators (Rock et al., 2016). Furthermore, few practical guidelines are available for teacher educators to improve the accessibility of instructional materials. The goal of this article is to reduce the knowledge gap by sharing guidelines for teacher educators to use in enhancing digital accessibility through the Universal Design for Learning (UDL) framework.

Applying Digital Accessibility through UDL Framework

Universal Design for Learning is a learning design framework that intends to improve accessibility for all students by identifying potential barriers inter-

TABLE 1: Applying Universal Design for Learning to Digital Accessibility

	Universal Design for Learning (CAST, n.d.)	**Digital Accessibility through UDL lens**
Multiple Means of Representation	Offer ways of customizing the display of information Offer alternatives for auditory information Offer alternatives for visual information	Transform non-readable PDF files to readable. Add alternative text for images. Format documents for accessibility. Make video learning materials accessible.
Multiple Means of Engagement	Optimize individual choice and autonomy Optimize relevance, value, and authenticity Minimize threats and distractions	Provide flexible teaching environments that students can exercise their executive functions (EFs). Activate student background knowledge about how to use digital tools before class starts. Provide explicit directions for class activities, including group works.
Multiple Means of Action and Expression	Vary the methods for response and navigation Optimize access to tools and assistive technologies (ATs)	Provide options of product formats, considering digital accessibility. Provide students support in developing products.

rupting student access to learning and improving access by using multiple means of representation (i.e. presenting content different ways), engagement (i.e. increasing interaction with content), and action and expression (i.e. providing varied ways to demonstrate learning) (CAST, 2018; Rose & Meyer, 2002; Terrazas-Arellanes, 2018). The Individuals with Disabilities Education Act (2004) includes UDL with expectations that special educators create accessible learning environments and materials for students with disabilities. As authors, we have chosen to use UDL as a framework for inclusiveity because UDL has been used to help educators identify potential barriers to mitigate the demands and to better meet the needs of diverse learners in the classroom (e.g., Thomas et al., 2015). Because its key message is to decreases barriers and increases access, integrating digital accessibility from a UDL lens to digital learning environments, materials, and activities in coursework is appropriate to guarantee students' accessibility (Powell, 2012).

In addition, the development of UDL-infused digital accessibility guidelines for teacher educators is timely because teacher educators are the ones who model how to implement digital accessibility for everyone's success. The synthesis of UDL and digital accessibility supports 21st century learning in the classroom and makes our classrooms more inclusive, accessible, and equitable. Table 1 shows how key access aspects of UDL could be applied to digital accessibility with brief tips on what teacher educators can do to increase accessibility. This section explores each principle of UDL through the application of a vignette with specific examples demo - strating the identification of potentia barriers and improving accessibility.

Guideline 1: Consider Multiple Means of Representation

During the summer, Cindy was able to attend a digital accessibility professional development (PD) from her university's summer institute, and she remembers from the PD how important digital accessibility is for everyone's success in learning. However, she has not had a chance to apply the skills yet. Cindy is not sure where to start to ensure that her course materials, assignments, and activities are digitally accessible and will meet the needs of all her students including Hanna and James. She also thought about other students who might not disclose their difficulties or have other needs in accessing classes. Cindy questioned if she could use UDL to incorporate accessible digital materials and activities. She reviewed her university's digital accessibility resources on their website, but couldn't find guidelines or a checklist to help her apply how to incorporate digital accessibility tools. Cindy met with her university's digital accessibility specialist to receive additional support on how to create accessible documents and how to structure course materials for all students to engage with the content effectively. During the meeting, the specialist went over potential barriers her students might face while using her current course materials and how to improve course materials for accessibility.

Cindy has taught her current assessment course multiple times. Although she has continuously updated the course materials, she has used the same reading materials, including specific book chapters, for several years, because they are seminal pieces in the field. She plans

to use them again this semester; however, the PDF files are low resolution because she photocopied the book chapters multiple times over several years. She knows that James requires readings that are digitally accessible so that his screen reader can read the text for him. However, she doubts that those book chapters would be accessible. Cindy also uses PPT slides for the majority of her class presentations with many images because she intends to provide content in multiple ways as a part of UDL; however, Cidny relaizes using those images without planning for visual access creates a barrier for James She feels she needs an additional action to improve accessibility.

As Cindy thought about the additional materials she uses in her class, she realizes that some of the videos she has used in the past do not have closed captions available. She knows that Hanna requires closed captions for all video and audio content but is unsure of what she needs to do to update the videos she uses to include closed captions. She also wants to make sure she can provide closed captions during her presentations and lectures but is not sure what she needs to do to set that up. Additionally, she recognized that some of her videos rely on the visuals to show students how to do certain tasks. For example, in creating a video to teach students how to use Excel to graph data, Cindy's directions in the videos included things such as "Watch how I set up the data in Excel. Please make sure you use similar procedures for when you put your data in Excel." These types of directions in the video, will make it a challenge for James to understand how to engage in the task in the same way as his peers.

Representing information in multiple ways (i.e., how information is presented, pedagogical approaches, and materials) increases the pathways in which the brain connects and retains information (Hinton, 2007). However, as brain research shows that multiple means increase learning, multiple ways to represent materials increases the likelihood of inaccessibility. We recommend teacher educators to (a) identify potential barriers and (b) improve access accordingly.

FIGURE 1: Screenshot of Accessibility Audit

Identify Potential Barriers in Representing Information

Every student perceives and processes information differently; in other words, using only one format in providing course information could be a potential barrier. For example, texts and lectures with complex language demands contain inherent barriers for deaf/hard of hearing learners, multilingual learners, and learners with langauge disabilities. Teacher educators commonly use visual realm (e.g., graphic organizers, tables, pictures) to deliver content in multiple ways; however, these common strategies without adequate descriptors are infrequently accessible or adapted for learners with visual impairments. Those students using screen reader AT have difficult accessing the information listed on the table or image because of its formatting issues. To identify those barriers, teacher educators could complete accessibility audits or use accessibility check features in software programs.

Complete Accessibility Audits. An accessibility audit is a thorough, professional evaluation of the degree to which a website meets the needs of all users regardless of disability status. The existing accessibility audit complies with the ADA requirements through the Web Accessibility Initiative Guideline (WCAG) technical standards. Accessibility audits examine web pages, media, and content based on the WCAG standards. Audits identify the potential accessibility barriers on course websites and online materials, which can help instructors know where to start to improve digital accessibility before a barrier is created, while also providing evidence of an instructor's attempts to improve course design. Teacher educators can use accessibility audits in reviewing course LMS or open access materials. The accessibility audit tools available online show inaccessible features of the online web pages and how to improve accessability (see Figure 1 for an example). World Wide Web Consortium (W3C), an international consortium developing web protocols and guidelines more accessible, lists existing accessibility evaluation tools and guidelines on

how to select the tools.

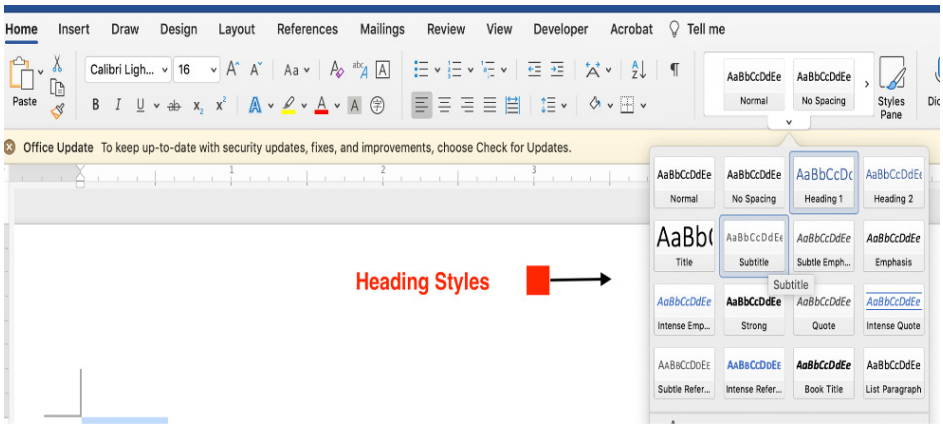
Use the Accessibility Check Features in Software Program. Use the built-in accessibility features of software programs to evaluate the potential barriers to the learning materials they are using. For example, Microsoft products include general accessibility checkers, as do Adobe, Google, and Apple. These general accessibility checkers ensure most users will have access to materials. Instructors who find accessibilit "violations" can use promts to change instructional design or seek supports to modify design. By meeting the basic accessibility checks, instructors establish a norm of UDL which benefits user who have access needs, as well as those who benefit biproximity of the inheren organziation of accessible design.

Improve Access for Representing Information

After identifying potential barriers in presenting the course materials through accessibility audits or software built-in accessibility check features, instructors need to resolve barriers to digital accessibility in course materials. Remember, from a UDL standpoint, accessible documents are not only beneficial for thos that are using AT, but for everyone using accessing digital platforms. By increasing the accessibility of the document, navigation, searches, and other interactions with documents become more efficient

Transform Non-readable PDF files to Readable. There are many reasons why course materials are not accessible. Like Cindy, teacher educators frequently use seminal pieces published long ago. Those reading materials are often scanned as an image, not in a text format, and then documents cannot be read by AT devices or screen readers. In other words, this would not allow some students to access the content. The firs step to resolve this issue is to make PDF files readable by using Optical Character Recognition (OCR). Teacher educators may consider using the auto tag function to tag headings for navigation, also.

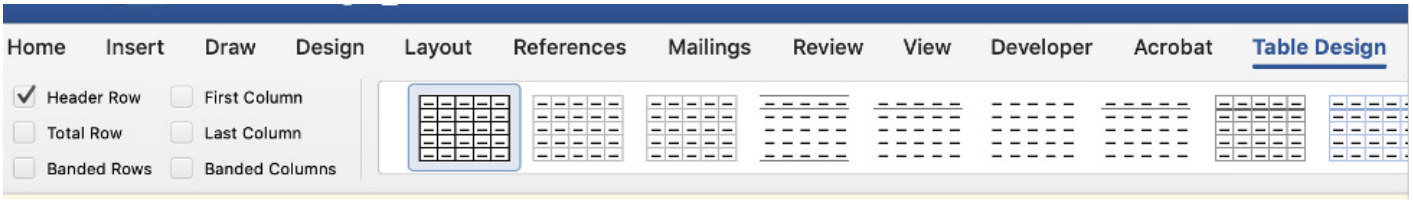
FIGURE 2: Selecting Heading Styles in Word



Create Accessible Visual Print Images. W3C provides guidelines on color contrast and Alt text to create accessible visual images. Visual information should also be accessed for color contrast. Alt text provides descriptions of images so that students who use AT devices, like screen readers, may access audio or visual descriptions of the visual. While automatically generated descriptions exist, teacher educators must ensure accuracy. Specificall , alt text should provide cognitive connections to the content for learning, as well as adjustments based on the purpose of the visual (e.g., to provide content, decorative). For example, Cindy's PPT includes a decorative image of a question mark on a slide asking students if they have any questions. This visual can be marked as decorative for the alt text because it does not provide any additional meaning for a learner who will use a screen reader to access the PPT slides. However, on another slide, Cindy provides an image of three types of distributions, including a normal bell curve and both a positively and negatively skewed bell curve to highlight the differences in data distributions depending on the data students are collecting. For this slide, Cindy needs to include specific alt text to explain wha the image shows to provide contextual meaning of the image. For example, she may include the following as an alt text: "Three bell curves representing different distributions: a) A negatively skewed distribution with a longer tail on the left, b) A normal distribution with a symmetrical shape, and c) A positively skewed distribution with a longer tail on the right." This alt text allows James and other students who may use screen readers to have the same access to the image content on the page in a concise manner.

Format Documents for Accessibility. To improve access, course instructors must consider using heading styles rather than adjusting font format solely. Headings (see Figure 2) are intended to organize the information, assist learners to navigate the document easily, and decrease cognitive load of students. These heading styles structure documents by making headings stand out from the body text. To format documents with headings in Word, teacher educators need to select the text and the heading style from the Style Box located on the Home tab in the ribbon (see Figure 2). Even if the document is converted into PDF, the heading styles will be retained. Likewise, embedded hyperlinks can help users navigate to referenced materials within a document and can

FIGURE 3: Formatting Table Properties



also be used to engage learners with further resources (such as this document provides).

In the same way, building accessible tables establishes the reading order and purpose of visually organized information. Figure 3 illustrates the design of tables using the MS Word built-in features. These styles may not adhere to the formatting of your professional writing norms (e.g., APA, Chicago, MLA).

In formatting tables, there are several considerations that course instructors need to keep in mind. First, the table formatting is enabled only when the table is added in text format. If the table is added to the document as an image (e.g., screenshot), teacher educators need to add the Alt text. Second, simple table structure is more accessible. If the table has any merged cells, it is hard for learners to navigate the information.

Make Video Learning Materials Accessible. Quality of captioning and video descriptions affect video accessibility. Captioning (closed) provides access to auditory information to deaf and hard of hearing users, deaf-blind users, multilingual users, and users accessing video without sound and have specific needs Open captions (captions printed on the video-- like on TikTok, instead of in the 'background interface') may not be accessible to deaf-blind users. Described and captioned media provides a full description on captioning, description, and subtitling videos for best access. Teacher educators must not assume that videos created by independent creators (e.g., Youtubers, influencers, other faculty) ar accessible, even when settings indicate that the accessibility features are present. When creating and incorporating closed captions to course materials, teacher eudcators must consider following four requirments of the quality captioning rules created by Federal Communications Commission. Specially, teacher educators ensure if captions are accurate, appear at the same time as the corresponding spoken words, cover the whole program, and does not cover up any important information on the screen.

For learners with visual impairments, it is important that the videos provide a clear description of what is happening in the video. If videos rely only on the visuals to portray information to students, then students who are listening to the video without being able to access the visual components will not be able to access the content in the same ways as their peers. In instructional videos, reference onscreen visuals descriptively, rather than generally (i.e., "You can see this on the screen"). WAGC provides guidelines on increasing accessibility for visual information without creating separate files for modification

Once Cindy identified various book chapters and articles that may not be accessible, she was able to work with the disability center to follow the steps to ensure that any PDF documents she was using were updated to OCR versions to allow for screen readers to read the documents. Additionally, she was able to check the accessibility in her PPT slides and update any images with text that explicitly described the image to make it accessible. Cindy now adds in descriptive alt text for all images in new PPT slides she creates to ensure that her PPT slides are accessible to all of her students now and in the future.

In preparing for course materials, including PPTs and online worksheets, she made sure she used correct headings and table properties and PDF tags in logical order for PDF files. Wherever she plans to use open access materials as class activities, she ensured they are accessible before sharing them with students. Unfortunately, when she realized one of her class activity sheets from an open access learning module was not accessible to some students, Cindy made additional documents so that all students could still access the information. At the same time, Cindy reviewed her existing videos and updated videos with closed captioning and explicit directions as necessary.

Cindy also worked with the disability center to learn how to add closed captioning to learning materials she planned to use in her class. The disability center was able to assist her with creating closed captioning to the videos that she was using. While working with the center, Cindy added auto-generated closed captioning in YouTube to ensure her videos had correct closed captions. Additionally, Cindy set up her PPT presentations to automatically include subtitles and closed captioning whenever she starts to present. To ensure that her video contents were clear to all learners, Cindy recreated videos that relied on the visual component to add in a clear description of what she was doing when providing directions to the class rather than telling them to watch what she was doing.

Guideline 2. Consider Multiple Means of Engagement

Cindy worked hard to adjust her plans to best support her students and meet their accommodation needs. However, even with her best-laid plans, she still observed some barriers that interrupted her students from engaging in class in the way she planned. For example, Cindy presented directions for group activities orally, and Hanna mentioned that she sometimes had a hard time following what to do for group activities because she often got lost. Cindy also noticed that other students would often ask questions for clarification on the group activities Cindy realized that she had to make some changes in order for her students to engage fully in her class.

Another barrier that Cindy noted was when she shared links with the class, she often included the link as-is with text that was difficult for a screen reader t capture in a meaningful way because the screen reader read the entire web address aloud. She also realized that the hyperlinks included in her slides and materials were not always easily accessible because they were not clearly labeled as hyperlinks. Sometimes she linked pictures in her slideshows, but it was not clear the picture was a hyperlink so students could not find the link easil .

Identify Potential Barriers in Engagement

Diverse level of executive functioning (EF) could be barriers to student engagement in learning. In particular, EF plays critical roles in many areas of student learning processes, including working memory and short- and long-term attention (Cartwright, 2012; Diamond, 2013; Flores et al., 2014). Given that EF and cognitive load closely interplay, it is not surprising that students with weak EF might not effectively engage in learning (Kennedy & Romig, 2021; Sweller, 2020). Processing new information and managing tasks could be overwhelming because they happen to overuse their working memory and attention to new information.

Indeed, students must have the shared background knowledge to process new information and maintain attention to engage in the course activities. In other words, unfamiliar content knowledge could be a barrier for students in the classroom to engage in class discussions and activities (Diamond, 2013; Sweller, 2020). When especially students do not know how to use digital tools, students cannot participate in course activites as expected. Furthermore, the issues combined with digital representation could distract or threaten student engagement. For example, some students might need help accessing collaboration platforms during activities because they cannot fin the links. Therefore, course instructors must consider how to address both those potential barriers and potential representation barriers.

Improve Access for Engagement

UDL highlights the diverse learners' affective aspects (e.g., motivation to learn, engagement) to improve student learning (CAST, n.d.). To provide engagement opportunities for students, Zhang and colleagues (2022) indicate the need for a comprehensive approach to improving individualized learning with technology for all learners, including student attributes (e.g., interest, motivation, self-regulation) and instructional practices (e.g., facilitating goal setting). Improving engaging opportunities aids learners in exchanging information with others. Based on the potential barriers listed above, teacher educators must consider planning courses for enhancing student engagement in different ways.

Activate Student Background Knowledge on Digital Tools before Class. Teacher educators need to check accessibility statements (e.g., Flipgrid, Padlet, EdPuzzle) in advance and provide the related information and activities for students to enhance their background knowledge of how to use the digital tools. Providing explicit directions of how to use the digital tools could minimize accessibility issues. Low-stake assessments (i.e., checklists, Likert scales, engagement activities) surveying ability to use the digital tools before the class not only identify barriers created by different background experiences but also have students prepare by improving student background knowledge on the tool used. Furthermore, giving students the opportunities to practice how to use digital tools to retrieve the required course materials and provide feedback to the instructor also reduces stress for all.

Provide Flexible Support in Digital Learning. Teacher educators need to consider providing digital tools that use and develop EF skills. For example, a weekly checklist on the course website helps students monitor their progress and exercise self-regulation. Graphic organizers used in class enhance organization skills, working memory, cognitive flexibilit , and planning.

Provide Explicit Directions for In-class Activities. Providing clear guidelines on in-class activities enhances student engagement. The directions include which materials to explore, what to do, and how to do it. Directions need to be given in multiple formats (e.g., verbal, written, images) so that all students can access the directions without confusion. Furthermore, documents for in-class activities need to state clear learning goals, directions for student activities, materials needed, and where and when they need to submit the work. For group work, more specific directions on collaboratio expectations would help students to understand how they should work together during group activities and assignments. Redundancy and scaffolded supports do not weaken the content or expectations, but provides tools to reduce anxiety, improve organization, and models expecta-

tions for the future classroom teacher.

Cindy realized that an easy fix for Hanna included providing written instructions and a checklist to the class for group activities, which she provided online to be accessed by everyone and a screen-reader could be used for James as well. While this helped Hanna and James participate more fully, Cindy noted that it was beneficial for all her students as they did not need to clarify directions and were able to spend more time working and talking with their groups.

Cindy also updated the full web address links and changed them to embedded links with a title to describe the link instead of the web addresss (e.g., changing the web address https://www.google.com/slides/about/ to a link such as Link: Google Slides. This made it easier for her students to find links they needed to access and allowed for screen readers to easily read the content of the link rather than the entire web address.

Guideline 3. Consider Multiple Means of Action and Expression

One of the major assignments in Cindy's assessment class includes having the students write up portions of an Individualized Education Program (IEP), and she traditionally had students use the template provided from her state's board of education website. However, after sharing the template with the class, James mentioned that the template was not accessible with his screen reader as the embedded tables could not be read in a logical order. Furthermore, Cindy observed that James' group members entered his response to the template for him because the IEP form was not formatted in a way that allowed James to use his AT device to enter his responses.

Cindy also has her students write individual reflections about different topics throughout her class. She has noticed that some students are able to express their thoughts well in class but sometimes do not provide in-depth written responses to the reflection questions. This made her wonder if there are other ways to help students reflect on the class topics through more accessible means to produce higher quality responses.

Identify Potential Barriers in Action and Expression

There are different reasons why students feel challenged in expressing what they know. CAST (n.d.) indicates that obstacles to student action and expression could vary depending on students' diverse needs (e.g., EF, physical and emotional status). Diverse needs of students could be challenging in a digital setting. In particular, response formats could be barriers for some students. For example, James in the scenario above might not be able to demonstrate his knowledge and skills because formatting the document was not accessible for the AT device he uses to enter information. Additonally, given that the teacher candidates' demographics haves become more diverse, teacher educators must adapt to meet learning and access needs. Specifically for special education teache preparation, to diversify the profession to include professionals with lived experiences, the field of special education mus include and support teacher candidates with disabilities (Strimel, 2022). Teacher educators must consider multiple ways for students to demonstrate their understanding of the content presented in their classes.

Improve Access for Action and Expression

Allowing for multiple means of action and expression gives learners opportunities to show their understanding and reduces barriers (e.g., anxiety). These methods help students to focus attention and retrieve/recall information (deWinstanley & Mjork, 2002). To address the potential barriers, course instructors must consider various ways to enhance student action and expression.

Provide Options of Product Formats, Considering Digital Accessibility. UDL highlights providing multiple means of products for students to show what they know. When combined with digital tools, it is critical to review the accessibility of the learning materials teacher candidates are working on. If the assignment is to complete IEP forms, which is an essential practice for special education teacher candidates, it is necessary for teacher educators to fin a way to make it accessible. For example, Cindy's priorities must be checking table properties to make the IEP form accessible. At the same time, Cindy must check if students' AT devices are compatible with the digital documents they are working on. If the class has group projects, it is essential for course instructors to provide documents in a variety of formats for the projects that will meet all students' needs. For example, teacher candidates need to be familiar with the traditional IEP forms, but they also need to be given an accessible format that anyone can access to express their knowledge. This indicates that it is even more important to audit the accessibility of the materials addressed in guideline one of this article.

Provide Support to Students in Completing Products. EF plays a role in completing tasks and achieving learning goals since it covers inhibitory control, working memory, cognitive flexibilit , attention, self-regulation, metacognition, organization, and planning (e.g., Cartwright, 2012; Diamond, 2013; Flores et al., 2014). When EF is weak, students might not priotize, plan, and compelte the given work. Therefore, teacher educators must pay careful attention in monitoring their progress and provide support for students to exercise EF accordingly. For example, in interpreting data, some students might have challenges about what and how to do the task, although general directions were given. Providing prompts for analyzing and

TABLE 2: Checklist for Improving Digital Accessibility before and during Class

REPRESENTATION

While preparing for course materials, did you:

- ☐ complete accessibility checks with software program (e.g., Microsoft Word, PDF)?
- ☐ adjust materials based on feedback from accessibility check?

If your document is a PDF file, did you:

- ☐ use OCR to make the PDF document readable?
- ☐ adjust PDF tags in logical order to be read by screen readers?

If your document is a word file, did you:

- ☐ use heading styles when creating headings?
- ☐ change abbreviated words to full words? For example, write Monday instead of Mon.
- ☐ use embedded links instead of writing out links in-text (e.g., Journal of Special Education Preparation instead of https://open-journals.bsu.edu/JOSEP)?

If you are working on tables or images, did you:

- ☐ build accessible tables?
- ☐ format tables in text rather than adding it as an image (e.g., screenshot) to the document?
- ☐ create descriptive alt text to images?

If you are using audio and video learning materials, did you:

- ☐ check the accuracy of closed captions?
- ☐ turn on captions and subtitles in PowerPoint Slides during synchronous presentation?

ENGAGEMENT

For better student engagements, did you:

- ☐ check if your course materials have any digital accessibility representation issues listed above?
- ☐ provide students background information on digital tools (e.g., accessibility statements) that will be used in the class in advance before coming to class?
- ☐ provide students opportunities to assess their knowledge skills on the digital tools by using low-stake assessments (e.g., checklist, Likert scales, engagement activities)?
- ☐ provide flexible support in digital learning (e.g., weekly checklist, graphic organizers)?
- ☐ provide explicit directions or modeling for class activities, including group works?

ACTION AND EXPRESSION

To help students express what they know, did you:

- ☐ check if digital documents are formatted in the right way that students using AT devices enter their responses?
- ☐ provide various formats of response in completing tasks (e.g., traditional and accessible IEP Forms)?
- ☐ provide explicit prompts in managing and completing tasks?
- ☐ include those prompts in the rubric, checklist, or timeline?

interpreting data supports (e.g., self-monitoring assignment checklists) students in managing information. Embedding those prompts in a rubric and timeline helps them enhance their capacity to monitor their progress.

To ensure that James and future students who might need an accessible IEP template, Cindy worked with the disability center to create an IEP Word document to allow for screen readers to read the template in a logical order. This version of the document took some work to create, but it allowed James to complete the assignment, and Cindy has offered to share the template with other professors in her department who may also have students needing an accessible version of this form.

In response to student difficulties in interpreting the assessment data, Cindy added several prompts for any student to use in completing the data interpretation. When thinking about some students struggling with written reflections, Cindy decided to give students other options to do their reflections. She still gave students the option of writing their responses, but also told students they could do an audio or video reflection or could create an infographic or drawing to reflect on the various topics discussed in class. In addition, she added prompts to the rubic. After providing these additional options, she noticed that while many students still chose to write their responses, others thrived with having new creative options that allowed them to reflect more deeply and thoughtfully.

CONCLUDING RECOMMENDATIONS

This article suggests multiple avenues of action for teacher educators to enhance digital accessibility through the lens of UDL. In doing this, we highlighted potential barriers to improve accessibility through vignettes (see Guidelines 1, 2, and 3 above), focusing on two students with sensory disabilities. However, all students in the classroom can benefi from these actions. For example, closed captions can provide additional context for understanding meaning with videos or lectures regardless of if learners have hearing impairments. Using alt text with images can enhance learners understanding of images they are seeing even if learners do not have visual impairments. As student needs are becoming more diverse in the classroom, teacher educators struggle with where to start to improve digital accessibility in their courses. Below, we created a checklist (Table 2) to assist teacher educators as they work to improve their practice of incorporating digitally accessibile supports to ALL learners.

Requiring Teacher Candidates to Use and Create Digitally Accessible Materials

Digital accessibility is critical for teacher candidates' success and future K-12 student outcomes. Teacher candidates must be knowledgeable and fluen in establishing inclusive classrooms, including utilizing accessible digital tools to meet the needs of their future K-12 students. To respond to the needs, teacher educators must provide teacher candidates opportunities to practice using and creating digitally accessible materials and assignments as a routine part of the teaching process, not an extra component. Therefore, teacher educators need to develop and update guidelines for improving digital accessibility in the classroom to ensure teacher candidates' learning needs are met and to model how to incorporate digitally accessible content in their future classrooms. Potential activities or assignments that teacher educators can embed in the teacher education program include having teacher candidates make accessible documents or use the accessibility check feature before submitting assignments. These activities can assess teacher candidates' competency in digital accessibility and their awareness of this topic. Furthermore, practicing digital accessibility as a part of course requirements can help teacher candidates have a better sense of how to apply these skills in their future classrooms.

Providing Support for Teacher Educators

Likewise, special education teacher educators are tasked with modeling digital accessibility in their teacher preparation courses. Furthermore, teacher educators are responsible for providing accessible tutorials across the courses. However, unclear support on the accessibility of materials, supports for increasing accessibility, and evaluating accessibility adds to the complexity of inaccessibility barriers (Linder et al 2015). Unfortunately, depending on the institutions' compacity, faculty support in this area may vary. To keep up with the changes in technology and laws, teacher educators need support and access to learning opportunities through PD and various resources and services related to digital accessibility. Furthermore, teacher educators and university access and accommodation centers must closely collaborate to meet the needs of those who need disability-specifi accommodations beyond digital accessibility. CEC subdivisions, including Innovations in Special Education Technology (ISET) and Teacher Education Division (TED), as leaders in the field of specia education, must continue to provide resources and guidelines to teacher educators in enhancing digital accessibility for equity and inclusion (e.g., Kaczorowski et al., 2022).

Continue to Work to Improve Digital Accessibility

Digital accessibility needs continuous efforts because students and context-related factors vary every semester (Shaneen, 2022). For a constant step in

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enhancing digital accessibility, teacher educators could consider adopting the UDL plus one approach, consisting of (a) identifying barriers to learning, (b) targeting one barrier to address, (c) setting a goal for one element in their course for the targeted barrier, and (d) implementing and evaluating one instructional change (Tobin & Behling, 2018). Such a continuous cycle of selecting one specific barrier woul make a big difference in the class and setting goals and plans to reduce barriers in learning (Flanagan et al., 2022). By implementing these cycles, courses evolve to be even more accessible across learners.

When the semester was over, Cindy was excited to realize her materials did not take a great deal of additional time to make them digitally accessible. By incorporating multiple means of representation, engagement, and action and expression in the planning phase of her instruction, she can better meet all of her student's needs without stigmatizing individual students. Cindy spent some time reflecting on her course and thinking about all she learned to increase the digital accessibility in her class. While she learned so much from her students and felt good about the changes she made, she also knows that she needs to continue to learn more about how to make all of her classes accessible to meet the needs of all of her students. She also realized that she can use her class to model and teach the importance of digitally accessible materials and content so that teacher candidates are prepared to meet student needs. Cindy also plans to attend some additional PD focused on digital accessibility and start collaborating with her colleagues to generate new ideas and ensure that this is an area of focus as they prepare teacher candidates in special education.

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Community of Inquiry: Designing Quality Online Instruction for Special Educator Preparation

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ABSTRACT

Online education programs are on the rise and institutions of higher learning are utilizing Learning Management Systems (LMS) to facilitate online learning. The Community of Inquiry (CoI; Garrison et al., 1999) framework identifies three categories of cognitive presence, social presence, and teaching presence to guide the development of online instruction and has been adopted by numerous institutions of higher learning. This article identifies instructional strategies conducive to the design of online presence using the CoI framework to ensure quality learning experiences in online special educator preparation programs. We address some of the features of LMS system tools present in Canvas that are utilized by instructors when designing and implementing online instruction to include: communications, modules and assignments, collaboration, and grading.

KEYWORDS

Canvas, community of inquiry (CoI), learning management system (LMS), online learning, special educator preparation

Dr. Smith teaches special education courses for online graduate students at a university in a small town in the Midwest. Most of the students in her courses work as teachers and do not come to campus. Last semester, Dr. Smith had a few students struggling to catch up on course assignments. She believes the lack of synchronous interactions in online courses potentially caused the challenges. In the course evaluation reports of the previous semester, students expressed a disconnection with the instructor and peers, along with feelings of anxiety from not knowing what exactly has to be done in courses. Dr. Smith begins investigating what framework can be utilized in her course design to serve the online students better and found the 'Community of Inquiry' framework that has been well established for decades. Now, she reviews some of the literature that discussed practical examples and decides to incorporate some practices into her own online courses. Her university uses the learning management system (LMS) Canvas, therefore, Dr. Smith outlines strategies that can be implemented in Canvas considering the framework.

Educator preparation programs have increasingly grown in online presence. In 2013, The American Association of Colleges for Teacher Education (AACTE) reported online educator preparation programs were offered by up to 75% of universities. Online learning has escalated in popularity due to its flexibility an customizability to meet the learning needs of students (Allen & Seamen, 2016; Cui, 2013; Richardson et al., 2017), by eliminating geographical barriers to accessing instruction for many students wishing to pursue degrees in special education. Learning Management Systems (LMS) are utilized by higher education institutions to facilitate online learning experiences. A broad array of LMS is available in higher education to select from (e.g., Moodle, Google Classroom, D2L Brightspace, Schoology, Blackboard Learn, Canvas, Sakai), and multiple factors need to be considered in selecting an LMS depending on the learning objectives and goals in providing the instruction. Canvas has become a prevalent part of the LMS market, and has been adopted by school districts, colleges, and universities throughout the United States. In school districts, the adoption of Canvas is widespread. For example, Vermont

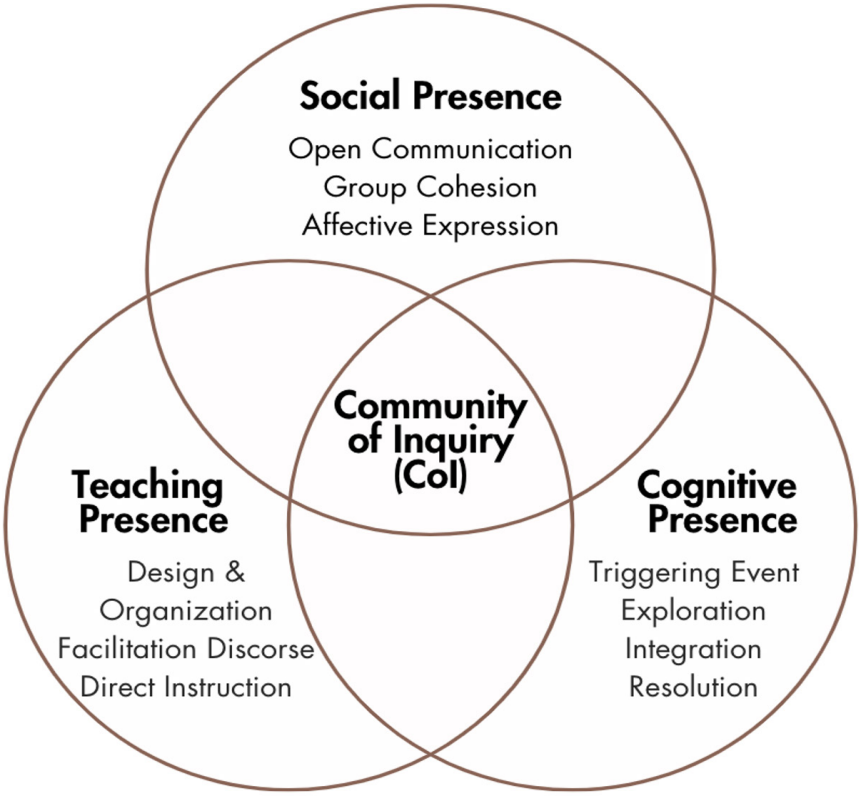
and Virginia have incorporated the use of Canvas within their statewide virtual school programs, and there are more than 1.5 million students using Canvas in Texas (PRNewswire, 2020). Universities have followed suit in adopting Canvas to include Stanford, Florida State University, Cornell University, Mississippi State University, and many others (Etherington, 2018). Factors that have led to the widespread adoption of Canvas in schools as an LMS include its functionality in facilitating online collaboration and communication (Etherington, 2018).

Online educator preparation, no doubt, extends beyond geographical boundaries and impacts the type of instruction pre-service and in-service special educators receive at both the undergraduate and graduate level. Due to the widespread adoption of Canvas as the LMS utilized by online special education programs at colleges and universities nationwide, we address some of the features of LMS system tools present in Canvas and utilized by instructors when designing and implementing online instruction to include communications, modules and assignments, collaboration, and grading. This is by no means exhaustive of the kinds of applications that can be utilized in Canvas to design instruction. Our main objective here is to provide online special educator preparation programs and instructors with a variety of tools that are available in Canvas to support implementing the Community of Inquiry (CoI) framework. In this article, we introduce various ways to adopt the ideas from the CoI framework using real-world examples.

Community of Inquiry Framework

Quality instruction for special educators can ensure preparedness in teaching as well as increase rates of retention (Boe, 2014). Anderson and Garrison (1995) and Clark (1994) discussed the application of technology in designing instruction, and in particular, its role in quality online learning. Th CoI framework was developed by Garrison and his colleagues (1999) as a response towards identifying instructional key categories for facilitating positive online learning experiences and outcomes in higher education. The CoI framework follows a constructivist philosophy to online education (Rovai, 2003). Descriptors of constructivist learning environments have been posited by Lebow (1993) to include provision for the social aspects of learning, equipping students with opportunities to engage in the knowledge construction process with self-awareness and ownership, entertaining multiple points of view, developing alternative representations of content, and expereincing relevance and authenticity in instructional activities.

FIGURE 1: CoI categories and elements *(Garrison & Arbaugh, 2007)*



According to Garrison et al. (1999), quality online instruction entails educators establishing three categories of presence: (a) cognitive, (b) social, and (c) teaching. Categories of presence along with indicators that provide detailed descriptions of how to address each category have been outlined by Garrison and Arbaugh (2007, p. 159; see Figure 1). Categories of social presence include open communication, group cohesion, and affective expression, and aim to develop open dialog, which is facilitative of ongoing communication and the development of a community. Teaching presence encompasses ongoing instructional activity by the instructor in designing, organizing, and facilitating online instruction and consists of design and organization, facilitating discourse, and direct instruction. Cognitive presence indicators include active exploration or engagement of participants

through an ongoing reflective process i the construction of meaning. Cognitive presence can be incorporated within the design of content and learning activities by ensuring students are given the opportunity to engage in reflective thought The elements of the three CoI categories can overlap each other and must be considered holistically when designing online courses.

Adopting the CoI framework

LMS can be utilized by instructors to secure students' access to information and interact with their instructor, peers, and content through the facilitation of the development of cognitive engagement presence, social presence, and teaching presence outlined in the CoI framework. The CoI categories and indicators can be implemented with various functionalities into the current LMS (e.g., Canvas, Blackboard) provided, such as in group discussion boards, learning modules, quizzes, videos, or blogs. Collaboration and engagement play important roles in organizing ideas and creating new sets of knowledge from dynamic learning activities (Dede, 1990; Rovai, 2003).

Key features of LMS include enabling instructors to provide students with announcements, post instructors' conference hours, and actively engage in communicating with students (Bradley, 2021). In addition, instructors can use LMS features to post course content and provide structure to outline course material in modules and assignment tools. Instructors can utilize discussions as a tool to encourage the active engagement (e.g., sharing and structuring experiences and knowledge) of students within an LMS. In addition to providing students with the ability to connect with their peers in discussions and through collaborative assignments (e.g., developing a group presentation), LMS also have a grading tool by which instructors can post student grades and provide ongoing feedback.

COMMUNICATIONS

Communication tools in Canvas are essential to implementing the CoI framework and supporting social and teaching presence. There are various ways to digitally communicate with students in an online course, to facilitate teaching presence, such as email conversation and conference meeting software (e.g., Zoom, Microsoft Teams). Communication tools available in Canvas have been identified here to include Conversations Chat, Conferences, Announcements, and Discussions. Online students can easily feel disconnected and lose track of course progress due to a lack of real-time contact with instructors and peers (Rush, 2015). Teaching presence is essential to students feeling supported in an online course. In a study carried out by Watson et al. (2017) to assess graduate students' recommendations for instructors in supporting their online learning, students cited instructors' responses to queries in a timely fashion as a major factor. Instructors should answer student emails in a timely fashion so as to facilitate student learning (Lowenthal & Parscal, 2008). Instructors can ensure students are feeling motivated and on-task in completing assignments by consistently maintaining open communication with their students (Johnson, 2014), thereby facilitating teaching and social presence in online courses. Special educators must be equipped with certain communication skills to manage various collaborative situations with different stakeholders. Facilitating the communication between instructors and students using various methods in online environments may positively impact students' future competency in collaboration when teaching.

Conversations, Chat, and Conferences

The Conversations tool allows instructors to compose and receive emails from students. Chat is also featured in Canvas and offers users the ability to engage in real-time communications. Any messages sent in chat, including chat history, are viewable to all students enrolled in the course and can be a valuable tool for instructors responding to course content questions, as all students can view responses. The Conferences tool enables instructors to hold synchronous online meetings with students using a conferencing software, BigBlueButton, that enables recordings of meetings to be stored for a period of two weeks.

Practical Applications for Instructors in Special Education

To create an engaging learning environment, special education instructors can start the course by sending a welcoming email in Conversations that is illustrative of personal attention and informs students about other communication options like Chat. Consistent encouragement messages can also be helpful to keep motivating students who may easily get anxious or overwhelmed with the information provided online. Instructors can offer flexible confe - ence options (e.g., open office hours) t provide additional support for successful course completion, using Conferences; reminding students to set up conference meetings is important when they need support, considering many students are working in the field and the graduat work simultaneously.

Announcements

Instructors can utilize the LMS tool of announcements to regularly provide students with relevant details on course structure and upcoming assignments and to actively communicate with students. By doing so, students are able to gain a sense of the instructor's presence in the course while also facilitating an overall sense of social presence for students.

Formatting options are available in rich text editor, which enables instructors to include video and imagery in their posts, as well as delay the posting of announcements, and enable students to respond in kind.

Instructors that regularly post announcements can facilitate student engagement and learning through ensuring that teaching presence is accounted for in an online course. Announcements can be posted on a weekly basis to provide students with relevant course updates on deadlines for assignments through text, audio, and video content and thereby decrease student anxiety about upcoming events in the course (Lowenthal & Parscal, 2008). Instructors can model the use of affective expression to include sharing personal stories and using emoticons to facilitate social presence. The use of affective expression can ensure students are able to experience a sense of group cohesion and belonging, thereby negating a sense of isolation in an online course (Lowenthal & Parscal, 2008).

Practical Applications for Instructors of Special Education

Regular and consistent posts by special education instructors can ensure that students feel a sense of connection with their instructors and can facilitate teacher-student communication. Special education instructors can incorporate audio and video into announcements in Canvas to create this social presence. Special education instructors can post announcements that reflect professio - al experiences from conferences they attend and can make use of emoticons, share personal stories, and communicate their reflections. For example posts can be developed to share relevant information and sources via announcements to include posting potential funding opportunities, research articles, news updates, and collaborative and professional growth opportunities to support students in their studies. Special educator instructors can facilitate the opportunity for social presence to be developed in the design of the course by enabling students to post replies or like replies to announcements to ensure a common understanding among students using Canvas (Canvas, n.d.). Students in special education programs can also be enabled to post content in announcements that can be shared with the whole class to encourage collaborative work, which is considered a critical skill for special educators who are required to work with various stakeholders (e.g., parents, general educators, administrators, related service providers) to support students with disabilities.

Discussion Tool

Collaborative activities should be developed to be equitable and consideration of cultural differences in communication should be rightly addressed to facilitate social presence (Rovai, 2007). Promoting diverse points of view and their application into course content facilitates student participation through cognitive engagement (Rovai, 2007). Divergent perspectives can be supported by ensuring students are entertaining multiple points of view in their responses to content in student discussions (Stephens & Roberts, 2017). Instructors should provide students with multiple means to interact and respond to one another by utilizing blogs, wikis, and online journals to develop their ideas and interact (CAST, 2018). Wikis and blogs can be valuable tools for instructors to utilize in providing multiple options for students to engage in discussions via technological applications. Ensuring content and references (including in-/ outside- course materials) are accessible enriches discussions and scaffolds the students' understanding, reflection, an consequent cognitive engagement in discussions.

Instructors can model the types of interactions that students are expected to engage in within the course (Dolan et al., 2017; Dunlap & Lowenthal, 2018), provide students with explicit instruction on how to interact with one another in discussions (Stewart, 2017), and set clear expectations and understanding on how to engage in group-work skills (Stephens & Roberts, 2017) which are active in engaging in online discussions. Providing students with ground rules to engage in discussions enables students to understand the expectations of the instructor in the course (Rovai, 2003). Instructors can also develop a participation rubric tool that prompts students to evaluate and respond to each other's discussion posts and can also pair students in discussions with similar interests. In addition, instructors can require students to respond to others' posts by assigning grades to course discussions as a source of motivation to increase student engagement and foster the development of an active learning community (Rovai, 2003, 2007).

Dialog present in discussions enables students to engage in the active construction of learning through writing and reflection on posted conten (MacKnight, 2000; Rovai, 2003). Instructors can actively encourage dialog among students as a facilitator and provide thoughtful insights in addition to reframing questions that may arise in an online discussion (Trammell & LaForge, 2017). Instructors can use online discussions to ensure clarification of concept but should refrain from being a dominant presence in online discussions so as not to dampen students' participation (Mazzolini & Maddison, 2007; Paloff & Pratt, 1999; Trammell & LaForge, 2017). Instructors can ensure effective online discussions are occurring in their courses by utilizing strong prompts to encourage student reflexivity (Rovai 2007). Moreover, instructors' replies to students' discussion posts should be promptly answered which may also ensure that conversations do not stall.

TABLE 1: Suggested Activities within Canvas and Across Categories of CoI Framework

Canvas Function	COI Categories			Suggested Activities
	S	T	C	
Communications	■			Send a welcome email to increase student engagement
	■			Provide various options to communicate (e.g., email, message, conference)
	■			Respond to emails and messages from students promptly
	■			Offer flexible conference options (e.g., open office hours) for extra support
Announcements	■	■		Utilize affective expression to personalize announcements
	■			Allow students to respond to announcements (i.e., text, audio, video)
		■		Post frequent announcements of course assignments and expectations to facilitate course structure and provide explicit explanations and directions
Discussion	■			Create learning profiles and discussion posts for student introductions
	■	■	■	Explicitly model appropriate discussion post interactions supportive of diverse perspectives, provide meaningful comments, and accessible content
	■	■		Use affective expression
	■		■	Encourage student reflections using multiple options/platforms for expression and accessibility
		■	■	Provide prompts for discussion posts, but discussions are led by students
		■		Be available to meet with students
Modules and Assignments			■	Provide scaffolding (e.g., prompts) for higher-order thinking
	■		■	Utilize various features to foster reflective analysis and self-exploration.
			■	Co-construct and design learning experiences to increase student engagement
Collaboration	■		■	Develop community structure, account for individual student interests, relevancy, and background in developing assigned groups
	■			Include a peer review process
	■		■	Provide explicit instruction and rubrics to students for collaborative project-based work, individual work, and evaluation by team members
	■	■		Ensure students can access a collaborative communication platform
		■	■	Provide immediate feedback and the opportunity to meet with the instructor
			■	Give students choice in developing projects aligned with learning objectives
			■	Incorporate student self-reflection, synthesis, creativity, and design
Grading	■			Provide timely grading and feedback to develop rapport with students and facilitate learning
			■	Provide students with rubrics to evaluate their work, peers, and themselves
			■	Encourage multiple points of view and active student reflection in grading/commenting on student work
			■	Scaffold support into the grading/commenting of student work
		■		Align coursework and assessments with learning goals
		■		Set clear instructions and expectations for assignment completion for students meeting learning goals in course
		■		Give consistent feedback; interact regularly with students via grading comments or email

Note. S = social presence; T = teaching presence, C = cognitive presence.

Practical Applications for Instructors in Special Education

Special education instructors can use discussion posts by prompting students to think about current trends and issues in special education in order to promote and encourage discussion and cognitive engagement in reflecting on content. To support meaning-making via discussion activities, special education instructors can spend some time reading the discussion posts carefully and connect the discussions into actionable and practical suggestions with constructive and timely feedback for students to reflec on. In an online special education course, instructors can provide students with the opportunity to lead in the discussion by designing and debating special education content and concepts (e.g., the role of technology in supporting inclusion; inclusion as a practice; instructional design; developing individualized education programs [IEP]) provided in the course, but instructors can also use group discussion and group brainstorming to support students' development of ideas as a mediator. Consistently providing special educators with the opportunity to engage in discussion with one another is essential to facilitating social and cognitive presence in an online course.

Dr. Smith considered ways to use the communication applications in Canvas to facilitate social presence and teaching presence in her course. She decides that she will develop weekly announcements to give an overview of content and assignment deadline information, provide students with individual conference meeting options, and use the discussion board to initiate student introductions. For her first post, Dr. Smith creates a welcoming announcement via a video and text. Dr. Smith introduces herself, relating her previous experiences as a special education teacher and provides some background information about her interests in teaching special education. She also turns on the Canvas functionality of allowing students to reply to announcements. In the discussion board, students were asked to introduce themselves by sharing their interests and what they expect to learn from the course. Dr. Smith finds through the introductory discussion that she not only facilitated social presence for her students by giving her students the opportunity to connect with one another, but she also instilled a sense of teaching presence that increased her capacity to assess her students learning needs.

MODULES AND ASSIGNMENTS

Instructors can utilize learning modules and assignments to structure course content for students to create cognitive presence. Modules are the primary tool that is used in an LMS to post learning content according to the major course objectives and is essential for guiding students. Instructors can facilitate cognitive presence in learning modules and activities of an online course through instructional design that is relevant to learners' needs. Instructors that ensure flexible options for accessing conten and completing assignments are present in Canvas and can help to personalize learning for students. The module contents should be multimedia, including real-world learning materials that intrigue students' interests and motivations and help connect their previous experiences and knowledge to new concepts. Students that are given choices in how they submit their work or access content (e.g., podcast, video, text, organizational chart, PowerPoint) are better able to engage in creative exploration that facilitates cognitive presence and experience a positive affective response in an online learning environment. Instructors can ensure that content is flexibly designed an accessible for diverse learners by using the universal design for learning (UDL) framework (Dunlap & Lowenthal, 2018) to provide options for students to access content in a variety of ways, as well as submit their products in variable formats to illustrate their learning (CAST, 2018). The provision of multiple means of access to content allows students' individual learning needs to be met and facilitates cognitive presence.

Practical Applications for Instructors in Special Education

Special education students can engage in reflective analysis through a plethor of options to engage in conveying ideas (e.g., develop a flowchart, create a Po - erPoint presentation, develop and write a paper, submit a video, develop a podcast; CAST, 2018). Special education instructors can provide students with direct instruction through utilizing a variety of media tools to vary the instructional methods and address the variability of learners via video posts, podcasts, or text. It is essential to connect course materials within modules to assignments so that students can utilize them correctly. For example, instructors can use various state and district level policies and forms when teaching special education law courses to better help students be able to apply their knowledge into practice. By doing so, the students can understand the importance of utilizing learning materials that reflect real-world contexts which are directly applicable to one's life.

Thinking about cognitive presence, Dr. Smith re-evaluated how her course modules and assignments have been previously set-up. From her course evaluations, Dr. Smith knows that her students have expressed confusion as to what they need to be doing. She considers how students' confusion impacted their ability to not only learn the content, but to stay caught up on course assign-

ments. Dr. Smith has already decided to post weekly announcements to help students understand more of the core content and assignment deadlines, but in thinking on the matter more deeply, she decides to restructure her course. Dr. Smith modifies her course modules and assignments to provide multiple ways to access the content. She provides an array of resources from documents used in school districts to peer-reviewed research papers. She incorporates videos (with captions) and different visuals to support students' better understanding of the concepts discussed in each module. She also decides to provide a rubric for each assignment with multiple options for students to show mastery of their learning. Students will be empowered to choose the assignment format in submitting their work, such as podcasts, papers, or flow charts.

COLLABORATION

Instructors can provide students with a sense of social presence by using collaboration tools to assign students to groups for working on projects. The provision of group project-based assignments in an online course can ensure that students are able to meet with their peers and engage in the active process of team building, establishing rapport with one another, and developing their overall ideas through active dialog and exchange, thereby facilitating social presence. Project-based assignments give online students the opportunity to create learning products that are relevant and applicable to their teaching. Students that are given the opportunity to work on projects together are better able to develop relationships with one another and engage in the exchange of ideas, to ensure a sense of social presence (Dunlap & Lowenthal, 2018; Trammell & LaForge, 2017). Social engagement facilitates not only social presence in a course, but cognitive presence for students.

In addition, it is important for instructors to establish a teaching presence in scaffolding and guiding group project activities by ensuring students are able to engage in collaboration and have the necessary tools to communicate with one another and sufficiently engage i group discussion. Instructors should use descriptive rubrics to facilitate understanding of how students' work will be assessed, provide scaffolding for group members by ensuring members of groups are able to draw up a group contract that accurately depicts their shared responsibilities, and facilitates members' accountability to the group, thereby establishing teamwork and providing explicit instruction on how to engage with one another in completing projects.

Instructors who provide group project-based assignments that are designed to allow students to create, design, and develop learning products can facilitate the synthesis of ideas for their students' cognitive engagement based on their interests and needs. Projects can be designed so as to encourage students to engage in thought-provoking dialog in relating ideas, self-reflection, an analysis, that is supportive of cognitive presence in an online course. By providing students with relevant, meaningful, and engaging content that is appropriately scaffolded to be supportive of collaborative activity, instructors can facilitate cognitive, social, and teaching presence in their online courses.

Practical Applications for Instructors in Special Education

Online special educators should consider how to incorporate individual interests in collaborative projects (e.g., multi-tiered system of support [MTSS], transition plan, UDL, behavior management), background knowledge in teaching grade levels, as well as content areas to work on a project. In designing group project-based assignments, special education instructors can utilize a peer-review process so as to encourage critical thinking, reflection, and ongoin synthesis of ideas across groups through an iterative design process. For example, special education students can develop presentations on content (e.g., reading strategies for dyslexia, assistive technology, legislation and policy surrounding special education) and review one another's work.

Group project-based assignments distinguish collaborative work and are essential for developing special educators who experience various collaborative tasks, such as IEP meetings.

For example, instructors could group students based on their teaching levels (e.g., elementary, secondary), students' exceptionalities (e.g., disability categories or severity), educational placements (e.g., inclusive education setting, self-contained classroom, life skill classroom) to foster active interactions with similar backgrounds and interests.

Dr. Smith wants to ensure that her students are able to engage in shared social experiences that will help alleviate a sense of disconnection or isolation. Dr. Smith realizes that she could create a collaborative group-project in addition to using the announcement and discussion posts to facilitate a sense of social and cognitive presence among her students. Dr. Smith could easily group her students according to the grade levels they each teach to make the content more meaningful and relevant to her students' learning needs after reading their introductory discussion posts. She develops a group-project to explore the uses of assistive technology in the field of special education. Dr. Smith provides her students with a rubric and a peer contract that specifies what each group member's contribution must be to the project to provide

clarity and avoid confusion while also giving the students choices in how they would like to best communicate with one another (i.e., email, text, google chat). She encourages her students to engage in active dialog to complete the assignment. Students will collaborate by using a Google document to develop a schematic that highlights the types of assistive technology they each use in their teaching, as well as outline the types of assistive technology most prevalent in special education. The project-based assignment will enable her students to engage in social exchanges to not only share their knowledge, but to engage in a project-based research activity.

GRADING

Timely grading and teacher-student interactions are essential to model immediate feedback for students and provide students with a sense of teacher presence (Dunlap & Lowenthal, 2018; Lowenthal & Dunlap, 2018; Watson et al., 2017). Given online modules lack synchronous, face-to-face human interactions, quick grading can provide sufficient time fo students to modify their work based on instructors' feedback and provide students with a model of positive teacher-student interactions. SpeedGrader is Canvas's grading tool and can be used by instructors to grade student assignments with feedback. Objective and thoughtful feedback should be provided to let students monitor their progress in learning. Rubrics and point allotment systems always need to be in place to guide objective grading and be shared with students. Canvas can be automatically set to notify instructors of students' graded submissions to prompt the instructor to provide students with feedback, and support students' sense of teacher presence. Students given immediate feedback and allowed to engage in an iterative process of designing and redesigning/modifying their work may be more cognitively engaged in completing project-based assignments. The incorporation of audio and video into feedback can also facilitate a sense of social presence for students in an online environment (Lowenthal & Parscal, 2008).

One simple strategy to connect with students is to address them by their names when posting comments and feedback. In doing so, rapport may be established to foster comfortable communication between instructor and student(s) and to interact with students on an individual and personal level (Dunlap & Lowenthal, 2018).

Instructors should also align course activities and relevant assessments to course objectives. Having clear expectations of assignments is necessary to minimize potential confusion. Deadlines with frequent prompt reminders are helpful for students to complete assignments on time. Feedback should correct students' misconceptions of the topic. The feedback should be timely and could be delivered in multiple ways, such as videos, rubrics, and audio (CAST, 2018). Interacting in a consistent manner with students via the Canvas gradebook comment feature allows students to receive frequent opportunities to receive instructor interactions that are facilitative of ensuring students are experiencing teacher presence. Instructors can comment on students' work using humor, when appropriate, and with personality to create a sense of connection and teaching presence in Canvas (Dunlap & Lowenthal, 2018).

Practical Applications for Instructors in Special Education

Special education instructors can use the grading feature of Canvas to comment in the Gradebook on assignments and provide timely feedback to support students' ideas, and students can also respond to instructor feedback. A dialog can be created between the special education instructor and student to facilitate learning with the use of rubric systems with constructive feedback. Because progress monitoring has been more accessible than ever using Gradebook, special education instructors can make better instructional decisions with student data. Student feedback, such as ideas, thoughts, and feelings can be also considered when structuring courses and developing assignments. By experiencing the reciprocal grading process, special educators would be better equipped with the knowledge and skills to better serve students with disabilities in online learning environments.

Dr. Smith realizes that she could use features within Canvas's grading tools to connect more with her students outside of announcements and discussions. Because her students have previously reported a lack of connection with their instructor in course evaluations, Dr. Smith decides to intentionally use the grading tool to foster a greater sense of teaching presence. Dr. Smith uses Canvas grading notifications to alert her to student submissions of assignments which enables her to provide prompt feedback. Dr. Smith believes that prompt feedback will allow her students to more quickly understand their progress and have less anxiety about assignment performance. In addition, any misconceptions can be caught earlier so that students do not keep repeating mistakes across multiple assignments due to delayed feedback. Through prompt grading, Dr. Smith creates the opportunity for students to understand content in more depth, re-submit their work, and stay caught up in the course before advancing on to their next assignment.

CONCLUSION

As a framework, CoI is a valuable tool by which educators can utilize to help guide their instructional design and

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ensure that presence (i.e., social, cognitive, teaching) is established. Although we outlined ways to utilize the CoI framework within a particular LMS (i.e., Canvas), the CoI framework can equally be applied in other LMS and may be helpful to special education instructors when designing online learning environments conducive to social interactions for special educators to facilitate student engagement in learning. As the CoI framework is descriptive and not prescriptive, it is important that instructors maintain a sense of flexibility in adop - ing its use when designing equitable learning activities in online instruction. In support of equity, instructors should incorporate learning activities expressive of multiple points of view to support diversity and students' participation within online special educator preparation. Consideration of how to implement the CoI framework and establish social, cognitive, and teaching presence should always be linked to ensuring quality online learning experiences.

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Embedding High-Leverage Practices into Special Education Field Experiences

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ABSTRACT

Through special education teacher education, the preparation, support, and ultimately retention of highly qualified special educators is made poss ble with systematically designed field experiences. Tailored field experiences and supervision ensur candidates are equipped to meet the increasing demands of the field and have the requisite tools for longevity in the field. Specific alignment th High-Leverage Practices (HLPs) provides preservice teachers with multiple opportunities to apply knowledge and skills from coursework. Additionally, this work can continue through induction to increase the likelihood of long-term success in the field. O fered in this article is a model for policy and practice in personnel preparation toward the goal of addressing the critical shortage of highly qualified special educators nationwide. Specificall , teacher preparation programs can strategically embed HLPs into all components of programming to bridge coursework and field experi nces through systematic application of course assignments to fieldwork, as w ll as repeated opportunities to reflect on the implementation of HLPs during field experiences both independently and collaboratively.

KEYWORDS

Field experiences, High-Leverage practices, special education, teacher preparation

Across the United States, schools struggle to provide adequate services to students with disabilities due to a continued severe shortage of qualified specia education teachers (Boe, 2014; U.S. Department of Education [DOE], 2016). During the 2022-2023 academic year, over 40 states reported shortages of special educators (U.S. DOE, n.d.). Over half of public schools reported feeling understaffed, and 65% of these schools were understaffed in special education, surpassing general education (National Center for Education Statistics [NCES], 2022). Furthermore, nearly 80% of public schools reported difficulty hiring fully c rtified special educator (NCES, 2022). Enrollment in teacher preparation programs declined by 35% between 2009 and 2015 (DeMonte et al., 2016) and analyses have consistently illustrated decreased numbers of special education program completers (DeMonte et al., 2016; Harper et al., 2022). At the same time, declines in the special educator workforce exceeded changes in the identification of students with disabilit es (Harper et al., 2022). Special education has been designated as a high-need area for teachers and the demand for teachers in this area exceeds the supply, despite being a popular degree fiel (American Association of Colleges of Teacher Education [AACTE], 2022).

Across undergraduate degree and certificate specialty areas, nine percent o degrees and certificates in the 2018-19 academic year were conf rred in special education (AACTE, 2022). Therefore, the demands placed on special educators, and subsequently teacher preparation programs, have grown (Leko et al., 2015), requiring a clear need for innovation in teacher preparation to address this issue and produce quality special educators.

High-Leverage practices have emerged in several teaching domains toward the goal of clarifying effective instructional practices (Nelson et al., 2022; O'Flaherty & Beal, 2018). Within special education, High-Leverage Practices (HLPs) for students with disabilities in the areas of collaboration, assessment, social /emotional/behavioral, and instruction were developed with support from the Council for Exceptional

Children (McLeskey & Brownell, 2015; see also Table 1 for a list of HLPs). While many teacher preparation programs have used these HLPs to restructure coursework (Maheady et al., 2019; Nelson et al., 2022; Windschitl et al., 2019), gaps between coursework and field experiences persist. Structure field experiences can help to bridge thi gap by enhancing preservice special educators' capacity to use HLPs through practice-based opportunities (e.g., Maheady et al., 2019). Engaging in such opportunities affords pre-service teachers (PSTs) the chance to build their capacity for instructional decision-making and expertise (Benedict et al., 2016).

Recognizing the importance of multiple opportunities to apply pedagogical content knowledge in authentic contexts (Billingsley et al., 2019; Leko et al., 2015), our model emphasizes structured field experiences for PS s in special education. According to the AACTE (2018) Clinical Practice Commission, high-quality teacher preparation requires clinical practice to support PSTs' process of learning through ongoing practice. Field experiences positively contribute to the development of special educators as they offer PSTs the opportunity to apply their knowledge in authentic settings (Nagro & deBettencourt, 2017). A recent literature review of special education teacher preparation field experience found common field experience learnin activities were related to lesson planning, data collection, reflection, video recording, and feedback through coaching and observations (O'Brien et al., 2023). Given their impact on teacher effectiveness and retention, practice-based approaches to special education teacher preparation are frequently recommended (e.g., Benedict et al., 2016). Case studies, rehearsal, video analysis, virtual reality simulations, microteaching, coaching, lesson study, and aligned field experiences are research-supporte practice-based learning opportunities (Benedict et al., 2016; Brownell et al., 2019). Such opportunities can be provided through both coursework and fiel - work. Determining the length of the fiel experience, selecting instructional activities, identifying PSTs' work products, assessing PSTs, and providing continued feedback are recommended steps in designing and studying field experience (Nagro & deBettencourt, 2017). Drawing on practice-based approaches found to promote the use of HLPs during field experience (e.g., Brownell et al. 2019) and research on effective special education field experiences (e.g., Nagr & deBettencourt, 2017), we developed a model that allows PSTs to work with a mentor teacher and a university supervisor to practice integrating HLPs in authentic contexts, receive coaching and feedback, and develop as professional educators.

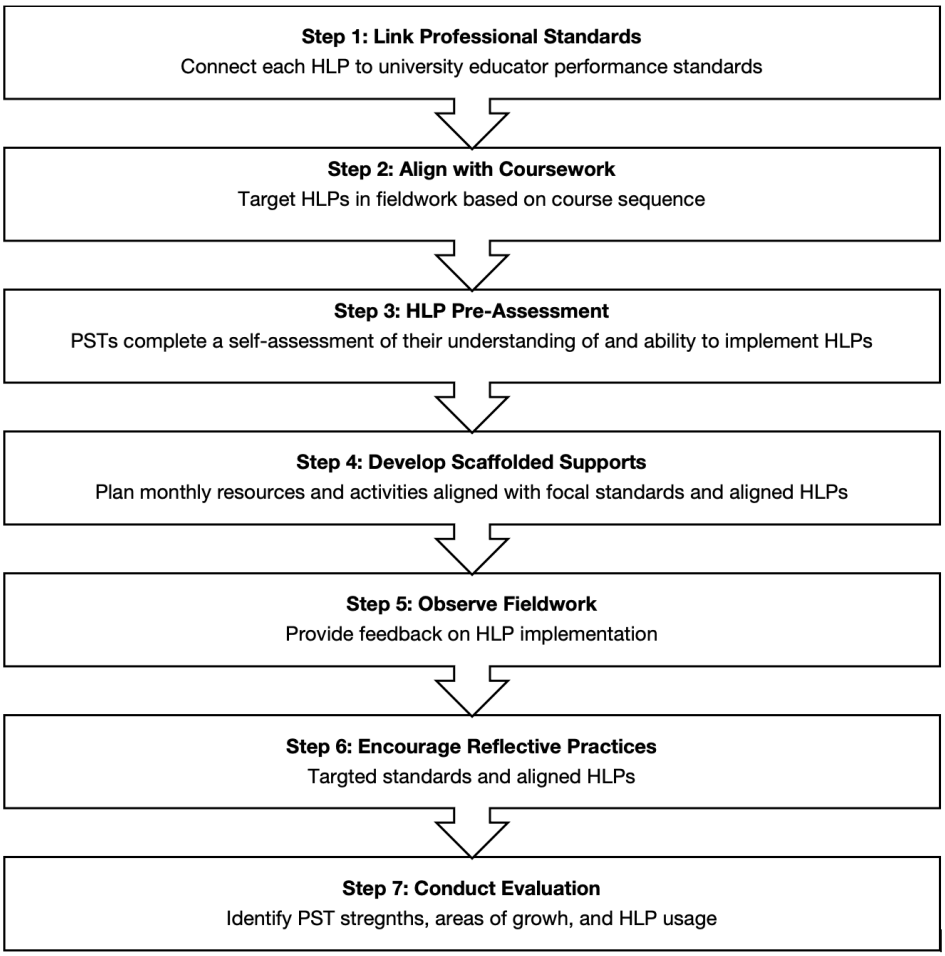
HLPs and Structured Field Experiences

Since the creation of the HLPs for special education by McLeskey and Brownell (2015), a growing body of research has highlighted the importance of HLPs for special educators (e.g., Billingsley et al., 2019; McLeskey et al., 2019; Nelson et al., 2022). Given this, teacher educators utilize HLPs to plan teacher preparation programs with much of the emphasis placed on the role of HLPs within coursework (Windschitl et al., 2019; Maheady et al., 2019). To bridge the gap between coursework and fiel experiences, it is also necessary to embed HLPs within structured field experience so that PSTs have opportunities to both learn about and use effective practices (Brownell et al., 2019). Research shows that a shared definition of practices i insufficient for implementation. Rathe , employing HLPs in teacher preparation must include a scaffolded approach with opportunities for application, feedback, and reflection (indschitl et al., 2019). Integrating a specific set of practices such as HLPs, into field experiences in cyclical and advancing manner can offer great value to special education PSTs (Mathews et al., 2023).

HLPs can be embedded into teacher preparation programs in a variety of ways, dependent on contextual factors and through the use of holistic, signature set, and individualized approaches (Markelz et al., 2021). The most comprehensive approach is the holistic approach, in which all HLPs are integrated into coursework and fieldwork. This approach can increase program coherence and involves participation from most faculty in a teacher preparation program (Markelz et al., 2021). Focusing on a signature set of HLPs necessitates selecting core practices to embed into the preparation program, requiring prioritization and promoting deeper learning of the selected HLPs. In this approach, several HLPs are intentionally selected and embedded to promote enrichment. An individualized approach involves a smaller subset of faculty selecting a reduced number of HLPs to include in their course(s) when there is limited interest and opportunity for wider implementation (Markelz et al., 2021). In our current model, we drew on multiple approaches to embedding HLPs into a special education teacher preparation program. University supervisors engaged in a multi-step process to align field experiences with HLPs program-specific standards, and cours sequences.

Our work was situated within an accelerated residency model at a state university special education teacher preparation program with field plac - ment supervisors who were interested in strategically integrating HLPs into fieldwork with continuous reflecti practices. This residency model, funded by a federal grant, consisted of two

FIGURE 1: Multi-Step Process to Embed HLPs with Program Standards



summer semesters of hybrid coursework and two regular semesters of in-person coursework combined with a 10-month residency in a partner school. While completing coursework, PSTs were paired with a cooperating or mentor teacher in partner schools, allowing for a supportive student teaching experience with scaffolded support faded over the course of the academic year, and attended classes in the evenings. Fieldwork observations were conducted virtually four times per semester. PSTs were not employed as full-time teachers or by school districts, but rather received a stipend as part of the grant. Upon completion of the program and the fina portfolio (see Step 7), the PSTs earned a master's degree in special education and a K-12 cross categorical special education license. A combination of a holistic and individualized approach was taken to embed all 22 HLPs into this model, targeting purposefully sequenced sets of HLPs within fieldwork. Figure illustrates the process we employed to develop our model, with each component of the seven-step model detailed in the following sections.

The Process for Embedding HLPs into Special Education Field Experiences

Step 1: Link Professional Standards

As the first step in the process, w reviewed the linkage between the HLPs for special education and the Council for Exceptional Children's (CEC, 2020) Initial Special Education Preparation Standards to identify connections with the program-specific preparatio standards. These standards describe the program's learning outcomes and are similar to the Interstate Teacher Assessment and Support Consortium (InTASC) developed by the Council of Chief State School Officers (CCSSO, 2013). Usin this linkage as a model, we then mapped the HLPs to the program-specific teacher preparation standards. Each HLP was mapped onto only one program standard to streamline the focus areas, although multiple areas of alignment were possible. Table 1 shows the linkage between the university performance standard domains and the HLPs.

Step 2: Align with Coursework and Developmental Progression

Next, we divided the linkage between the university preparation standards and the HLPs to be addressed strategically over 10 months. During this step, we considered PSTs' developmental progression, timing within the academic year, and course sequencing to determine which domains and aligned HLPs were most logical for each month. For example, we selected the Learner and Learning Environment domain and aligned HLPs for September, as PSTs were beginning their field experience and had not yet completed coursework on instruction or assessment. Assessment was selected for December, as this coincided with the completion of a course on this topic. This intentional alignment provided authentic experiences implementing HLPs toward the ideal of high impact and low effort (Markelz et al., 2021).

Some HLPs are difficult to observ through fieldwork observations. Sp - cificall , HLPs in the Collaboration practice area may not be directly observable or present during classroom instruction, which is traditionally the focus of fieldwork observations. I contrast, PSTs have more opportunities to practice implementing HLPs from the

TABLE 1: Linkage Between University Performance Standard Domains and HLPs

University Performance Standard Domains	High-Leverage Practices (HLPs)
Learner and Learning Environment	1. Collaborate with professionals to increase student success. 7. Establish a consistent, organized, and respectful learning environment. 14. Teach cognitive and metacognitive strategies to support learning and independence.
Planning and Preparation	6. Use student assessment data, analyze instructional practices, and make necessary adjustments that improve student outcomes. 11. Identify and prioritize long- and short-term learning goals. 12. Systematically design instruction toward specific learning goals. 13. Adapt curriculum tasks and materials for specific learning goals. 19. Use assistive and instructional technologies.
Engagement and Instruction	8. Provide positive and constructive feedback to guide students' learning and behavior. 9. Teach social behaviors. 15. Provide scaffolded supports. 16. Use explicit instruction. 17. Use flexible grouping. 18. Use strategies to promote active student engagement. 20. Provide intensive instruction. 21. Teach students to maintain and generalize new learning across time and settings. 22. Provide positive and constructive feedback to guide students' learning and behavior.
Assessment	4. Use multiple sources of information to develop a comprehensive understanding of a student's strengths and needs. 5. Interpret and communicate assessment information with stakeholders to collaboratively design and implement educational programs. 10. Conduct functional behavioral assessments to develop individual student behavior support plans.
Professionalism and Ethics	2. Organize and facilitate effective meetings with professionals and families. 3. Collaborate with families to support student learning and secure needed services.

Instruction and Social/Emotional/Behavioral practice areas. To address this, we intentionally distributed HLPs across the performance standard domains and considered where HLPs were also being addressed through coursework. We also encouraged PSTs to observe their mentor teacher collaborating with professionals and families, as well as conducting meetings, and to utilize the reflectio prompts shown in Step 6 to reflect o these observations. PSTs were further encouraged to make connections to less visible HLP implementation during their observation debriefings. For instance collaboration among professionals may not be directly observed during a co-taught lesson; however, the PSTs could share about and reflect on the co-pla - ning process in their written reflectio and in the subsequent triad meeting with their field supervisor and mento teacher. Additionally, as is detailed in Step 7, PSTs were required to submit artifacts aligned with each performance standard domain and HLP practice area. Therefore, field supervisors regularl and explicitly discussed the critical role less visible HLPs play in high-quality instruction and student engagement.

Step 3: HLP Pre-Assessment

Conducting baseline assessments enables teacher educators to see which HLPs are currently being taught in coursework (Markelz et al., 2021). Although we did not explicitly assess HLP instruction in coursework, fiel supervisors were aware of HLP instruction occurring in the reading, math, and assessment methods courses due to their instructional role in those courses. To

TABLE 2: Selected Scaffolded Supports by Month

Month and Focus Areas	Scaffolded Supports
November **Domain:** Engagement and Instruction **HLPs:** 8, 9, 15, 16, 17, 18, 20, 21, 22	Readings • High-Leverage Practices in Special Education (McLeskey et al., 2017. p. 69-116) • Big Ideas in Special Education (Riccomini et al., 2017) • Whole-Group Response Strategies to Promote Student Engagement in Inclusive Class rooms (Nagro et al., 2016) Self-Paced Modules • IRIS Center Module: Scaffolded Supports (2005) • IRIS Center Module: Assistive Technology (2020) Videos • HLP 16: Use explicit instruction (Kennedy et al., 2018) • HLP 17: Use flexible grouping (Kennedy et al., 2019a) • HLP 20: Provide intensive instruction (Kennedy et al., 2019b)
December **Domain:** Assessment **HLPs:** 4, 5	Readings • High-Leverage Practices in Special Education (McLeskey et al., 2017, p. 41-54) • The Taxonomy of Intervention Intensity (Fuchs et al., 2017) Activities • IRIS Center Case Study: Data-based decision making (Brown et al., 2009a) • IRIS Center Case Study: Progress Monitoring (Brown et al., 2009b)
March **Domain:** Professionalism and Ethics **HLPs:** 2, 3	Readings • High-Leverage Practices in Special Education (McLeskey et al., 2017, p. 27-40) • Developing collaborative partnerships with culturally and linguistically diverse families during the IEP process (Rossetti et al., 2017) • Strategies for helping parents of young children address challenging behaviors in the home (Chai & Lieberman-Betz, 2018) Self-Paced Modules • IRIS Center Module: Student Centered Transition Planning (2017)

gather baseline assessment data, PSTs completed an electronic self-assessment adapted from the HLP self-assessment developed by the CEEDAR Center (VanUitert & Holdheide, 2021). Using a Likert scale, PSTs rated their understanding of target HLPs from (1) "I am unfamiliar with this principle or element" to (5) "Mastered. I already apply this skill to my work and have noted improvements in student learning." They responded to statements such as "I create lessons where student outcomes are clear, measurable, ambitious, attainable, and actionable," "I provide scaffolded supports (e.g., graphic organizers, sentence stems) across a wide range of areas (e.g., academics, behavior, social skills)," and "I provide positive and specific feedback on student learning. This tool allowed us to gather data on PSTs' perceptions of and familiarity with HLPs and to monitor their progress over time as the assessment was administered twice per semester.

Step 4: Develop Scaffolded Supports

Based on the pre-assessment data, we developed a bank of resources to scaffold PSTs' implementation of HLPs and to complement learning from coursework. To meet the requirements of the residency model, PSTs were expected to attend their field placement daily for th duration of the school day. To accom-

TABLE 3: Observation Schedule and Tasks

Month and Focus Areas	PST Tasks	Field Supervisor Tasks
September **Domain:** Learner and Learning Environment **HLPs:** 1, 7, 14, 18	• HLP self-assessment • Observation cycle 1	• Initial triad meeting • Written feedback • Debrief observation 1
October **Domain:** Planning and Preparation **HLPs:** 6, 11, 12, 13, 19	• Observation cycle 2	• Written feedback • Debrief observation 2
November **Domain:** Engagement and Instruction **HLPs:** 8, 9, 15, 16, 17, 18, 20, 21, 22	• Mid-term self-evaluation • HLP self-assessment • Observation cycle 3	• Mid-term evaluation • Written feedback • Debrief observation 3
December **Domain:** Assessment **HLPs:** 4, 5	• Observation cycle 4 • Semester 1 self-evaluation • HLP self-assessment	• Written feedback • Debrief observation 4 • Semester 1 evaluation
February **Domain:** Behavioral and Classroom Management **HLPs:** 10	• Observation cycle 5	• Written feedback • Debrief observation 5
March **Domain:** Professionalism and Ethics **HLPs:** 2, 3	• Observation cycle 6 • Mid-term self-evaluation • HLP self-assessment	• Written feedback • Debrief observation 6 • Mid-term evaluation • Collaborate with PST to identify focal areas for remaining observations
April PST-Selected Focus	• Observation cycle 7	• Written feedback • Debrief observation 7
May PST-Selected Focus	• Observation cycle 8 • Semester 2 self-evaluation • HLP self-assessment	• Written feedback • Debrief observation 8 • Semester 2 evaluation

modate some in-person courses, occasional early releases were permitted, as were structured workdays on campus to provide additional time for coursework and final portfolio completion. Monthl resources and activities focused on the targeted university performance standard domains and aligned HLPs. We organized these materials in a shared online drive. However, creating self-paced modules in a learning management system would be an ideal way to organize resources for easy access. PSTs were also provided with video examples of HLPs. Alternatively, modeling of target HLPs by field supervisors would furthe practice-based learning opportunities by exhibiting expert performance (Benedict et al., 2016) for PSTs to then enact in their own practice. Engagement with these scaffolded supports was strongly encouraged but not required nor graded. Coordination with a seminar or other assigned credit hours would further strengthen this approach by adding accountability for engaging with the HLP resources. Table 2 displays a selection of scaffolded supports as an example.

Step 5: Observe Fieldwork

PSTs were required to complete four observation cycles per semester with additional associated tasks as detailed in Table 3. Each observation cycle entailed reviewing the criteria for success in the target domain, planning the lesson,

TABLE 4: Reflection Prompts Aligned with Standards and HLPs

DOMAIN AND HLPS	REFLECTION PROMPTS
Domain: Learner and Learning Environment **HLPs**: 1, 7, 14, 18	• How did your students feel throughout the lesson? How do you know? Is that what you hoped for? How did your students' feelings and reactions impact your decision making? • What personal teaching and relationship building strengths and characteristics do you have? How can you use these to support student learning and well-being? • How does your current teacher identity contrast with the teacher you hope to become? How will you know you are closing the gap? What activities will you engage in to close the gap when you are a full-time practitioner? What can I do to best support you?
Domain: Planning and Preparation **HLPs:** 6, 11, 12, 13, 19	• What did you want your students to learn? • What did your students already know about the learning objectives, and how do you know? How did your understanding about your students' prior knowledge shape your decision making? • What makes this lesson a significant moment in your practice?
Domain: Engagement and Instruction **HLPs**: 8, 9, 15, 16, 17, 18, 20, 21, 22	• What materials and strategies did you use to engage pupils in the learning tasks? • How did you encourage student thinking? In what ways did your actions foster student learning? • Did the students meet the objective or learn anything new? Who got it and who didn't? How do you know?
Domain: Assessment **HLPs:** 4, 5	• Did all your students demonstrate evidence of learning? How do you know? • Which students did not meet the expected learning outcomes based on the assessment data? What will you do now for those students? • How will you share student learning data with the students? • How will you use the assessment information you collected during this lesson to inform future instruction?
Domain: Behavioral and Classroom Management **HLPs:** 10	• How did you demonstrate a consistent, positive learning environment during this lesson? • In what ways has your learning environment changed since the beginning of the school year? How do you feel these changes have impacted student behavior? • How do you collect data to monitor progress toward behavioral goals? How do you use the data you collect?
Domain: Professionalism and Ethics **HLPs:** 2, 3	• What relationships have been important to you and your teaching? What can you do to strengthen your membership in your school community? What support do you need to become better integrated into the school community? • How does your current teacher identity contrast with the teacher you hope to become? How will you know you are closing the gap? What activities will you engage in to close the gap when you are a full-time practitioner? What can I do to best support you?

revising the lesson plan, recording instruction, watching the recording paired with feedback from their field superv - sor, and submitting a written reflection Within each observation cycle, fiel supervisors provided targeted feedback on implementation of the selected HLPs using a virtual supervision platform (i.e., GoReact). Feedback was predominately provided on the focal HLPs for each month; however, feedback on the implementation of all HLPs was provided during the final two observations. Thus, supervisors were able to implement both directive coaching, wherein the supervisor is the HLP expert sharing knowledge and skills through constructive feedback, and facilitative coaching, which involves supporting PSTs to construct new knowledge through reflective practice (Aguilar, 2013).

Utilizing a virtual supervision platform, directive coaching most often involved field supervisors providin time-stamped feedback on moments where PSTs demonstrated a HLP (e.g., simply noting "explicit instruction" or "asking this question allows you to assess student understanding"). A missed opportunity for implementation of a HLP with detailed commentary as to how to engage in the practice was also provided within directive coaching (e.g., "Before beginning with the new topic of the lesson, briefly review relevant prev - ously learned skills/strategies"). This form of coaching and feedback, aimed at improving PSTs' practice and expertise, is a cornerstone to providing quality

practice-based opportunities (Benedict et al., 2016). Facilitative coaching, on the other hand, most often took the form of questions posed by the field supervisor regarding specific moments of practice For example, a supervisor might ask why a PST made a specific instructiona decision (e.g., "What was your thought process with implementing feedback in this way?") as well as inquire about alternative strategies they might implement in the future reflecting thei practice (e.g., "How might you engage students with [topic] in a more meaningful way?").

Using a virtual tool for field supe - vision also allowed the PSTs to watch their own instruction during the cycle of evaluation and identify individual areas for continued growth on specific HLPs This required step was intended to promote PSTs' use of feedback for developing their practice, as seen in teacher candidate self-efficacy (Mathews et al. 2023), and to support the development of their reflective abilities (deBettencourt & Nagro, 2019). PSTs also completed a survey reflecting the frequency of thei usage of HLPs at multiple points during student teaching, allowing teacher candidates and university supervisors to identify specific practices to ta get for continued growth (Firestone et al., 2021). The intentional sequencing of HLPs during each observation cycle, with repeated foci areas and self-evaluation, offered opportunities for frequent and continued feedback and reflection Additionally, as will be described in Step 6, PSTs participated in debriefing conve - sations via Zoom for additional coaching and feedback from their fieldwor supervisor.

Step 6: Encourage Reflective Practices

Central to the work of educators is the ability to reflect on one s practice, and developing this skill begins during teacher preparation. Therefore, with each observation of their instruction, PSTs were provided structured reflectiv opportunities. A series of intentionally sequenced reflection prompts, adapte from Soslau and Alexander (2021), related to target standards and aligned HLPs were offered to special education PSTs as illustrated in Table 4. Prior to engaging in a conversational debrief with their university supervisors, PSTs were encouraged to complete a written reflection for at least one of the gi - en prompts. Written reflections wer strongly suggested but not required, and as detailed below, were structured to support PSTs in developing their final portfolio. During the observatio debrief, PSTs expanded upon their written reflections through a discussio with their field supervisors and mentors If written reflections were not submi - ted, the observation debrief provided an opportunity to discuss the reflectio prompts.

Additional broader reflective practice were also encouraged through supervisors asking questions such as, "Describe what went well during this lesson. How do you know?" and, "What are you proud of for yourself and your students from this lesson?" Encouragement of such analysis and reflective practice promotes PSTs' self-awareness of their practice and areas for growth (Brownell et al., 2019), contributing to improvements in their instructional quality.

The written reflections and clea alignment with specific HLPs o fered scaffolding to advance PSTs' ability to successfully complete special education licensure requirements and enter the field

Step 7: Conduct Evaluation

While PSTs were regularly encouraged to engage in individual reflectiv activities for each lesson, opportunities to reflect on their practice more holi - tically through an evaluation occurred as a team twice each semester. This evaluation involved each team member (i.e., PST, university supervisor, and mentor teacher) individually completing an electronic survey prior to meeting together. Each team member identifie the PST's strengths, areas of growth, and usage of HLPs addressed to date, with PSTs also developing a specific goal fo themselves. During the meeting, each member shared their individual refle - tions in a conversational manner, with discussions leading to strategizing how PSTs would continue to develop their practice and implementation of HLPs with the support of the team.

A final portfolio also served as a evaluation of PSTs' mastery of the program-specific performance standard and implementation of HLPs. This portfolio included artifacts and narrative reflections selected by PS s from their fieldwork experiences. In total, PS s were required to identify 20 artifacts with two artifacts for each of the six domains of the performance standards and two artifacts for each of the four areas of the HLPs. For each artifact, PSTs completed a written narrative reflectio to explain how the artifact illustrated their knowledge and skills for that particular domain or HLP practice area and to reflect on their progress over time Because the scaffolded supports from Step 4 and reflection prompts utilized i Step 6 were crafted in alignment with the requirements of this final portfolio PSTs could more easily identify artifacts to include in their portfolio and use the written reflections submitted after eac observation as the foundation of their narrative. Once completed, portfolios were double scored with a rubric by two fieldwork supervisors. Di ferences in scoring were discussed until consensus was reached. Providing strategic support throughout fieldwork was intended t strengthen PSTs' implementation of

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HLPs and to foster reflective growth, which was then evaluated in this fina component of the teacher preparation program. Future research could use the results of final portfolios and the HL self-assessment to evaluate the effectiveness of this approach.

CONCLUSION

Special education teacher educators can tailor clinical experiences to align with coursework and HLPs as one approach to connecting knowledge acquisition and skill application (Brownell et al., 2019; McLeskey & Brownell, 2015). Using targeted resources and a scaffolded approach, this model provides tools for field supervision that i - tegrates methods coursework and fosters reflective growth. Each month of fie experience includes clear, observable goals related to HLPs and performance standards, resources to facilitate professional growth, and customized prompts for guided reflection. This approach promotes a structure and focus for PSTs to develop and refine their skills in usin essential practices for the instruction of students with disabilities. Other teacher educators interested in following this process to strategically embed HLPs into fieldwork can readily do so with facult committed to this process of redesign. An important aspect of embarking on this program development or redesign involves the intentional and realistic consideration of the context of the teacher preparation program, as this may influence how the aforementione steps and support can be incorporated. Accountability for the completion of reflections and activities by PS s is highly recommended. By embedding HLPs into structured field experiences, teache educators can support PSTs in applying knowledge from coursework and deepening their ability to enact effective instructional practice. Ultimately, this results in improved outcomes for students with disabilities through the development of a well-qualified special educato workforce possessing the knowledge and skills to remain in the field

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Co-Teaching in Teacher Preparation: Programmatic Priorities, Promising Practices, and Potential Pitfalls

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ABSTRACT

Co-teaching is recognized as a best practice that is increasingly being utilized to meet the needs of diverse learners in the classroom. All teachers need to be prepared to meet the needs of diverse learners, including students with disabilities. However, few teacher preparation programs lead to dual certification in eneral and special education, and even fewer include the use of co-teaching in teacher preparation programs. Like in P-12 education, organizational systems and collegial dynamics can pose barriers to implementing the use of co-teaching in higher education. This article addresses the benefits and challenges of co-teaching in a teach r preparation program. Specifically included is a discussion about how engaging in the co-teaching process can be valuable to pre-service teachers and faculty members, as well as barriers to consider when navigating institutional procedures and policies. University faculty share their experiences proposing, developing, and implementing co-taught courses in an undergraduate dual certification (elementary and special education) nclusive education program. Strategies that can be used to address known barriers and successfully implement co-taught courses in a teacher preparation program are provided.

KEYWORDS

Co-teaching, higher education, inclusive education, teacher preparation

As the leading national organization for educator preparation, the American Association of Colleges for Teacher Education (AACTE) has established priorities for building and sustaining high-quality preparation for all educational professionals, which includes "valuing the diversity of students, their families, and educators; equity in access to high-quality instructional environments; and the inclusion of all students, defined as acc ss and opportunity, in PK-20 classrooms" (AACTE, 2024, para 2). Co-teaching is an inclusive practice that involves two professionals collaborating on all aspects of instructional planning and delivery to support a diverse group of students (Lusk et al., 2016). Co-teaching is a common practice in K-12 settings used to facilitate the inclusion of students with disabilities in the general education classroom (Friend et al., 2010). According to the National Center for Education Statistics (2022), 66% of the 7.2 million school-age students identified with disabilities were included "full time, which the Individuals with Disabilities Education Act defines as spending 80% or more of their school da in general education classrooms. Utilizing a co-teaching model allows students with disabilities to access the general education curriculum while continuing to receive supports and specialized instruction to meet their individual needs (Cook & McDuffie-Landrum, 2020)

As co-teaching practices become more prevalent in P-12 settings, teacher preparation programs must respond to better prepare teacher candidates to teach in co-taught settings by fostering collaboration skills and increasing their knowledge about roles and responsibilities in co-teaching (Ricci & Fingon, 2018). On-going research now indicates positive impacts on pre-service teachers experiencing co-teaching as part of their program, as demonstrated by the collaboration between university faculty (Buckingham et al., 2021; Pellegrino et al., 2015; Ricci & Fingon, 2018; Steele et al., 2021). Despite positive outcomes for students, university faculty may be hesitant to engage in co-teaching due to concerns about time, coordination, and potentially un-

even or disproportionate workload caused by poor implementation of co-teaching (Steele et al., 2021). Additionally, there are logistical concerns such as the need for administrative support, scheduling, dedicated time or release from duties for planning, possible collaboration across departments, and reduced student-teacher ratio (Buckingham et al., 2021). Thus, some of the same tensions and barriers to co-teaching in P-12 are also cited in higher education.

This manuscript reveals the perspective of university faculty co-teaching pairs as they share experiences in proposing, developing, and implementing co-taught courses in an undergraduate dual certification (elementary an special education) inclusive education program. Within this article, the authors address the benefits and challenges o co-teaching in a teacher preparation program. More specificall , we explain the benefits to pre-service teacher and faculty members engaged in the co-teaching process. Then, we explore barriers encountered during the proposal phase, including negotiating load, student enrollment, scheduling, physical space requirements, and gaining support from university leadership. After reviewing logistical responses to these hurdles, the authors discuss strategies used to implement co-taught courses in a teacher preparation program successfully.

Preparing general education preservice teachers to educate and support students with disabilities in general education has been a part of undergraduate curricula for decades (Friend et al., 2010; Jordan et al., 2009). However, teaching about disability and special education is often isolated to a single introductory course whereby the best practices and skills needed for all teachers to meet the needs of diverse learners are often designated as a specialized curriculum housed with special education programs. Except in relatively few integrated programs, special education and general education teacher preparation curricula remain conceptually separate (Pugach et al., 2020). The silos between general education and special education teacher preparation perpetuate the idea that general education teachers are primarily responsible for learning how to teach students who are not identified as havin disabilities (Cosier & Ashby, 2016). This divide can carry over into P-12 schools and hinder inclusive education if general education teachers only see some students as *their* students and defer to special education to support students with disabilities effectively.

THEORETICAL FRAMEWORKS

Several teaching and learning frameworks guide our practice as a teacher preparation program. In this article, we discuss how we draw on the theoretical framework of Transparency in Learning and Teaching (TILT) and use a disability studies in education approach to teacher preparation with inclusive education candidates. Winkelmes' (2019) concept of making a small adjustment or "tilt" to embedded assessments is also well aligned with Tobin's (2018) "plus one approach" to inclusive teaching using Universal Design for Learning (UDL) in higher education. Both frameworks also address the importance of students understanding "*the why*" of what they are learning and the tasks they are completing in the classroom and in the field. Furthe , both take up the need for instructors in higher education to make intentional incremental changes to their instruction and assignments that remove known barriers, increase access points for all learners, and proactively support the various kinds of interactions that students have with learning material and with each other. Taken together, these guiding frameworks are undergirded by a commitment to making learning accessible with explicit and purposeful attention to practices that support equitable and socially just approaches to and experiences within education.

Transparent pedagogy is a critical instructional epistemology woven throughout our inclusive education teacher preparation program. We recognize that if we expect our preservice teachers to employ best practices in the field moving forward, they need to se those skills modeled and have experiences with them as learners. Throughout coursework and clinical field experien - es, we communicate together as instructors and with students to breakdown learning activities and assignments in terms of our pedagogical decisions as instructors, their immediate learning application in connection to the classroom and the field, and considerations for ho to use and adapt high leverage practices for special education in their future P-12 classrooms in relation to establishing positive learning environments, using instructional strategies, and designing and adapting assessment for authentically understanding students.

In an effort to help students learn from their courses and the larger process of teacher decision-making, we routinely use the following foundational elements of TILT (Winkelmes et al., 2019):

(a) Define the purpose of assignments learning exercises, and academic work in explicit, accessible language for disciplinary novices preparing to use and write in the language of the profession.
(b) Clarifying tasks and procedures in terms of productive steps for students to follow and counterproductive steps they should avoid.
(c) Offer transparent assignments that provide students with a set of criteria for success and multiple examples from real-world work expected from educational professionals.
(d) Students offer insight about what

types of examples and non-examples are helpful from real-world classroom contexts (Winkelmes et al., 2019).

As inclusive education faculty, we routinely use transparent pedagogy in teacher education in our instruction; however, co-teaching has provided us even more opportunities to effectively and consistently model using strength-based approaches among colleagues and with students. Through co-teaching in conjunction with transparency in learning and teaching, we have been able to model and explain our pedagogical decisions and processes to our preservice teachers. We have also been able to debrief the learner experience so that preservice teachers might be better equipped to recognize these decision-making moments as they enter the field and are supporting their K-12 st - dents in successfully reaching learning expectations.

BENEFITS OF CO-TEACHING IN TEACHER PREPARATION

Perceived Benefits for Pre-service Teacher Candidates

Co-teaching in teacher preparation creates an opportunity for authentic learning where a best practice for inclusive education is both modeled and experienced (Chanmugam & Gerlach, 2013; Friend et al., 2010; Lock et al., 2017; Steele et al., 2021). By virtue of having two equally invested and qualified educators serving as instructors co-teaching is a well-regarded practice in inclusive education that is utilized to increase access for students with disabilities in the general education classroom (Cook & McDuffie-Landrum 2020). The six models of co-teaching developed by Cook and Friend (1995) – one teach, one observe; station teaching; parallel teaching; alternative teaching; team teaching; and one teach, one assist – provide a set of specific approache for utilizing two instructors to best meet student needs based on the instructional intent. Explicitly embedding co-teaching experiences in pre-service teachers' learning addresses Friend et al.'s (2010) concerns about a lack of preparation to effectively co-teach in P-12 settings. Overall, teacher candidates who experience co-taught classes in teacher preparation report positive attitudes toward the practice and a greater interest in co-teaching (Steele et al., 2021).

In a survey of 957 university students enrolled in multi-instructor courses, Jones and Harris (2012) identifie specific benefits from a student p - spective, including a variety of methods for presenting information, assessment methods, and teacher expertise. Morelock et al. (2017) found that co-teaching encouraged instructors to put greater effort into teaching and allowed students to engage with content through different perspectives or teaching methods. Burns and Mintzburg (2019) adduced that co-teaching often invigorates the classroom with new teaching methodologies and diverse teaching styles compared to a course taught by one instructor. Lock et al. (2017) asserted that modeling collaboration – even tension or disagreement – allows teacher candidates to gain an appreciation for colleagues supporting each other's learning. Through observation, teacher candidates can form their pedagogical understandings of co-teaching as part of their professional practices (Lock et al., 2017). The research also shows that students value enhanced feedback received through co-teaching (Steele et al., 2021). Whether instructors provide joint feedback on an assignment or informal feedback in class, different voices built in as supports allow pre-service teachers to grow professionally (Burns & Mintzberg, 2019).

Guidry and Howard (2019) discussed the potential impact of co-teaching on both student-teacher relationships and student relationships to content. Further, Wehunt and Weatherford (2014) found that co-teaching in higher education helps students and instructors develop mutual respect, leading to increased engagement. Through strategies such as think-aloud and structured class discussions, connections and authentic engagement can be better fostered with co-teaching pairs (Wehunt & Weatherford, 2014). Wilson and Ferguson (2017) advocated that having two experts to engage with allows students to feel more comfortable asking hard questions and taking risks. Additionally, connections between concepts can be made explicit, and information can be presented in multiple ways, leading to lasting retention and skill-building (Guidry & Howard, 2019). Various studies show that presenting material in multiple ways is beneficial from the instructors perspective (Morelock et al., 2017; Wehunt & Weatherford, 2014). In sum, there is an increasing body of literature about the need for and the benefits of usin co-teaching in teacher preparation. That said, Jones and Harris (2012) warned that instructors can exaggerate this benefit. Therefore, further substantiating research findings and including discu - sions of benefits and challenges in th literature are important.

Perceived Benefits for Instructors

The previous section focused on the benefits of co-teaching for students however, the benefits of co-teaching als extend to instructors (Buckingham et al., 2021; Lock et al., 2017; Steele et al., 2021). The professional experience of co-teaching allows instructors to see and experience different teaching methodologies, content, and materials (Buckingham et al., 2021). Further, ongoing collaborations allow co-teaching pairs to diversify their instructional content and take more pedagogical risks (Burns & Mitxburg, 2019). In addition to exchanging content and pedagogical knowledge,

Buckingham et al. (2021) noted that co-teaching can allow for exploring the use of technology. Drelick et al. (2023) recommended leveraging co-teaching to expand comfort and overall technology implementation through the one teach, one tech co-teaching strategy. Informal mentorship and collaborative technology integration can help remove barriers affecting technology integration during co-teaching (Drelick et al., 2023).

Co-teaching allows the individuals involved to engage in a unique collegial relationship. Co-teaching contributes to developing a sense of belonging to a team and building mutual respect, trust, and accountability between instructors (Buckingham et al., 2021). Morelock et al. (2017) stated that co-teaching can lead to building authentic mentoring relationships and interdisciplinary collaborations. For example, co-teaching in teacher preparation could support new faculty transitioning to their roles at an academic institution or foster interdisciplinary learning opportunities that strengthen the teaching partnership, engage asset-based approaches to teaching, and model more robust examples of making strong interdisciplinary connections within required content. Broadly, co-teaching can increase positive relationships between instructors (Morelock et al., 2017). Regular meetings to plan and reflect on learning experience can build a community of practice and strengthen professional relationships and practices (Steele et al., 2021). Thereby, instructors actively engage in the kinds of reflective practice expected of ed - cators at all levels and can intentionally model these aspects of their practice for students.

POTENTIAL BARRIERS FOR CONSIDERATION

Institutional Considerations

Support for Faculty

Successful implementation of a co-teaching model in teacher preparation is contingent upon institutional recognition and support (Buckingham et al., 2021). Rabin (2019) noted that professional development and resources for faculty may be needed to ensure success. At some colleges and universities, a faculty teaching and learning center may offer this kind of support (Wright, 2023).

Teaching Policies

Institutional policies for teaching and the distribution of an individual's time are also important considerations. There may be policies around when, how, and what instructors can co-teach (Rabin, 2019). Conversely, a lack of attention to co-teaching in policy may also limit faculty's use of this instructional approach or unintentionally communicate that co-teaching is not an option in postsecondary education. Policies governing the use of faculty time can further complicate discussions and even introduce new barriers that require administrative approval in order to use co-teaching in higher education. Finally, numerous studies have identified time a a major factor for co-teaching (Buckingham et al., 2021; Morelock et al., 2017). Time to connect with colleagues across disciplines, programs, or academic units is critical. Buckingham et al. (2021) recommended released time to build this collaborative relationship, which again requires administrative support and buy-in.

Space, Scheduling, and Load

In addition to providing time and resources, logistical challenges must be addressed by institutional leaders, including scheduling and officia distribution of course load (Morelock et al., 2017). Instructional space is at a premium on many college and university campuses. First, accounting for the physical space appropriate for co-teaching might need to be considered (Morelock et al., 2017). It is critical to address institutional-level concerns such as student-to-staff ratios (Buckingham et al., 2021). Wilson & Ferguson (2017) cited that institutions may raise class sizes, which can increase stress and workload for instructors. Further determining how faculty equitably receive teaching credit for co-teaching is needed.

From an administrative role, Steele et al. (2021) found that the successful implementation of co-teaching was centered on workload and compensation. By providing faculty with additional release time for planning and allotting full credit for co-teaching, highly qualified and interested faculty can b recruited (Steele et al., 2021). Morelock et al. (2017) validated various models for sharing the workload to institute co-teaching in teacher education. However, how credits are distributed to faculty can impact faculty's willingness and ability to participate. The workload associated with co-teaching can often exceed that of the allocated credit hours. Thus, faculty may be deterred if they receive reduced credit hours for co-teaching (Morelock et al., 2017). Institutionally, there is also concern about two faculty members receiving credit for shared time, which could be perceived as reducing the expected workload of one between two faculty members if the model for doing so is not clearly or sufficiently explained. These concerns could be reduced by adopting models that combine content across multiple courses. Guidry and Howard (2019) found success when blending content from intentionally combined courses, which allows faculty members to be associated with an individual course while simultaneously team teaching.

Another administrative consideration is how co-teaching assignments can impact the tenure and re-contracting processes. Morelock et al. (2017) reported that tenure track faculty may feel reluctant to engage in co-teaching experiences due to fear that the appearance of a reduced course load may be

looked upon unfavorably when being reviewed for tenure and promotion. Furthermore, Morelock et al. cited that teaching load reflected by credit hours especially in institutions with larger student enrollments, could be viewed with more scrutiny in the review process. This, along with many administrative concerns, should be addressed proactively through open communication and collaborative problem-solving (Rabin, 2019). Ultimately, whether or not there is institutional support to implement this innovative practice will affect faculty participation, and whether or not co-teaching is presented as valuable to the instructional landscape of higher education will be noticed across the institution.

Collegial

Co-Teaching Relationships

The need for a good working relationship between co-teaching colleagues has been well established as an attribute for successful co-teaching partnerships. In analyzing interviews with university faculty co-teachers, Steele et al. (2021) identified co - patibility, compassion, and trust as key elements in positive co-teaching relationships. Ideally, co-teachers are able to select their collaborative partner, but this is only sometimes the case (Scruggs et al., 2007).

Establishing a positive working relationship is critical to helping pairs establish parity, make decisions, collaborate across content areas, and proactively address tensions that may arise (Burns & Mintzberg, 2019). Lock et al. (2016) noted that previous relationships can impact how co-teachers function, as a general understanding of teaching practices, philosophies, and beliefs may already be established. This may be particularly important when co-assessing by providing feedback and grading students (Buckingham et al., 2021).

Communication & Teaching Styles

Effective co-teaching takes time and requires sharing control, which can be disorienting as co-teachers move beyond the comfort of one instructor managing a course (Lock et al., 2016). Jones and Harris (2012) found that some co-teachers noted compatibility, communication, willingness to adjust teaching style, and a need for teaching freedom as disadvantages experienced while co-teaching. These negative impressions underscore how uncertainty and barriers around innovating can intensify individuals' resistance to change. As such, Lock et al. (2016) recommend being mindful of co-teaching pairings to maximize the likelihood of having healthy rapport.

Academic Hierarchy

The dynamics within the institutional hierarchy may also need to be considered as a challenge in co-teaching. Morelock et al. (2017) discussed the impact of rank on building authentic co-teaching relationships in higher education. While co-teaching provides a space for mentorship between colleagues or even between faculty and graduate students, the power dynamics within these relationships may lead to difficu - ty with shared ownership or authentic reflections on the process. Buckingha et al. (2021) also noted that comparison among co-teaching faculty can be worrisome as faculty do not want to be perceived as more difficult, strict, or less approachable to students.

Course Content and Format

Determining which course or courses are well suited for co-teaching and how the content load will be co-managed by instructors is a complex undertaking. Co-designing one course with two instructors poses challenges of merging teaching styles, valued learning experiences, and instructional responsibilities (Burns & Mintzburg, 2019). Steele et al. (2019) proposed co-teaching courses across a blended elementary and special education program through intentional program design and committed faculty. The aforementioned institutional challenges often make this model more difficult to implement as capacit concerns limit the perceived value of co-teaching to administrators (Wilson, 2017). Further, student demographics are shifting away from what has been viewed as traditional college students. Ricci and Fingon (2017) alternatively recommended merging content across two courses from special and general education curricula to provide a more authentic experience and better mirror K-12 practices. Further, creating this learning experience models best practices for future special and general education teachers and better prepares pre-service teachers for building collaborative relationships through transparent pedagogical moments (Ricci & Fingon, 2017). When merging content, selecting appropriate courses can also be a challenge. Guidry and Howard (2019) found that merging literacy methods with content areas like social studies was successful when coupled with purposeful planning on developing assessments, syllabi, and field experiences

Massey and Strong (2023) called for teacher preparation programs to engage in reflective and innovative practice to attract and maintain diverse teacher candidates. With limited time in the curriculum for special education-focused content, blended or hybrid learning, which incorporates synchronous and asynchronous learning experiences, can deepen preservice teachers' active learning (Massey & Strong, 2023). This practice can also be applied to co-taught courses to ensure specific content i covered while maximizing co-teaching opportunities during face-to-face courses.

FIGURE 1: Key Elements for Co-Teaching Decision-Making and Guiding Questions

	Key Elements	Guiding Questions
Institutional 	• Support for Faculty • Teaching Policies • Space, Scheduling, and Teaching Load	• What types of professional development or resources, including time to plan, are available for co-teaching faculty? • What institutional policies need to be reviewed or modified to support co-teaching? • How can policies be adapted to allocate appropriate time for faculty to engage in co-teaching? • How will co-teachers' time and workload be accounted for in scheduling and credit load? • What spaces are available or need to be created to support co-teaching?
Collegial 	• Co-teaching Relationships • Communication & Teaching Styles • Academic Hierarchy	• How can existing relationships be leveraged or new relationships fostered to support co-teaching? • What structures are in place to ensure parity? • How will co-teaching demonstrate and communicate parity to administration and students? • What power dynamics are in play that could impact co-teaching pairs?
Course Content and Format 	• Focus Course(s) • Delivery options	• Which course(s) would be best facilitated through co-teaching? • If multiple courses, which courses have complementary content? • What is the best option for content delivery: o Face to face o Online o Hybrid/Blended
Student Success 	• Students' Perception of the Experience • Grading • Student Feedback	• What proactive plans can be developed to address potential points of confusion or tension in co-teaching? • How can co-teachers establish consistency in grading and feedback for students? • How can student feedback be effectively incorporated to improve the co-teaching experience?

Student Success

Students' Perception of the Experience

As students adjust to a new learning environment with two instructors, they may need to adjust to new learning styles, expectations, and communication styles (Jones & Harris, 2012). Morelock et al. (2017) found that students need clarification about which instructor i responsible for which learning tasks. Further, a lack of communication between instructors before, during, and after instruction can affect student learning by creating disjointed learning experiences and inconsistent messages (Morelock et al., 2017). While tense dialogues between co-teachers can provide unique learning opportunities where various perspectives are heard, Steele et al. (2019) warned this may affect how students view teachers' expert knowledge and their relationship with each other. It is recommended to develop a proactive plan and uncover potential points of tension before teaching the content (Lock et al., 2016).

Grading

Inconsistent grading and the rigor of grading and feedback can also be a point of frustration for students in co-taught courses (Steele et al., 2019). Burns and Mintzburg (2019) recommended co-grading and engaging in critical discussions beyond rubrics or established metrics to establish consistency and shared expectations for grades and feedback. In any arrangement, it is imperative that co-teaching faculty make purposeful, shared decisions about how to handle assessment, including the procedures and products, with their students (Winkelmes et al., 2019).

Student Feedback

Jones and Harris (2012) offered recommendations to support student success in the co-taught college or university classroom. Minimizing the adjustments students must make related to the pedagogical approaches, teaching methods, and assessment styles of two instructors can help reduce confusion. Further, surveying students to obtain feedback that instructors then reflec and act on allows students to be heard. Explicitly noting why some suggestions from students were taken or not also provides a level of transparency in teaching (Jones & Harris, 2012). Thus, the co-teaching classroom provides a unique context for modeling, eliciting students' contributions, and engaging in reflective practice as educators

Implementing Co-Teaching Practice

Figure 1 lists each of the categories highlighted in the literature, which is supplemented by an outline of key elements and guiding questions that can support practitioners in making decisions about implementing co-teaching in their own teacher preparation programs. The remainder of this article offers detailed explanations for how our university navigated each of these key elements, including implementing our programmatic commitments to inclusion with fidelity and navigating tension throughout the process.

Below, we describe how barriers to successful co-teaching implementation were addressed at one university in an Inclusive Education Program. The program was developed by faculty with both elementary and special education backgrounds and leads to dual certific - tion in these areas. Pugach et al. (2020) stressed the need for inclusive education programs to break down silos between

elementary and special education to shift the traditional views of teachers in these respective roles. As such, this program is built on addressing certification sta - dards, with a strong focus on UDL, high leverage practices, multi-tiered supports, and disability studies in education. Modeling co-teaching to students was identified as a program goal to provid teacher candidates with direct experience in a co-taught environment.

Committing to the Process and Engaging Stakeholders

In line with the program goals, modeling co-teaching practices was a high priority for faculty. With department-level leadership's support, program faculty interested in co-teaching committed to planning and collaborating to align course content. Faculty shared their backgrounds, experiences, and availability for in-person teaching during the vetting process of potential co-teaching pairs. Faculty members co-teaching courses were either special education faculty or faculty with dual certificatio and backgrounds in elementary and special education. Each faculty member elected to engage in this process and played a part in forming partnerships, which built upon previously established collegial relationships.

Instructional Load and Scheduling

To meet university-level demands for faculty course load, it was determined that each faculty member must be associated with one 3-credit course as a lead instructor, ensuring that both faculty members receive full credit allotment for teaching one course. Thus, in our model, two courses were paired and co-taught. As the instructor of record, each faculty member was responsible for managing one course, which included instructing, grading, managing the course shell on our instructional learning system, and providing feedback for all students enrolled in that section of the course.

Scheduling joint time for co-taught courses was initially a challenge. Paired courses were listed as co-requisites, and the co-taught sections of each bundled course were blocked off on the registration schedule for students who would be cohorted for the bundled co-taught courses. In two pilot semesters, each course was scheduled for a traditional 3-hour face-to-face teaching block. Therefore, students had the full instructional time required for both 3-credit courses. However, co-teaching via shared content was delivered over the last half of one course and the firs half of the other. The additional face-to-face hours in each course were used for course-specific purposes, including but not limited to, structured learning activities, small group work sessions, and one-on-one meetings with students or assignment support.

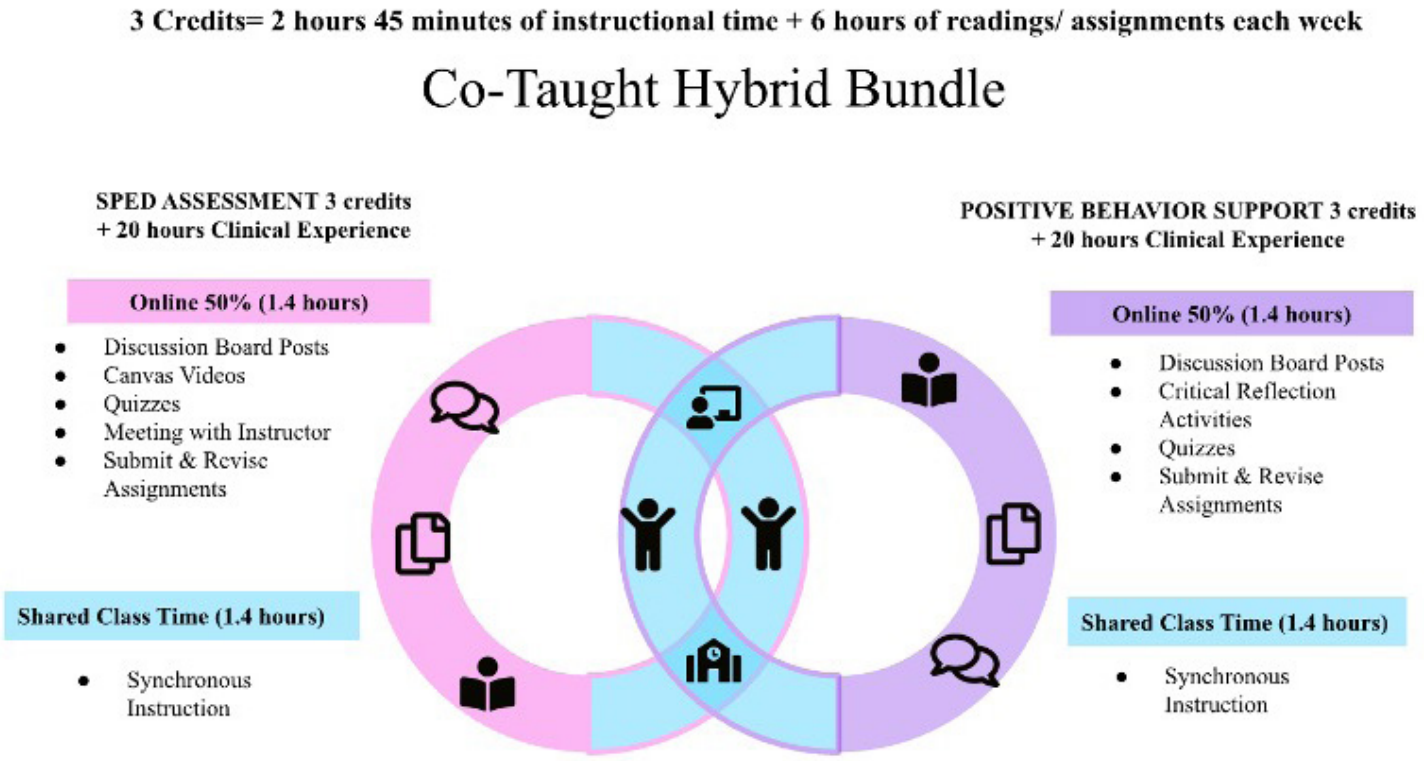
The physical space required to co-teach was also a consideration when scheduling courses. It was important to teach students in a room that allowed for the implementation of the six models of co-teaching. Classrooms with tables for group work and station teaching were identified. From that group o rooms, spaces that allowed students to be split into groups, with each having access to whiteboards and projectors, were selected for parallel or alternative teaching models. In order to secure these locations, program chairs worked directly with the administration to prioritize access to these spaces.

Selecting Courses, Aligning Content, and Determining Format

Firstly, courses that shared clear content connections (i.e., educational processes, technical/professional preparation skills, interdisciplinary application) were identified and paired. Then, based on faculty expertise and commitment to the process, sections of inclusive special education-focused courses were selected for co-teaching. Based on the course sequence of our program and shared field experiences, two special educatio courses were selected as "bundled" implementation sites for co-teaching over 2 consecutive years. The bundled courses were *Assessments in Inclusive Education* and *Positive Behavior Supports,* which are taken in Year 3 of our teacher preparation program. Both courses focus on technical aspects of special and inclusive education, including laws and policies protecting students with disabilities, multi-tiered supports, collecting data, creating and implementing interventions, responding to data, and informing stakeholders of progress. In Year 4, *Specialized Instruction* and *Assistive Technology* were bundled. Both of these courses focus on accommodations, modifications, and adaptations to the curric - lum to support students with disabilities. With shared field experiences for eac set of courses, learning experiences aligned to clinical requirements and fiel applications could be streamlined.

In addition to the complementary content, the selected courses were already developed as online learning courses and had a wealth of online materials from virtual instruction during COVID-19. The additional online content could be used to supplement co-taught materials. This reduced some of the planning and preparation required by the co-teachers. The original pilot design was then adapted, and the program team elected to run the courses as hybrid-bundled, co-taught courses. This meant 50% of the course content could be taught asynchronously online. This also allowed class hours to be scheduled with 1.5 hours in person and 1.5 asynchronous for each course with a 3-hour block of time for co-taught, face-to-face instruction. While the course schedule only reflected 1. hours for each course, instructors agreed to teach across the 3-hour time block and facilitate asynchronous instruction for their assigned course.

FIGURE 2: Visual Representation of Semester Hours for Synchronous and Asynchronous Learning



In aligning the content for each course bundle, instructors first met to compar existing syllabi. Several topics shared across both courses were easily scheduled in corresponding weeks. Major field assignments were also carefull reviewed and aligned to demonstrate shared elements or corresponding tasks and to provide pacing guidelines for the suggested progression of steps for working directly with students in the field. I is also worthwhile to note that due dates for major assignments were staggered in bundled courses, while redundant assignments were streamlined. Content unique to one course was identified, an co-instructors determined when and how it would be covered together.

In some cases, one instructor led full weeks of instruction; in others, students were given material to discuss in class, or asynchronous tasks (i.e., recorded lectures, discussion board, quiz, or mini reflection) were assigned. All content delivered in co-taught class sessions, including lectures and learning activities, was planned together. Additionally, course layout and content organization within the learning management system were streamlined to have a similar workflow and o ganizational structure in both courses. For example, students had formatted weekly overviews in each of the two bundled courses that presented due dates, readings, learning activities, and a breakdown of the use of co-taught instructional time.

Aligning Pedagogical Approaches and Implementation

Prior to beginning instruction, instructors sought to align course policies and teaching styles to streamline the learning process for students. First, co-established policies such as how to approach absences, late work, requests for extension or revisions, use of technology, and academic integrity were discussed. In alignment with a joint commitment to inclusive education, co-teachers adopted shared policies that provide universal access to common accommodations such as flexible deadlines, shared notes and open technology policies to model accessible learning through UDL.

More conversations were needed to establish sustainable learning goals, which would be non-negotiable criteria for successful completion of courses. These included using strengths-based language when discussing and writing about students with disabilities, completing allotted field hours accordin to our College of Education and State criteria, and demonstrating attention to professionalism in the field, aligned t the Council for Exceptional Children's (2020) Special Education Standards for Professional Practice and Special Education Professional Ethical Principles. With these non-negotiable skills and dispositions in mind, instructors could provide united feedback on key assignments. Finally, instructors examined how to best communicate shared

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expectations to students. Co-teachers also reviewed and came to a consensus about communication between them, the expected rate of communication, and how messages were distributed to students.

In teaching lessons, both instructors provided virtual updates as to what would be covered in class related to each course. Material that needed to be reviewed or completed prior to class was sent out as a reminder 2-4 days before the face-to-face class meeting. During class, instructors strived to explicitly use and engage students in the various models of co-teaching outlined by Friend (2010): one teach, one observe; station teaching; parallel teaching; alternative teaching; teaming; and one teach, one assist. The instructors also explicitly discussed their pedagogical choices with pre-service teachers, explaining how and why they made specific co-teaching decisions They further debriefed regarding the impact of these decisions from the learner experience, including potential ways to adapt the use of numerous instructional strategies from the university to the P-12 classroom. Following each co-taught lesson, instructors co-reflected on what worked and wha posed a challenge for instructors and/or students. Any points for clarification o additional resources needed immediately as a result of these reflective practic conversations were distributed in the asynchronous portion of the class. Instructors also documented suggested course updates for the following semester.

Maximizing Student Success

Despite instructors' best intentions and efforts, students entering co-taught courses still experience some confusion and express misunderstandings. Often, early in the semester, it is difficult fo students to think about content from two different perspectives based on the two courses. Additionally, the adjustment to hybrid courses, with 50% of the course hours being online, was turbulent. Students reported feeling overwhelmed by what was perceived as increased out-of-class work. To make the need for instructional hours related to earned credits explicit to students, Figure 2 is used in discussions about managing time and expectations in hybrid bundled coursework.

In line with recommendations from Jones and Harris (2012), faculty offer various opportunities for students to anonymously provide feedback on what is working well and what is not working. The co-teaching university faculty reviews feedback, and changes are made, or the rationale for a practice, process, or learning experience is explicitly shared with students.

As there are two opportunities for students to learn in bundled co-taught courses in our program (Year 3 and Year 4), instructors in Year 4 report less of an adjustment period for students when they enter their second semester of co-taught classes.

CONCLUSION

Co-teaching in teacher preparation programs is beneficial for bot pre-service teachers and instructors. To reap the benefits of this rich learnin environment and deepened professional collaboration, programs and instructors must set priorities to establish co-teaching and proactively address potential pitfalls around institutional procedures, collegial relationships, instructional

decisions, and expectations for student success. With administrative support, collaborative planning, creative problem-solving, and ongoing reflection one program established a successful model for co-teaching across courses. As each teacher education program has unique aspects, programs are encouraged to explore the benefits and barrier to success they anticipate within their institutional and program structures. By rethinking how courses are offered and embedding a best practice, such as co-teaching, into instruction, teacher education programs can provide innovative learning experiences to prepare teacher candidates to educate diverse learners in today's ever-changing classroom landscape.

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Diagnosis, Remediation, and Error Correction for Mathematics: How to Teach Pre-service Teachers

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ABSTRACT

Mathematics is a core academic subject, regardless of grade level or setting. Everyone uses mathematics in their everyday life, so being competent in basic mathematics is critical to independent living. One thing teachers can do to ensure learners are learning the mathematics concepts being taught is to diagnose and remediate the errors they are seeing. This skill involves digging deeper into the work of the learners and looking for error patterns. Unfortunately, this skill is not a focus of mathematics instruction courses that pre-service teachers (PSTs) take in their program. This article is aimed at mathematics instruction faculty and describes three main error types as well as what to do when they are identified

KEYWORDS

Diagnosis, errors, mathematics, pre-service teachers, remediation

Numbers are everywhere: phone numbers and addresses, prices at the store, recipes for cooking, and sizes for clothing, to name just a few. Interpreting these numbers and manipulating them through operations and analysis to provide meaning are important life skills. However, teaching mathematics, particularly to learners in special education, can be a difficult process. What, at face value, seem to be simple concepts can be problematic for some learners. The ability to complete basic operational computations can set up a learner for vocational opportunities and independent living (Newman et al., 2009). For learners in special education environments, these skills often do not come easy (Browder & Spooner, 2006, 2011). According to the National Assessment of Educational Progress (NEAP) testing, scores for mathematics for learners with disabilities have fallen each administration since peaking in 2007 for third-grade learners and 2011 for eighth-grade learners (U.S. Department of Education, 2022). Teachers need to carefully plan instruction with the idea that all learners have the ability to learn as long as the most appropriate methods are chosen. Learning the most effective ways to provide that instruction comes during their pre-service teaching programs.

Fluency with basic operations (addition, subtraction, multiplication, and division) is a critical skill learners need to be able to complete more advanced mathematical tasks. Codding et al. (2017) suggested that fluency with basic act retrieval can be positively related to math performance through high school. They also suggested that learners without that fact fluency struggle to perform the computational tasks required for things like word problems and data analysis. Operations can pose problems for learners who are not fluent in basic facts. Howeve , as a classroom teacher, there are two things you can do to redress the situation. Diagnosis and remediation of learner errors can allow instruction to be individualized to the learner or groups of learners with similar error patterns. Riccomini (2005) found that teachers did not look for error patterns or adjust instruction based on error analysis for subtraction problems, instead focusing on reteaching basic facts. For this reason, discussion of diagnosis and remediation strategies should occur during the pre-service teacher (PST) preparation program as part of mathematics teaching instruction. In mathematics courses for PSTs, diagnosis and remediation need to be considered as important as the pedagogy itself.

Diagnosis refers to identifying the error type the learner is making. An initial grading based on problems completed incorrectly can be utilized, but the additional step of identifying the errors will allow teachers to specifically ta get problems for the learners (Kubina & Yurick, 2012). If a learner makes many errors on a worksheet, the teacher may not need to examine each incorrect response to identify that error type. These errors will generally follow a predictable pattern, with some slight variance. However, one error type will generally be dominant for a learner and guide the planning for remediation. A minimum of three data points are required to identify a trend (Collins, 2012). However, Browder and Spooner (2011) suggested six data points since using the intersection method for drawing a trend line requires six points, and the trend is an important indicator of learning. If the error types are consistent across the firs few problems, there is a high likelihood that the issue has been identified, an the teacher can plan for remediation without assessing the remaining missed problems.

Remediation is the process of applying an intervention that is aimed at correcting errors (Merriam-Webster, 2022). There are three main types of errors that learners make (Hudson & Miller, 2006; Kubina & Yurick, 2012; Stein et al., 2018). Although the names of these error types vary slightly, they have common descriptions. Hudson and Miller (2006) refer to them as factual, procedural, and conceptual errors. Kubina and Yurick (2012) and Stein et al. (2018) call them fact, component-skill, or strategy errors. These three error types can provide the teacher with information about where the learner falls in relation to the current lesson. Because these error types increase in complexity, deciphering the error type for the learner will give the teacher a starting point for remediation of the skill, reducing the amount of time the learner will practice errors and increasing the fluency with which th learner completes the skill. As previously mentioned, these error types will present differently and be consistent as errors on worksheets.

Evidence-Based Practices and High-Leverage Practices

Education law requires the use of evidence-based practices (EBPs) in the classroom. According to the Every Student Succeeds Act, teachers should look for practices that meet one of the two highest levels of evidence (Every Student Succeeds Act, 2015). In addition, research has identified certain practices called high-leverage practices (HLPs), as particularly important in the delivery of quality instruction (McLeskey et al., 2017). Twelve of 22 HLPs relate to instruction. The more of these practices that are taught to PSTs who bring them to the classroom, the higher the quality of the instruction learners will receive. Instructors of PSTs should include these in their course design.

PST Preparation

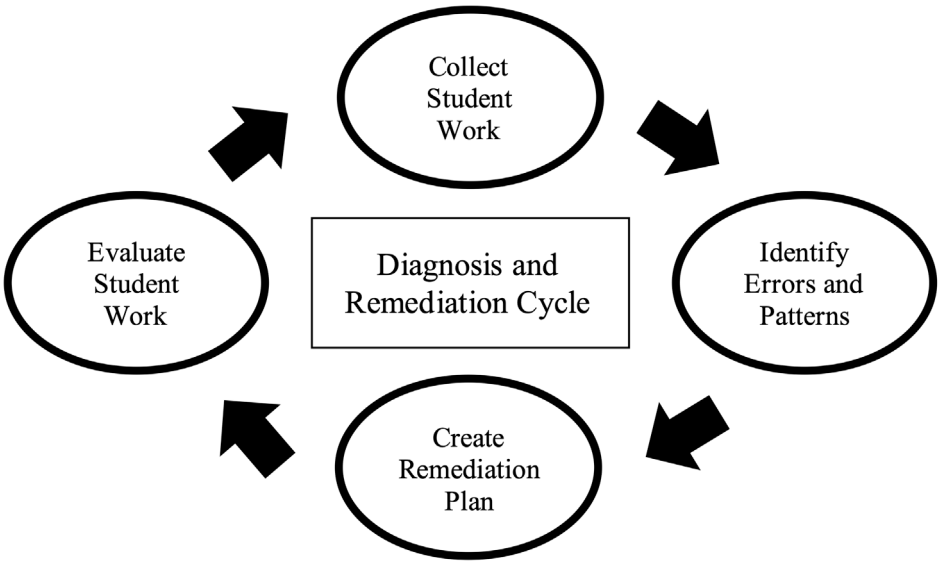
During teacher preparation programs, PSTs are required to take different types of mathematics courses to help them develop a basic understanding of the material they will need when they transition to the classroom. Not all PSTs enter their teaching programs with the same level of teaching self-efficac . Many PSTs have had poor experiences with mathematics in their academic careers, leading to negative attitudes toward mathematics and the potential for modeling anxiety in their instruction (Olson & Stoehr, 2019). Mathematics anxiety can lead to PSTs opting for teaching grades with easier mathematics or focusing on areas without mathematics included. However, according to Aksu and Kul (2019), a survey of over 400 PSTs found that those with higher levels of pedagogical content knowledge were less likely to experience anxiety and felt higher levels of teaching efficac . This suggests that providing PSTs with coursework aimed at addressing their self-efficacy an anxiety can yield better instruction when they enter the classroom. This improved self-efficacy can have an importan impact on learners down the road.

In their longitudinal study of 113 children, Vukovic et al. (2013) suggested that effective instruction for learners may need to include aspects of explicit instruction, review and practice, and connection to provide relevance. The relevance provided by teaching the material in a way that connects with the learner's life connects the concepts with familiar things and allows for greater understanding (Herron et al., 2009). Instruction designed to build skills rather than be regurgitated on a test will be more beneficial for the learne . This is important for inclusion courses preparing PSTs for mathematics instruction.

ERROR ANALYSIS

In determining why errors are occurring, Hudson and Miller (2006) suggested looking first at whether the learner i making errors due to carelessness or not knowing the procedures. This suggests that teachers should pay particular attention to the presentation of the lesson and how learners are engaged with the material. Carelessness can come from poor-quality instruction. Kenny (1980) identified several components of instru - tion common to a high-quality instructional format, including pacing, choral responding, and corrective feedback. For some learners, slower pacing can lead to inattention. Hudson and Miller posited this inattention can lead to a lack of understanding during instruction or carelessness in completing the work. After ruling out simple carelessness, teachers can then focus on issues related

FIGURE 1: Workflow Diagram of Diagnosis and Remediation Process



Note: Created based on Witzel, B.S., Riccomini, P.J., & Herlong, M. L. (2012). *Building number sense through the common core.* Corwin Press.

to procedural knowledge.

As mentioned previously, diagnosis and remediation are important steps in the learning process. Witzel et al. (2013) described four distinct steps a teacher should follow to provide the best outcomes for their learners, as described in Figure 1. The first step is to collec some sort of permanent product from the learner. This most often looks like worksheets completed independently. As with any type of data analysis, examining only one instance is not enough to determine patterns. Several instances of the learner's work need to be compared. Teaching PSTs the importance of data-based decision-making during class can reinforce the point. Modeling, an EBP, can be helpful in this regard. As an instructor of PSTs, you will be collecting some permanent product from your learners based on the assignments in your class. You can model data-based decision-making by describing how grades are calculated and how the errors are used to drive future content.

< Insert Figure 1 here >

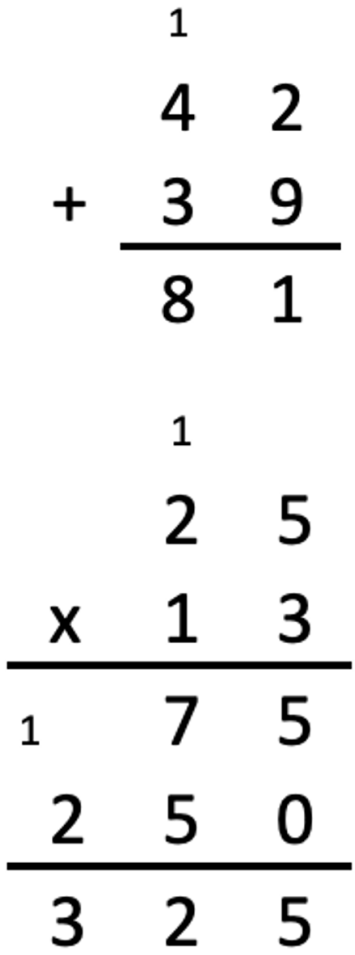
The second step is to identify errors in the work (Witzel et al., 2013). Identifying error patterns is important to help guide the instruction to reach learners who may be struggling. When evaluating learner work, teachers should firs determine whether the learner has identified the correct response. The number of problems answered correctly is not the only metric used to determine learning. Because incorrect procedures can still result in correct responses, counting the number of incorrectly answered problems on a worksheet can tell the teacher only how successfully the learner completed the work. To evaluate the level of understanding of those mathematical concepts, the teacher needs to examine each incorrect response to identify the error type the learner is exhibiting (Forbringer & Fuchs, 2014). Howell et al. (1993) suggested that having the learner demonstrate and explain their work can be a helpful additional step in identifying the cause of errors. This can guide the additional instruction the learner might need moving forward. For an already overworked teacher, this sounds like an additional burden. However, if done correctly, it can reduce the overall teaching load by focusing instruction where needed to improve correct responding and concept acquisition.

When working with PSTs in the classroom, there are a few ways to practice this step. First, the PSTs can use existing permanent products. These can be obtained from local school classrooms if access is permitted. They can also be generated from the computer. This exercise could be treated like a lesson, with some practice before a graded quiz. Another method, using technology, could be creating a simple Kahoot! (https://getkahoot.com/) for the PSTs to complete in class (Wang & Tahir, 2020). Kahoot! (2023) is a game-based application that requires participants to use a handheld device or computer to respond to questions. The instructor can create problems with different error types and give the PSTs time to review each problem and decide on the error type, choosing an option provided. PST responses are anonymous individually, but Kahoot! does show correct and incorrect responses. This allows the instructor to provide immediate corrective feedback without calling attention to anyone specificall (Plump & LaRosa, 2017).

However, these recommendations do not allow for Howell et al.'s (1993) suggestion to include the learner in the analysis process. They also recommend looking for exceptions to the common error patterns. These exceptions can be things like getting the correct response despite not following the typical algorithm for solving the problem. If the teacher only looks at the answer, they will miss the fact the learner did not completely understand how to complete the problem.

Once error patterns have been identified, teachers need to create plans t target instruction for that learner, focusing on addressing the errors (Witzel et al., 2013). This third step in the process is critical because teachers will identify potential missing prerequisite skills that must be explicitly taught. When these skills are identified, and instruction i focused on improving them, the learner

FIGURE 2: Potential error points in two mathematical operations



1. Add the two numerals in the ones column
2. Place the ones digit from the result below the line under the ones column
3. Place the tens digit from the result above the top numeral in the tens column
4. Add two numerals in the tens column together
5. Add the additional numeral above the tens column to the result
6. Place the result below the line under the tens column

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1. Multiply the two numerals in the ones column
2. Place the ones digit from the result below the line under the ones column
3. Place the tens digit from the result above the top numeral in the tens column
4. Multiply top numeral in the tens column and the lower numeral in the ones column
5. Add the numeral above the tens column to the result (if applicable)
6. Place the new result below the line with the ones digit in the result under the tens column and the tens digit in the result next to it (if applicable)
7. Add a placeholder 0 under the ones column.
8. Multiply the lower numeral in the tens column and the upper numeral in the ones column
9. Place the ones digit from the result under the tens digit column
10. Place the tens digit from the result above the tens column above the line
11. Multiply the lower numeral in the tens column and the upper numeral in the tens column
12. Add the numeral above the tens column to the result (if applicable)
13. Place the new result
14. Add the numerals in the ones column between the lines
15. Place the ones digit from the result under the lower line
16. Place any tens digit from the result above the top numeral in the tens column between the lines
17. Add all numerals in the tens column
18. Place the ones digit from the result under the tens column
19. Place any tens digit from the result above the top numeral in the hundreds column between the lines
20. Add the numerals in the hundreds column
21. Place the result under the hundreds column below the lower line

is more likely to be successful with that process in the future. This step is critical for moving the learners forward. Assignments in the PST mathematics class may focus on lesson planning. Referring to previous lessons to reteach missing skills or provide additional practice to weaker skills, the PSTs may design more comprehensive lesson plans moving forward.

Finally, Witzel et al. (2013) recommended that teachers continue to monitor learner performance to ensure the additional instruction has the intended effect. This creates a circular workflo (see Figure 1) that guides the teacher through a continual process of evaluating the teaching process used for that lesson. Although the key step in the process is identifying the errors the learner is making, it is just as important for the teacher to create an appropriate way to teach the skill that may be leading to the error. In a PST program, teaching this cycle should be included with each topic taught so the PSTs gain experience completing the cycle with each type of mathematical concept.

A formal task analysis, an EBP, can be useful in teaching and be presented to learners in forms like graphic organizers. Task analysis is also a HLP that is similar to systematically designing instruction toward a specific learnin goal or scaffolded supports (McLeskey et al., 2017). It can also be just as helpful for teachers in identifying the errors learners make on their formative assessments. Task analysis is simply breaking a multi-step job into its most simple components, the sequential combination of which completes the task (Cooper et al., 2020). Math textbooks may provide suggested task analyses, or they can be situation-specific. By examining th individual steps required to complete the problem, teachers may be able to find the patterns in learners responses that lead to errors. Additionally, it can provide guidance on what specific skill would need to be taught to remediate the errors. Figure 2 shows an example of the potential number of responses a learner must make to complete two different mathematical operations. Each step is a point at which the learner could possibly make an error.

The idea of diagnosis and remediation through task analysis stems from error prediction theory in consumer ergonomics (Stanton & Baber, 2005). Knowing the points at which errors may be made can allow for more effective, directed teaching. In the addition problem, there

are seven possible points at which the learner can make an error. The task requires several prerequisite skills, including vertical addition, addition with carrying, and knowledge of place value. Errors in any one of the steps can result in an incorrect final calculation For the multiplication problem, the learner can make an error in any one of 21 different spots. Because the operation requires knowledge and execution of both multiplication and addition, there is a greater likelihood of an error during initial teaching. Again, several prerequisite skills are required to successfully complete the problem. Learners must be able to distinguish between multiplication and addition parts of the algorithm to complete the problem. Additionally, they need to know the same general skills required for addition problems. It is important for teachers to figure ou why the errors are occurring.

Error Types

Solving mathematical problems is best done by following the prescribed steps in a problem-solving strategy specifi to the operation. Learners may commit errors at any point in the process. As mentioned previously, there are three main error types learners can make in mathematics operations (Hudson & Miller, 2006; Kubina & Yurick, 2012; Stein et al., 2018). Each has unique characteristics, but they can often be combined to cause errors. This can mean that diagnosing the errors becomes more important because the teacher will need to develop an appropriate remediation plan for that learner.

Basic Fact Errors

Basic fact errors are just that. Learners making fact errors have not mastered basic math facts related to the four operations: addition, subtraction, multiplication, and division. The earlier learners become fluent with these facts, the mor successful they will be with more complex mathematical concepts in the future (Gersten & Chard, 1999). *Fluency* is the ability to recall information quickly and correctly (Baroody, 2011). In addition, fluency exercises can be added to Tier 2 and Tier 3 interventions in a RtI/MTSS framework. Teachers often post basic math facts as tables in their classrooms. These tables can be helpful prompts for learners as they work to acquire fluenc with the facts.

Errors with basic facts are generally obvious and follow predictable patterns. Fact errors normally require only additional practice on those math facts; however, this may need to be specifically ta geted toward the error patterns discovered (Hudson & Miller, 2006; Stein et al., 2018). As mentioned, teaching PSTs to identify fact errors can be accomplished by embedding sample learner worksheets into lessons.

Teachers can provide additional practice with basic facts with explicit instruction and timed fluency exercises Many different commercial packages are available for teachers to use; however, this can be accomplished with simple worksheets and a timer. Teachers can use any worksheet, including ones they might already be using for general instruction. Practice can include the entire class or may be targeted to individual learners that require additional time and attention. College instructors can expose PSTs to these types of interventions during class by setting aside time for the PSTs to act as learners and practice using the materials. PSTs should be taught to change worksheets daily to avoid having the learners try to memorize the answers in a specific pattern Problems may repeat but not in the same order on the sheets. For example, fiv to 10 worksheets may be rotated so that the same worksheet is not provided on consecutive days.

Practice across the facts should progress in a focused manner. Generally, easier facts should be introduced first followed by related facts, and then reverse facts (Stein et al., 2018). Because of the inverse relation between addition and subtraction as well as multiplication and division, concurrently introducing both can create some problems for learners. By teaching basic math facts in this particular order, the learner practices sets that are different enough to avoid confusion. Sets with similar responses are introduced later once the learner is more fluent in the initial sets. Discri - ination practice can be achieved by including mastered problems with those in acquisition.

Manipulatives are another tool that learners can use to learn basic facts. Both concrete and virtual manipulatives are EBPs that provide a connection to the material. PSTs should be exposed to using manipulatives in their instruction course. Providing them with access to the materials and time to use them in mock lessons can help their understanding of the best ways to implement them while creating engagement for the learners in their class. Objects such as Unifi Cubes or Lego® bricks can demonstrate addition in a tangible, visual way. By dividing the class of PSTs into three groups, the instructor can simulate a classroom experience of stations. One group can work on fact problems using one type of concrete manipulative. Another group can practice fluency usin fact family diagrams. A third group can use virtual manipulatives or games for their practice on a Smart™ Board. By combining explicit instruction and real-world applications, teachers can effectively address fact errors in mathematical operations and support students in developing fluency and accuracy i arithmetic.

Component-Skill Errors

The second type of error, component-skill errors, directly reflects ho

well the learner is absorbing the lesson content. With component-skill errors, the learner attempts to use the strategies taught to complete the problems but misses some elements or performs the steps out of order (Hudson & Miller, 2006; Stein et al., 2018). Although the learner may also commit some fact errors, the error patterns show some confusion about applying the skills accurately. Component-skill errors are not solitary. Learners often make multiple types of errors, but they typically follow a predictable pattern.

In many cases, the learner will attempt to follow the specific instructions pr - vided by the teacher but will often show the same error across multiple problems on a worksheet. This indicates that the learner understood the basics of the lesson but simply implemented it incorrectly. Different remediation methods will depend on the specific erro . Typically, remediation involves reteaching a part of the basic algorithm. For example, when a learner makes an error in renaming, a teacher can provide additional practice with place value and placing digits in the correct location, critical skills for multi-digit addition. Because all operations are related, remediating this skill can have long-term implications for the learner. Using prompts like graph paper to assist with demonstrating place value, the teacher can help the learner orient the problems vertically and remediate this problem. Because addition and subtraction are inversely related operations, remediation looks similar for subtraction problems. Practice with renaming during addition instruction can potentially reduce errors with subtraction.

As the problems become more complex, the opportunity to commit component-skill errors increases. With multi-digit multiplication and division problems, learners must also use addition and subtraction and may confuse the skills required to perform those operations. Like addition, remediating multiplication can involve practice with skip counting, which can remediate this error. A multi-digit problem error involving renaming could be the result of the learner placing digits in the wrong column. This error is similar to the type seen in multi-digit addition problems. Practice on place value can correct this error since the learner knows the process for completing the problem.

Division problems present differently than the other three operations because the problems look substantially different. The division sign (÷) is replaced with the more general checkmark-looking sign. This does not mean that learners make different errors. Identifying these errors allows the teacher to efficiently ta get the errors for remediation while keeping the learner engaged with the current lesson. For example, learners can still make renaming or place value errors. These can be addressed by the same methods used for addition or subtraction. By reviewing each learner's work, a teacher can determine remediation needed for both specific learners as well as th entire class. Multiple learners are likely making the same errors.

Instruction for PSTs on component-skill errors can include practice in task analysis of the operations. Providing a few problems in each of the operations and discussing the results as a class can facilitate dialogue on how to teach the steps. In addition, by introducing manipulatives, PSTs can demonstrate how to complete the steps. This can become part of their lesson plans as an assignment.

Strategy Errors

The final error type that learners coul make is strategy errors. Teachers provide strategies, or algorithms, to the learners, giving them a method for solving the problems. These typically consist of a set of steps (task analysis) the learner should follow. With strategy errors, learners show they have not learned the concepts being taught. Strategy errors differ from component-skill errors because the learner does not demonstrate the skills required to complete the strategy. With component-skill errors, the learner can follow the strategy and complete some steps correctly but lacks skills with some of the components. Strategy errors are some of the easiest errors to identify but require the most effort to correct.

Remediation for strategy errors involves reteaching the concepts from the beginning. It will also likely involve identifying and teaching missing preskills as well. One of the more common strategy errors would be the learner using an addition algorithm to complete subtraction or multiplication problems, which could also be related to a deficie - cy in fact knowledge. Facilitating this knowledge with prompts, the teacher can label each part of the problem and its place on the fact family diagram for the learner to include either on the worksheet or in a graphic organizer.

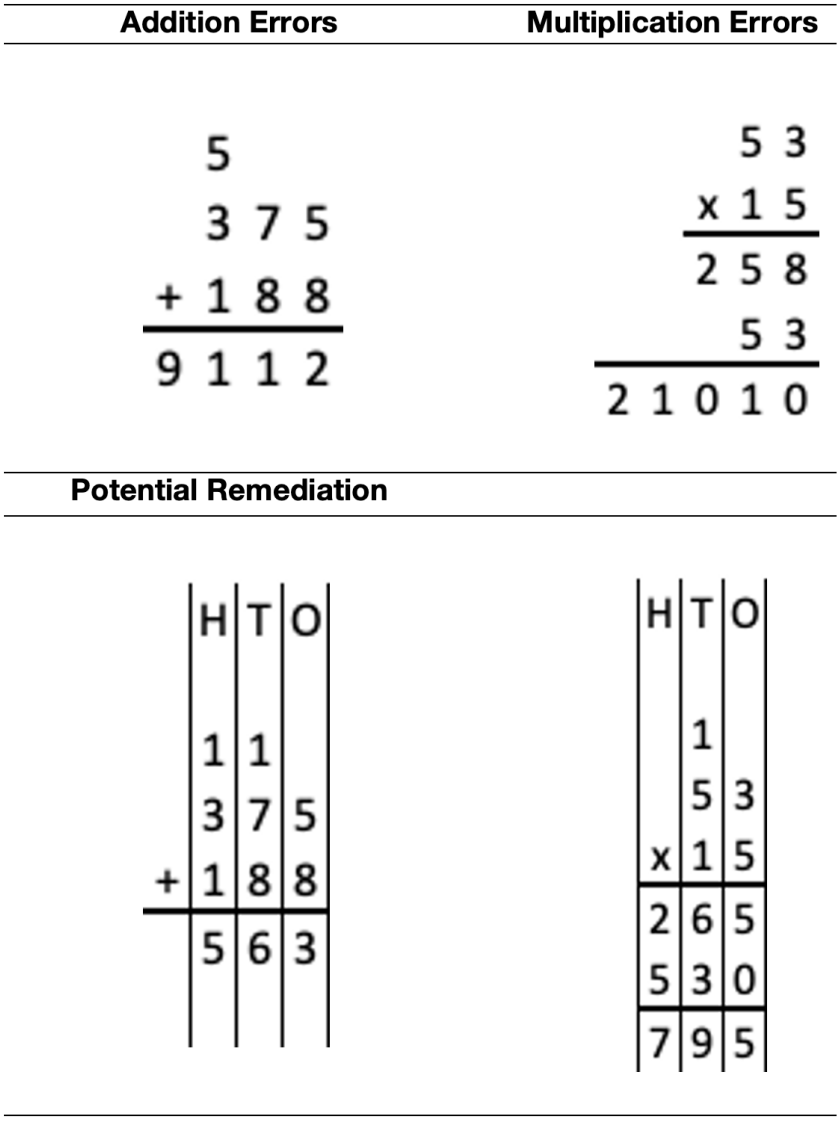
Teaching strategy errors in mathematical operations involves identifying common miscalculations and providing targeted instruction to address these errors. A common theme across all error types is the use of explicit instruction on problem-solving strategies. By breaking down complex operations into systematic steps and demonstrating problem-solving techniques, students can develop a deeper understanding of the underlying concepts and learn how to approach mathematical problems strategically. Teachers may also identify missing prerequisite skills that can be expressly taught to assist in strengthening the learner's use of the algorithm.

Utilizing visual aids and both concrete and virtual manipulatives can also help students grasp abstract concepts and visualize problem-solving strategies. For

example, graphic organizers, number lines, base-ten blocks, or geometric shapes can provide concrete representations of mathematical operations and aid in comprehension. Additionally, interactive activities and games that simulate real-world scenarios can engage students and encourage them to apply problem-solving strategies in context. Culturally relevant examples can also assist in making connections (Cook et al., 2023; Dueker & Chitiyo, 2023).

Encouraging students to explain their problem-solving strategies to their peers or the teacher and justify their solutions can deepen their understanding and help them identify and correct errors. By combining explicit instruction, visual aids, interactive activities, and collaborative learning opportunities, teachers can effectively teach strategy errors in mathematical operations and support students in becoming more proficien problem solvers. Teachers should think carefully about how to adjust the lesson to better present the concepts.

FIGURE 3: Addition and Multiplication Errors with Potential Remediation



Remediation Examples

The problems in Figure 3 are examples of addition and multiplication problems with common errors learners might make. The addition problem has both fact and component-skill errors. In this example, the learner has correctly tried the addition but erred in the factual computation. Because this error might be due to simple inattention, the teacher should first try to identify a consisten pattern of similar fact errors across multiple problems and worksheets. If that is shown to be the case, the teacher would want to employ a remediation strategy of providing additional practice on single-digit addition fact problems.

In addition, the learner has made errors related to renaming. This caused the written sum to be significantly higher than the correct answer. These could be either component-skill or strategy errors. Since the learner would place the entire answer under the line in a typical single-digit addition problem, the learner demonstrates he understands how to complete that part of the problem when solving the ones column. However, renaming is required for multi-digit addition problems. Also, when adding the tens column, the learner tried renaming but placed the tens value under the tens column and placed the ones value above the hundreds column. The first of thes errors might suggest that the learner had not learned the basic algorithm for multi-digit addition. The fact that the learner tried but was unsuccessful at renaming in the tens column shows that the learner did know to rename but failed to do so in the ones column. Remediating this would likely require discussions of place value and its relation to the columns in an addition problem. The second remaining error shows the learner tried to place the numerals in the columns but mixed them up by placing the tens value under the line and the ones value above the hundreds column. This resulted in the incorrect addition of

the hundreds column and a vastly larger incorrect sum.

The multiplication problem in Figure 3 also shows multiple errors. When calculating the ones column, the learner added instead of multiplying. This is a basic strategy error left over from single-digit multiplication. Strategy errors typically require reteaching of the algorithm. From there, the learner correctly multiplied the digit in the tens column in the upper numeral with the digit in the ones column from the lower numeral, indicating knowledge of multi-digit multiplication properties. The learner then failed to add a placeholder under the digit in the ones column in the product. This could be a component-skill error if it is not a consistent pattern. If the learner makes this error for each problem, it would be a strategy error. The multiplication of the rest of the problem is correct. With a component-skill error, the teacher can provide practice with prompted worksheets using graph paper or column lines.

However, additional errors occurred during the addition of the products. This demonstrates the relationship between addition and multiplication and the importance of ensuring learners have a strong foundation in addition before beginning multiplication. First, the learner made a fact error in adding eight and three in the ones column and an additional error by not renaming. The learner committed the same renaming error in the tens column. Because these two renaming errors occur in the same problem, they may indicate a strategy error that relates back to addition. The final product, 21,010, is considerabl higher than the correct answer of 795.

These two examples demonstrate that learner errors are not limited to one of the three types. Learners may make multiple errors in a single problem. If that error is consistently displayed, the teacher can create appropriate remediation strategies targeting specific deficit

In the figure, the remediation is f - cused on the concept of place value. The problems are embedded in a series of columns corresponding to the different place values. Each column is labeled above with a single letter, which might be part of the problem. The vertical lines can guide the learner on the placement of the digits once they have identifie the value. As with any prompt introduced to learners, these vertical lines and letters would need to be faded as the learner becomes fluent with the concept An easy way would be to fade the letters and then the lines. However, consistent practice will be required until the learner achieves a level of understanding.

CONCLUSIONS AND IMPLICATIONS

Teachers in the field must understan the importance of diagnosis and remediation in mathematics. This should begin during PST training. During teacher preparation programs, mathematics instruction classes should focus on content creation and improving the basic understanding of mathematical concepts. However, by including examples of errors learners might make during PST instruction, where they fit into th various error types, and how to address the issues presented, teachers of mathematics instruction can set the stage for their understanding and more frequent use in future classrooms. Instructors of PSTs should embed discussions and practice with diagnosis and remediation into every mathematical concept taught in the class. By providing this additional instruction to PSTs, faculty may reduce mathematics anxiety, increase content knowledge, and provide a way for the PSTs to understand their learners' mathematical understanding (Olson & Stoehr, 2019). Diagnosis and remediation analysis can also be an important way to address struggling learners. Using the information from a formative assessment, teachers can easily target instruction to ameliorate misunderstandings. Ensuring PSTs understand the importance of that relationship is a critical part of their training and should be included in any mathematics instruction course they take.

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Special Education Teacher Preparation in Hungary

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ABSTRACT

This article provides an overview of general and special education in Hungary, including training and teacher preparation. We examine trends towards inclusion and the challenges of training general education teachers to support students with disabilities. We also outline the process of qualifying for special education and explore teacher preparation in Hungary, including the various paths to becoming a certified teache and the ongoing professional development requirements. This article concludes by addressing the historical importance of public education in Hungary and the laws and policies pertaining to special education. We highlight current issues in special education and teacher preparation, such as the diagnosis process for autism and the need for improved support and pay for teachers. Overall, a comprehensive overview of special education in Hungary is provided, highlighting its challenges, progress, and areas for improvement.

KEYWORDS

Inclusive Education, Special Education, Students with Disabilities, Teacher Preparation

INTRODUCTION TO HUNGARY

Special education in Hungary has changed drastically over the years. In this article, we introduce Hungary as a country to better understand the circumstances surrounding the general and special education systems that are located there. The size of the population, the type of government, and the economic situation in Hungary all contribute to the type of education that students with and without disabilities are receiving. Also affecting the type of education that students receive, is the amount of preparation embedded into the teachers' training programs. Lastly, we will discuss the issues around special education in Hungary and offer some topics for future research that might benefit the communit and inform special education practices.

Demographics

Hungary is one of the oldest countries in Europe. Slovakia, Ukraine, Romania, Austria, Slovenia, Croatia, and Serbia border Hungary. Of the 9.7 million people who reside there, over 93% are Hungarian, with some of the ethnic minorities being Roma, Germans, Slovaks, Croats, Romanians, Serbs, Poles, Slovenians, Rusyns, Greeks, and Armenians (Vardy et al., 2023). With majority of the population being Hungarian, the most common language spoken is also Hungarian. Hungarian is one of the only languages in Europe that is not related to any other major European language, which could make it difficult for students there to l arn a second language. The country is currently divided into 19 counties with 174 different districts. However, this has not always been the case, and Hungary has changed significantly ove the last century.

Hungary's borders changed after World War II, causing the population in Hungary to decrease severely. After the war, Hungary lost 71% of its land mass because of the Treaty of Trianon in 1920 (Vardy et al., 2023). Hungary's population slowly started to recover in the early 70's and 80's but then began to decrease and is still low today (Vardy et al., 2023). Hungary is currently facing a negative natural increase rate,

meaning the number of deaths outweigh the number of births. It is important to note this decline in population when considering the number of students and teachers that are in the schools and what laws the government has created for this population.

Government

Hungary had a functioning parliament for about 80 years before the communists took over in 1948, creating a Soviet-style political system for the next 40 years (Vardy et al., 2023). Now the current political system in Hungary functions under a multiparty parliamentary democracy. They elect a president every five years who can only serve for two terms total. However, unlike the United States, their president only has power over the military, whereas it is the prime minister who has power in other areas of the country and duties over the government (Vardy et al., 2023). This is important to note because the government has a significant effect on the education system in Hungary, especially in relation to the laws around education and what that means for teachers and students. Not only that, but the government also significantly impacts the economy, which also influences the types of jobs and education that are available for students.

Economy

Before 1948, agriculture employed more than half of Hungary's population, but that decreased to about one eighth of the population by 1990 (Vardy et al., 2023). Hungary is self-sufficient in their food production, which is in large part due to a climate that is ideal for most crops. Because farming and agriculture are so important to Hungary's history and economy, private farms occupy roughly one-eighth of the land mass in Hungary. Despite agriculture employing most of the Hungarian population for many years, it is not the only economic opportunity.

In 1948, Hungary introduced a centrally planned economy which opened millions of new jobs in industry and service. Hungary controlled the wages and the prices for consumer goods, keeping wages low to create these opportunities and prices high for everything beyond staples in order to encourage saving. The government then used this money how they saw fit. The purpose of this new economy was to create economic growth for Hungary, which continued throughout the years with several more changes. This expanded Hungary's economy to include machinery, transport, export, and tourism (Vardy et al., 2023).

However, during the global recession, many economies failed and created an economic crisis for several years that eventually sent Hungary into a recession. In 2010, Viktor Orbán, the current prime minister in Hungary, came to power and brought a drastic change to the economic policy (Vardy et al., 2023). He put into place *Orbanomics* which allowed many menial jobs to be created, dropping the unemployment rate to 3.8% in 2022 (Hungarian Central Statistical Office, 2022b). The population of Hungary, the government, and the economy all contribute to the number of students who attend school and what types of schools they attend for both students with or without disabilities because of the laws, policies, and traditions that are in place.

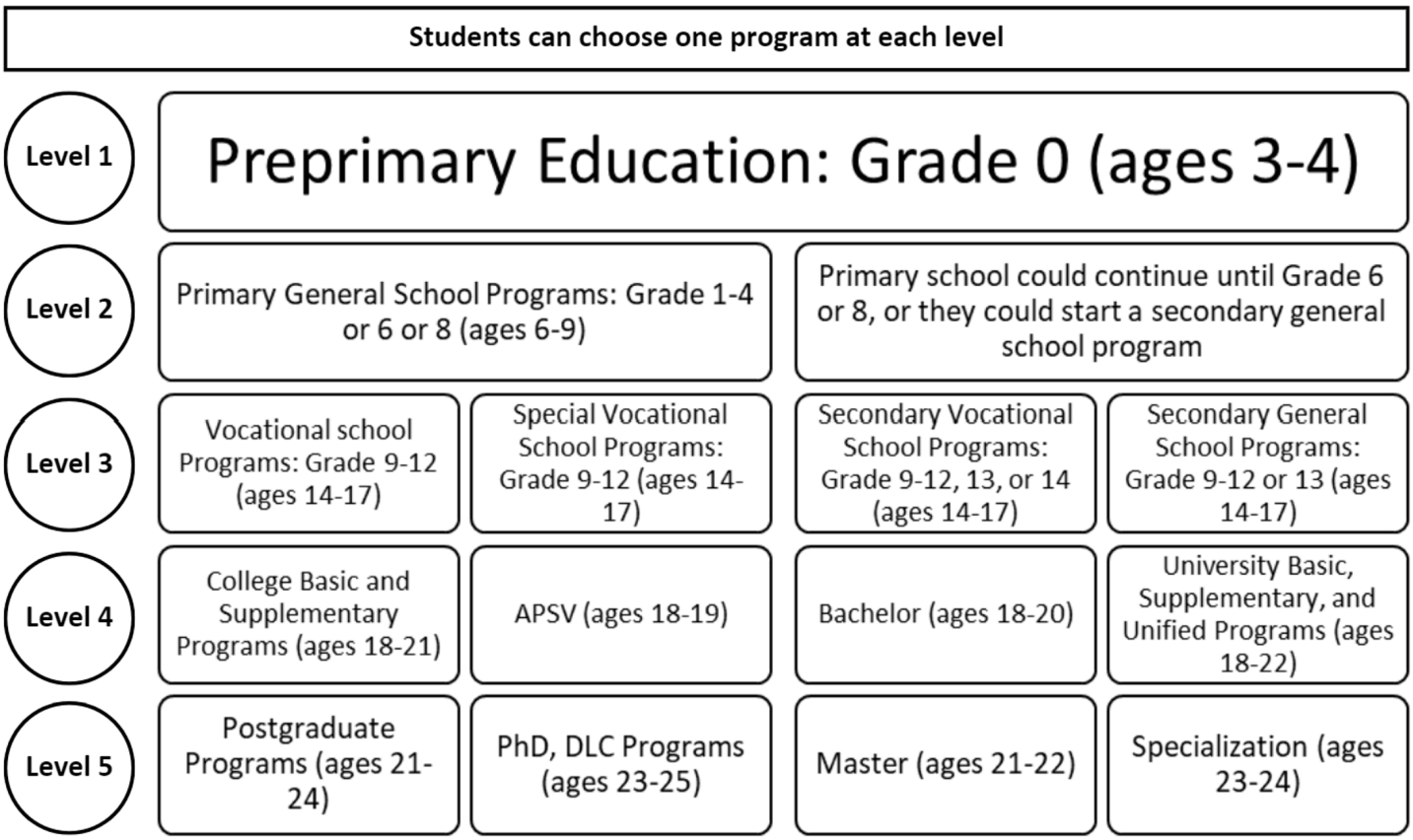
GENERAL EDUCATION IN HUNGARY

Public education in Hungary dates to the eighteenth century, but the first modern education act, put into place in 1868, was called The Education Act (Monostori, 2014). This act required compulsory education, meaning that that all children ages six to twelve would be required by law to attend school. Currently, the requirement is ages six to sixteen (Monostori, 2014).

Schooling is a main priority in the country of Hungary, and in 2020, about 82% of the three to twenty-two-year-old age group attended formal education (Hungarian Central Statistical Office, 2022a). This education includes learning a second language in the fourth grade, which is typically English, and a third language in secondary school. Throughout a child's time in school, they will attend pre-primary school or kindergarten, primary school, secondary school, and post-secondary education (see Figure 1; Laposa et al., 2015). Because Hungary has a free choice of school policy, families must decide where to send their children. Any child who attends a public school must apply and be accepted to that school (Radó, 2020). Hungary also has one of the highest percentages (15.4%) in Europe of primary school pupils attending private school. Radó (2019) claims that the percentage is large enough to impact the economy in Hungary and produce a systemic effect. However, each primary school will not accept all the students who apply and will instead decide which students to accept based on desirable traits, including family background (Hegedűs & Sebestyén, 2023; Radó, 2020).

Secondary general education is a more challenging process and is mainly based on primary school performance, which many feel is unfair in its selection process (Radó, 2020). The schools' acceptance and admission procedures are highly rigorous and require a strong resume (European Commission, 2023a). There are typically entrance examinations on mathematics and Hungarian that the student must submit to their schools of choice. Some schools require written and oral examinations as well (European Commission, 2023a). Similar to applying to secondary general education, graduating secondary school is a rigor-

FIGURE 1: Hungary School Structure



ous process in Hungary. During their upper secondary education, students in Hungary must complete at least 50 hours of community service (European Commission, 2023a), and complete a school-leaving examination. The state regulated the secondary school-leaving examination, and it became part of the entrance examination to higher education institutions. To prepare for the language portion of the leaving exam, some schools will teach subjects in a foreign language, such as history, mathematics, or physics (Hegedűs & Sebestyén, 2023). Once students finis public education, they can continue their education if they desire through college, university, or a specialization program (see Figure 1; Laposa et al., 2015). The students will receive scholarships and college acceptance based on how high of a score they achieved on the school leaving examination (European Commission, 2023a). If a student decides to attend vocational school instead of secondary school, they will go straight into the labor market following graduation and a competence assessment (Hegedűs & Sebestyén, 2023).

There are different types of universities in Hungary, including public and private institutions. The state runs public institutions whereas religions, non-profi organizations, and for-profit o ganizations run private institutions (Bacskai et al., 2020). "In 2015, 7 of 27 universities in Hungary were private, and 30 of 40 colleges were private" as well (Bacskai et al., 2020). In 2015, different church denominations ran five of the seve private universities, and churches also ran 21 of the 30 private colleges, while nonprofit and fo -profit o ganizations managed the remaining institutions (Bacskai et al., 2020). These different types of universities have different outcomes in terms of teacher retention, with most teachers from church-led training programs planning to stay in the profession. For institutions to properly prepare students for higher education, they need to have a well-trained staff of teachers who are determined to help their students achieve greatness.

General Education Teacher Preparation

To become a teacher in Hungary, there are different options in which one could specialize, including which type of school at which they would like to teach and which subject (Symeonidis, 2019). To become qualified to teach preschool future teachers must have three years of theoretical training and one year of practical training, which is the equivalent to a bachelor's degree (Böddi & Serfőző, 2019). Kindergarten and primary school teachers require a bachelor's degree as well (Bacskai et al., 2020). Bacskai and colleagues (2020) describe the Hungarian education system for teachers.

They said that teachers obtain degrees in primary education, including firs and second primary, through a four-year college program with only 15-20% of the time dedicated to practical training. Secondary teacher training typically lasts about six years; however, it is a different process because the number of years their degree lasts depends on their subject (Bacskai et al., 2020). However, there were some recent changes for teacher's preparation in Hungary.

In 2013, Hungary reintroduced undivided teacher education with some changes (Bacskai et al., 2020; Symeonidis, 2019). This meant that primary school teachers received five years o training and secondary school teachers received six years of training, where both completed the same number of credits. The last year for both programs consisted of the teaching practice. With this practice, there is more emphasis placed on pedagogical-psychological training and disciplinary education. Those have become more important in Hungary's education system because the interdisciplinary nature of university education was weakened and instead focused on courses in pedagogy and psychology to strengthen the competition between disciplinary and teacher training for teachers (Bacskai et al., 2020).

While completing the courses required to become a certified teache , students in the program can complete student teaching and practicum hours before graduation (Bacskai et al., 2020). The practicum hours and student teaching take place during the last year of the student's higher education program. Universities assign an infield mentor to th students, who they shadow during their last semester of teacher training (Bacskai et al., 2020; Symeonidis, 2019). The number of practicum hours spent, and the content learned depends on their area of specialization, including Hungarian, mathematics, science, etc. During those hours, the student will have time to teach lessons, assist in group work, and work one on one with students in the mentor teacher's classroom. The universities grade their students through observations and assignments which students complete in the mentor's classroom.

During teacher training at a university or college, teachers can join the secondary teacher program after one year of education in their field(s) o specialization (Bacskai et al., 2020). Each teacher chooses the subjects and areas of specialization that they would like to teach. The teachers learn how to create tailor-made instructions for each individual student, thus creating their own curriculum. However, in secondary general education, teachers will often prepare students for their school-leaving examinations and create the curriculum based on those requirements (European Commission, 2023a).

SPECIAL EDUCATION IN HUNGARY

Hungary has led the way for changes across Europe in relation to special education. Hungary started the firs separated school for deaf students in 1802, which was also the year that they established the special education system (Toth, 2014). Though it has its flaws Hungary has a long history of separate special needs schools in an attempt to best help these students. The also firs and only special education college for teachers in Hungary was founded in 1906 (Toth, 2014). Since that time, there have been many pieces of legislation that have changed the course of special education history in Hungary. This is important because Hungary has also seen a growing trend of students with disabilities relating to physical disabilities, speech impairments, hearing impairments, intellectual disabilities, autism spectrum disorder, emotional and behavioral disabilities, learning disabilities, and visual impairment (Magyar et al., 2020; Toth, 2014).

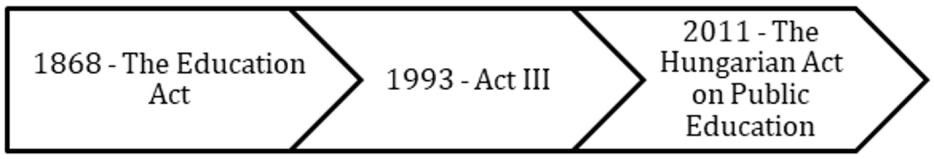
When a child is diagnosed with a disability in Hungary, it is decided by a committee of educators, special education needs professionals, and physicians (Czerwińska et al., 2020). This committee of professionals will recommend placement; however, the final decisio about where to place the child is up to the parents. According to the Hungarian Act on Public Education of 2011, students with special educational needs are those who require special treatment, have physical, sensory (visual or auditory), intellectual or speech impairments, autism spectrum disorders psychological development disorders, developmental disorders (severe learning difficulties attention deficits or behavior issues), o multiple disabilities (Act CXC of 2011 on National Public Education, 2011). This committee is responsible for recommending if a student should be transferred to a different school and if they need early intervention, specialized care, or tutoring. There are also many supports available to students with special needs in Hungary, including counseling, early development and care, development support and training, speech therapy, pedagogical care, conductive care, gifted education, and special physical education (Czerwińska et al., 2020). Schools stress the importance of socialization to help acclimate the child to daily routines, expected behaviors, and social skills. In Hungary, parents have the right to choose if their children with disabilities are instructed in a special institution due to the Hungarian Act on Public Education of 2011 (Act CXC, 2011). One of the large reasons that Hungary has special institutions for students with disabilities is because of how many students there are and how much easier it is to help them in a specialized institution.

In 2019, there were more than 88,000 special education needs students in the education system in Hungary (Magyar

et al., 2020). Magyar and colleagues (2020) found that 60% of the special needs students were educated in an inclusive environment. This means that separated schools are becoming less common now than they ever were, despite the rise in individuals with disabilities. This could be due, in part, to how Hungary views students with disabilities. Hungary is part of the European Union and they have eight guiding principles in how to view individuals with disabilities: 1) respect for inherent dignity, individual autonomy including the freedom to make one's own choices, and independence of persons, 2) non-discrimination, 3) full and effective participation and inclusion in society, 4) respect for difference and acceptance of persons with disabilities as part of human diversity and humanity, 5) equality of opportunity, 6) accessibility, 7) equality between men and women, 8) respect for the evolving capacities of children with disabilities and respect for the right of children with disabilities to preserve their identities (Department of Economic and Social Affairs, 2006). These principles help guide schools to know what supports and help to offer students with disabilities and how to treat them within the education system.

Hungary is currently striving to create a more inclusive school system where only students with severe disabilities attend specialized schools. However, the problem that Hungary is currently facing is how to train general education teachers to properly instruct students with disabilities. Currently, general education teachers receive very little instruction or training on how to teach individuals with disabilities. Despite this, an incredible example of training and inclusion was found at a primary school called, Gyermekek Háza Alternatív Általános Iskola és Gimnázium (Czerwińska et al., 2020). This school specializes in inclusion and completely mainstreams children with disabilities into every classroom. Students with disabilities at this school never leave their classroom, and a special educator comes to them to give them more modified instructio when needed. One of the reasons that this school's model is successful is because every general education teacher is trained properly on collaboration and how to teach children with disabilities (Czerwińska et al., 2020). This is a good example of how Hungary is beginning to increase its inclusion practices in the schools, and this can be furthered by teacher preparation.

FIGURE 2: Timeline of Education Laws in Hungary



Special Education Teacher Preparation

A special education teacher commits to a specialized four-year university program for their training (Bacskai et al., 2020). Like general education teachers, special education teachers will choose one (or two) of eight specialties. Those areas consist of education for persons with autism spectrum disorder, emotional and behavior disorder, hearing impairments, intellectual disabilities, learning disabilities, physical disabilities, visual disabilities, and speech therapy (Perlusz et al., 2014). The purpose of specializing in one of these areas is to offer the best support possible for that specific group of students. After future teachers receive a general introduction to special education and related topics, they will then continue their studies in the one or two areas of specialization that they chose. Once students graduate from their higher education teaching program with their specialization, schools hire them as full-time teachers. Before a school hires a special education teacher fully, the school wants to know that they are competent in their abilities, which primarily comes from participating in the career model.

The first two years as a teacher ar considered a compulsory traineeship period in which the teachers are examined and trained, like an internship in the United States (Sápi, 2019). They are similar because both the traineeship and internship consist of the student teacher shadowing a current teacher to gain experience and practice in the field befor becoming a full teacher. At the end of the two years, the teachers are given an evaluation exam and are asked to create a written portfolio of all that they have completed in the two years. If they pass, then they will continue as teachers. The teacher career model of 2013 created this two year program (Sápi, 2019). In this model, the following categories were defined: novice teache , teacher I, teacher II, master teacher, and researcher teacher. At the same time certificatio and evaluation systems were launched for this model (Sápi, 2019). However, training for special education teachers does not stop there.

Even after certification is awarded teacher training is continuous in Hungary. Every six years, teachers can increase their salary if they have completed the necessary in-service teacher training depending on the school where they work (Nagy, 2020). Teachers are trained even after they graduate university to focus on competency, expanding frameworks, linking theory and practice, and developing their profession (Nagy, 2020). Teachers are encouraged to continue

learning for these purposes, including helping the students that they work with. However, teachers also must work within the framework of the laws and policies in place and must understand how those work and how they impact their students, especially their students with disabilities.

Laws and Policies for Education

Over time, many laws and policies have been put into place to help give people with disabilities more rights and more freedom (see Figure 2). We have already mentioned some of these, like The Education Act of 1868 (Monostori, 2014) and the Hungarian Act on Public Education of 2011 (Act CXC, 2011). Another important act that impacted education in Hungary was the Act III of 1993. This act gave the families of individuals with disabilities an allowance to help assist in the extra costs and needs of those with disabilities. This act also gave each family money to provide extra care from nurses as needed. Overall, it was a beneficial act that eased much of the stress and financial burden that comes with having a child with a disability. These acts set the stage for future laws and policies to follow, making it easier for students with disabilities to receive an education.

A couple of years later, Hungary established the Hungarian Act on Public Education of 2011 (Act CXC, 2011). This act changed the lives of students with disabilities. Because of this act, all children with disabilities reserve the right to a free and compulsory primary education, a free and generally accessible secondary education up to achieving their secondary-school certificate, and training for vocational school if that is desired (European Agency for Special Needs and Inclusive Education, 2021) This act also changed compulsory education from the age to three, which has helped close performance gaps and to give more time to diagnose children with disabilities at an earlier age. The Hungarian Act on Public Education also helped to set an eligibility standard. For a student to receive special education services, they must have a physical disability, sensory disability, intellectual disability, speech impairment, multiple disabilities, or be diagnosed with autism spectrum disorder. If a child has one of those disabilities, then a committee will determine what services the child needs, based on their disability. Those services typically consist of inclusion practices, which is something that Hungarian schools focus on (Kovacs, 2020). Although Hungary has established laws, policies, and supports for students with disabilities within the education system, there are still some current issues that need to be addressed.

Current Issues in Special Education and Teacher Preparation

The education system in Hungary has come a long way, but there are still some current issues that research has found and that we would like to address. Because Hungary's education system is over 200 years old and is part of a country with rich cultural values, students in Hungary tend to follow the same patterns that were put into place in the past. It can be difficult for countries to adapt large systems like education; however, Hungary has done a good job of accounting for students with disabilities. Schools in Hungary are continually working on their diagnosis process for students with disabilities, building accessibility, inclusion, teacher training, and teacher's pay. We believe that as these things improve and are a focus in Hungary's education system, then students with disabilities will get more appropriate and equal treatment everywhere. We will discuss these topics in more detail and provide suggestions for how educators can improve these things within their own schools, narrowing the issues into two topics: special education and teacher preparation.

Issues in Special Education

One of the most apparent issues in special education in Hungary is their diagnosis procedure. Strict legal regulations control the process of examination and diagnosis for students with disabilities (Varga-Estefán et al., 2007). In Hungary, a special education expert committee diagnoses students with disabilities by going over the following aspects of disabilities: diagnostic, psychological, special educational, and social. Varga-Estefán and colleagues (2007) found that it is difficult to diagnose autism and to distinguish between a learning disability and a learning difficulty through the diagnosis process in Hungary.

In a recent study, Lukácsné and colleagues (2018) found that there are about 60,000 people with autism of varying degrees in Hungary, however, only about 8% of them have an official diagnosis, meaning that it is hard for anyone, especially children, to obtain a diagnosis. This makes it difficult for students with disabilities to access early intervention help and the supports that they need. For example, Lukácsné and colleagues (2018) found that in a 2011 census, there were 5120 of diagnosed individuals with autism and 624 of the individuals never completed the first grade, with more individuals dropping out before graduation. Only 244 students with autism had a high school diploma and only 304 were employed at the time of the census (Lukácsné et al., 2018). To improve this statistic, we can look to the United States for some guidance to improve and increase the supports for these students. We suggest creating a referral system in each school for all disabilities, something educators can advocate for where they work. This will increase diagnoses

at an early age and increase the support they receive early on. We also suggest creating incentives for individuals to become trained in diagnosing autism, since it is a lengthy process and autism is growing internationally.

Another current issue in Hungarian schools is the accessibility to their buildings. Because many of their buildings were built hundreds of years ago, most of Hungary's public schools are not accessible for those with physical disabilities. They are missing important things like ramps, elevators, and accessible play equipment. This is one of the reasons why Hungary has so many specialized schools, and that is to accommodate for accessibility. Oni (2020) found that cobble-stone streets, tight spaces, and trams can be an issue for individuals with disabilities who are traveling through Hungary. The study also mentions that while Budapest is creating more ramps and necessary accessibility needs, there are still many places that are inaccessible for those with disabilities (Oni, 2020). This is especially a concern for students with disabilities who may not be able to attend a desired school because of the lack of accessibility. Educators can help increase accessibility at their schools by advocating for their schools and governments to create more ramps, elevators, and accessible transportation as needed in their area. This can improve special education opportunities for students with disabilities, increase inclusion, and enhance special education practice around the country.

Lastly, inclusion is another current issue that Hungary is actively striving towards but has not yet reached. In Hungary, it is very common for children who have a disability to attend a specialized school instead of going to their local or neighborhood school. This is especially true for students who have a physical disability, limiting the accessibility they have to certain buildings. Going to a specialized school has many advantages for students with disabilities, including accessibility, trained staff, and specialized instruction. In specialized schools, all teachers are trained in that specific type of disability. For example, Mozgásjavító Óvoda, Általános Iskola, Gimnázium, Kollégium, Egységes Gyógypedagógiai is a specialized school and all the students who attend this school have some sort of physical impairment. All the teachers and staff at this school are trained in how to educate students with a physical impairment and know how to teach and accommodate their students. Many students who attend this school stay in dormitories because they travel from across the country to have access to a school that will provide them with the education that they deserve. This idea of a specialized school has many advantages but lacks inclusion and mainstreaming, which are goals that Hungary would like to incorporate within their education system. For Hungary to improve their inclusion practices, we suggest making all schools more accessible and training school staff on how to effectively work with and teach students with disabilities. This would help students gain more access to greater educational opportunities and help teachers grow in their knowledge of teaching a greater variety of students.

Issues in Teacher Preparation

Teacher preparation is a critical issue to focus on because teachers need to be prepared to help the students with whom they are working. Hungary is continually working on improving teacher's training, pay, and happiness. However, Hungary is sometimes criticized for its frontal teaching methods, meaning that teachers are mostly lecturing with little to no individual or group work (Budapest Metropolitan University, 2022). Improving teaching methods to include more individual and group work and being able to have a variety of impactful methods will increase student attention and performance at school. Not only should teachers be trained in a variety of teaching methods, but schools should also train teachers in how to work with students with disabilities. There are schools who have found the most success in inclusion when their teachers are properly trained on collaboration and how to teach children with disabilities (Czerwińska et al., 2020). Despite the success at this school, most teachers in Hungary are not being trained on special education topics. Improving teacher training has been shown to improve student outcomes (Czerwińska et al., 2020), and we recommend that this be a focus in Hungary.

Another prominent issue in Hungary is the low pay that teachers receive (Economic Research Institute, 2023). Local schools hire teachers in Hungary, but they are considered local government workers or public servants. Despite having lots of requirements to stay qualified, Hungarian teachers are the worst paid teachers in the Organisation for Economic Co-operation and Development (OECD). Their pay is not just considered low internationally, but also in the Hungarian salary system (Economic Research Institute, 2023; National Institute of Public Education, 2003). Because teachers are public servants of the government, their pay is set by the legislature. Having low wages can discourage people from seeking out careers as teachers and can also cause high burnout and low retention rates. Additionally, if Hungary is not paying their teachers adequately, they might seek out more lucrative job opportunities in neighboring countries that have higher teacher salaries and more favorable working conditions. What's more is that these low wages do not only affect teachers, but also students. The fewer teachers that work in Hungary, the less effective

the education system is for students. To improve these conditions, we recommend that Hungary increase teacher's wages and provide more incentives for teachers to stay in the field. This will benefit general and special education b - cause teachers will be more numerous, less stressed, and more prepared.

Lastly, teacher attrition is a problem in European education despite most university graduates planning to stay in the teaching profession (Bacskai et al., 2020). One of the reasons is low wages, but there are many reasons for teachers to leave the profession. Other reasons may include a better job opportunity, family circumstances, or stress. However, Bacskai and colleagues (2020) found that teacher retention is greater within private education compared to public education, with church-run schools having the greatest teacher retention. They found that church-run teacher education has different child-rearing values such as traditional, prosocial, collaborative, and community values, and this might create a more favorable school climate for the teachers. Perhaps this school climate supports them to preserve their professional calling as a teacher (Bacskai et al., 2020). We recommend that Hungary look to the church-run universities to improve the retention of teachers across the country. This will benefit both th schools and the teachers as they feel more supported. When teachers feel more supported, they will be better able to assist their students with and without disabilities in the learning process.

CONCLUSION

Hungary has made many improvements to their education system over the last 200 years. It was also one of the firs countries in Europe to focus on special education and create a post-secondary education program to train special education teachers. Since then, special education in Hungary has come a long way and is continually improving and progressing. Over time, multiple acts and laws have been put into place to help individuals with disabilities succeed in all aspects of life. Through special schools, specialized teacher preparation training, and early intervention, the people of Hungary can help their children and other individuals with disabilities succeed in academics and independence. We recommend that Hungary focus on improving teacher training, especially when it comes to teaching students with disabilities, and that the country increases accessibility to their schools. As teacher training and accessibility increase, so will student outcomes. While there is still room for improvement when it comes to the diagnosis process for students with disabilities, building accessibility, inclusion, and teacher's training, pay, and retention; the laws and regulations that Hungary currently has for individuals with disabilities provides them with all the necessary rights needed for them to succeed.

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Special Education in Germany

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ABSTRACT

Germany's education system is continually evolving and advancing, especially within special education. The country's history and the laws that have been implemented significantly shape special education as we know it today, yet unresolved issues persist in this field. One notable challenge is the divide between mainstream and special education, leading to limited inclusion of students with disabilities in regular schools. This article provides information about Germany's demographics, the history of the country and its education system, and the laws and policies that affect people with disabilities in the country. Furthermore, it describes what the current systems look like, general and special education teacher preparation, and the issues found in the special education system today.

KEYWORDS

Educational change, higher education, inclusion, special education, vocational education

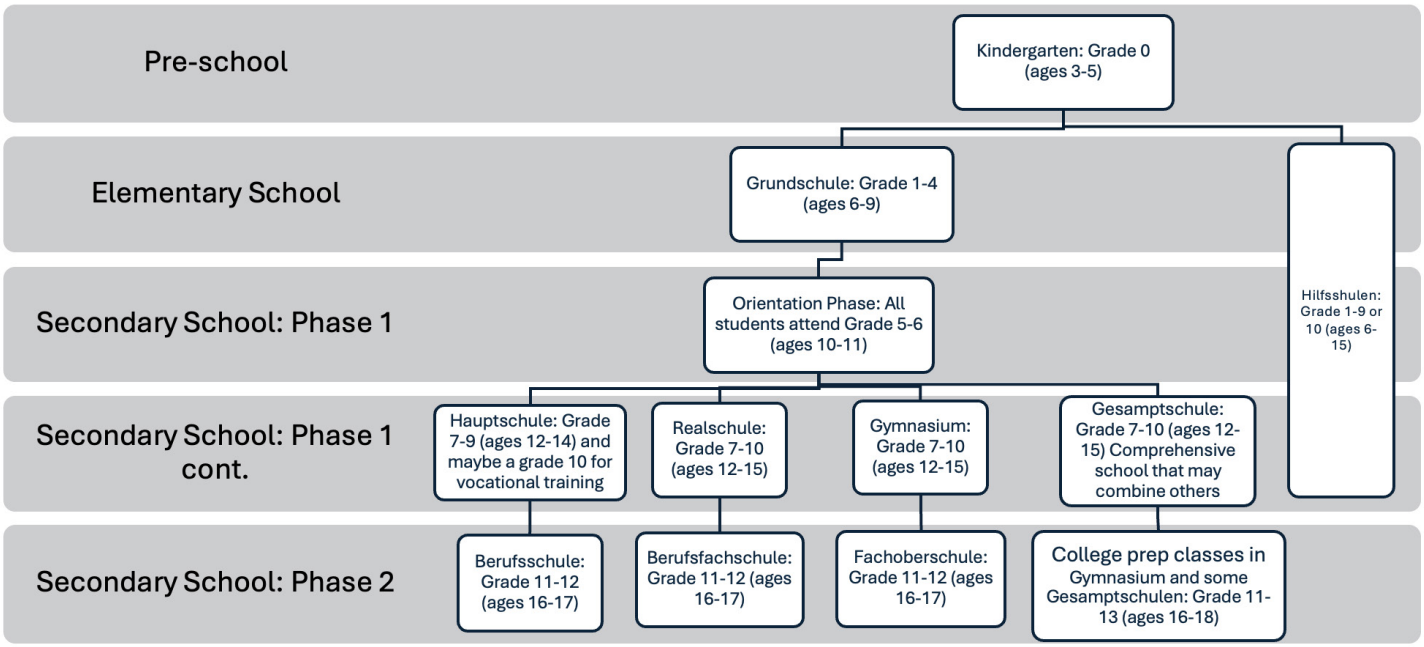
Germany is an industrialized country in Western Europe with a rich and complex history that has shaped its education system, and specifically the special education system, over the years. Profoundly shaped by both World Wars, it is young compared to other global nations. Germany has a total population of approximately 83.2 million, with native Germans comprising about 72.3 million and immigrants accounting for the remaining 10.9 million. The highest rates of immigrants are from Turkey, Poland, Kazakhstan, and Syria (Statistisches Bundesamt, 2023). As of 2021, a notable 77.5% of the German population resided in urban areas and cities, indicating a high level of urbanization (O'Neill, 2023). In terms of household composition, one-person households are the most prevalent, accounting for 41.7% of all households, while a mere 3.5% of households consist of five or more individuals. This trend is paralleled by a low marriage rate. As of 2022, only 411 out of every 1,000 inhabitants were married. In 2021, each mother in Germany gave birth to an average of 1.58 children, marking a slight increase of 0.05 from the previous year (Statistisches Bundesamt, 2023). The notable demographic shifts in Germany, particularly the teacher shortage, may be attributed to factors such as rising student numbers driven by immigration and a modest increase in birth rates (Trines, 2021).

GERMAN EDUCATION SYSTEM

After the merging of German states into one nation in 1871, it became necessary to find a unifying element for all German people. Chancellor Otto von Bismarck introduced universal mandatory education, heavily shaped by Prussia, the most influential political force in the newly formed Germany. Developed in the 18th century, the Prussian system funded schools through taxes, allowing for free attendance and mandating compulsory education. This included 8 years of mandatory schooling, equipping students with basic educational concepts like mathematics, writing, and reading, as well as lessons in obedience, duty to country, and general ethics (Grindel, 2018).

The National Socialists rose to power in 1933 and sought to streamline the Weimar-era school system, leading to the standardization of higher secondary education

FIGURE 1: Germany School Structure



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types in 1938. It was designed to create citizens who were ideologically aligned with the regime, physically fit for military service, and steeped in nationalist and racist beliefs. Education was less about critical thinking or academic inquiry and more about shaping the youth into obedient and loyal followers of the Nazi ideology (Herrlitz, 2008; Oz-Salzberger, 2016). These beliefs influenced how the education system shifted over the years.

The Federal Republic of Germany was then established in 1949, representing Western Germany and being allied to the Western democracies. It featured a multi-party system, representing a spectrum of political views. By this time, most German states had already mandated children's attendance at the country's schools. By the early 20th century, most states in imperial Germany had established a three-tiered school system: elementary school (*Volksschule*), middle school (*Mittelschule*), and secondary schools. At this time, the elementary school provided basic education for children Ages 6–14. The middle school served as a bridge between elementary and secondary education, catering to students not proceeding to higher education but requiring more than what elementary school offered. Secondary schools included *Gymnasium,* focusing on classical education, including the study of Latin, Greek, and Hebrew and preparing students for university; *Realgymnasium,* with a focus on mathematics, natural sciences, and modern languages; and *Oberrealschul,* emphasizing mathematics, natural sciences, and modern languages without a classical language focus (von Ackeren, 2015).

Post-World War II, West Germany revisited Weimar Republic education concepts, establishing a three-tiered system for secondary education that we see today: *Hauptschule*, *Realschule*, and Gymnasium (see Figure 1; Boeck, 2014). Introduced in 1950, Hauptschule prepared students for vocational education and covered Grades 5–9. After earning a Hauptschule diploma, students could start an apprenticeship or trainee program or pursue further education. Realschule, covering Grades 5–10, led to a diploma allowing for apprenticeships, trainee programs, or additional education. Gymnasium, covering Grades 5–13, prepared students for the *Abitur*, a comprehensive exam for university admission. These schools have shifted slightly in the grades that they currently cover, but their purposes remain the same. The 1960s introduced *Gesamtschule*, which merged various educational tracks for unified secondary education (see Figure 1; Boeck, 2014; Cortina & Thames, 2013).

East Germany adopted a similar but distinct approach after World War II. East Germany, under its socialist government, established a free education system that spanned from primary through the higher grades typically associated with high school. In contrast, West Germany continued a system where certain forms of secondary education were not free. Following the reunification of East and West Germany, the previously mentioned three-tier

model became the norm across Germany (see Figure 1). Although there are some private schools that usually charge tuition fees, public education in Germany has been free since the reunification (Trines, 2021). It is important to note, however, that the private school sector in Germany plays a relatively minor role (Trines, 2021).

Today, education in Germany is primarily under the jurisdiction of the federal states rather than the federal government. Consequently, educational structures differ to some extent across the states, and secondary schools are not tied to specific districts. This allows students to attend any school that matches their educational level, provided there is availability, and they have the means of transportation. Some German states allow parents the autonomy to choose the type of school their children will attend for their higher grades, while in other states, this decision is guided by students' academic performance (Trines, 2021). Another difference between states is the current status of the Hauptschule. In most states, it still exists. However, since this institution has developed a reputation as a lower-quality school and is associated with stigmatization, Haupt- and Realschulen have been combined in some federal states (Neimeyer, 2014; von Ackeren, 2015). Despite the subpar performances in international comparative studies, a significant portion of the German populace supports the idea of reintroducing the Hauptschule nationwide (Focus Online, 2023).

SPECIAL EDUCATION SYSTEM

Special education schools, or *Hilfsschulen,* emerged parallel to the mainstream school system and were established in the 1920s. Their aim was to provide an effective education for students with disabilities that would facilitate their integration into low-wage vocational roles. Special education teachers used modified curriculum and specified teaching methods, similar to current instructional practices within special schools for students with disabilities (Opp, 2001). While special schools in Germany have been modified, the Hilfsschulen became a model for future special needs schools and set a precedent for the organization of elementary and secondary education (Powell, 2015). The development of inclusive education exhibits political conflicts in education as there are conflicting views on inclusion, how people with disabilities are viewed and treated, and the current jobs that students with disabilities are prepared for after attending a public or specialized school.

In Germany, special and inclusive schools align with the regular education system, placing learners based on their abilities. In 1960, the Standing Conference of the Ministers of Education and Culture, or *Kultusministerkonferenz* (KMK), in collaboration with the German Committee for the Educational System, established various types of special schools for children and youth with disabilities, as well as their legal frameworks (Ellger-Rüttgardt, 1995). The KMK functions as a forum where ministers gather to develop and coordinate Germany's educational system, aiming for uniformity in interests and objectives nationwide. This body's goal is to tackle issues in education, research, and cultural policy to foster a unified approach and shared foals across the country. The specialized schools they established included those for blind, deaf, speech impaired, behaviorally challenged, and vocational education students (Powell, 2015). These schools aimed to offer tailored education for students with disabilities. However, there were many attempts made by parents and others to also have inclusive schools and integrated classrooms for students with disabilities.

Since the early 1990s, there has been a push to integrate all general education classes within elementary schools, but this was not supported by all the states. One potential reason for this is that many general education teachers have mixed views about including students with disabilities in their classrooms because they feel they lack training or that it would impact their other students (Mónico et al., 2020). After 1990, there were continual efforts to push for inclusion; however, special and general education schools grew further apart (Powell, 2015). For example, special and general education schools became more exclusive, making more difficult for students with disabilities to attend public school. This separation caused discrepancies in academic performance and parent satisfaction. Powell (2015) described how students with disabilities who attended special schools performed worse than peers who attended inclusive schools – even if they had the same grades in elementary school.

Despite the push for inclusion, there are still many specialized schools, or *Sonderschule,* in Germany today (Niemeyer, 2014). Currently, around 577,000 students with disabilities are enrolled in one of Germany's seven special school categories, each focusing on a specific type of disability (Statistisches Bundesamt, 2023). These categories include schools for students with visual, hearing, intellectual, physical, or health impairments, as well as those with learning, speech, and behavioral challenges. There is also a school called *Förderzentren*, which focuses on multiple areas of development, such as academic, social, emotional, physical, vocational, and behavioral development. During the 2019–2020 academic year, there were roughly 2,800 special education schools staffed by approximately 68,500 educators (Statistisches Bundesamt, 2023). In the general education schools, approximately 93,000 students with disabilities were enrolled in elementary

TABLE 1: Elementary General Education Schools in Germany with Special Education Needs Students in 2021/22 School Year

Type of School	Type of special education needs	Male	Female	Total
Elementary School	Learning	21,763	18,162	39,925
	Vision	827	630	1457
	Hear	1800	1564	3364
	Language	10,392	5451	15,843
	Physical/Motor Development	3448	2294	5739
	Emotional/Social Development	15,211	3435	18,646
	Not Assigned a Focus	624	129	753
	Total	58,334	34,577	92,911

*Information from Germany Statistics Bureau: https://www.destatis.de/DE/Home/_inhalt.html

TABLE 2: Secondary General Education Schools in Germany with Special Education Needs Students in 2021/22 School Year

Type of School	Type of special education needs	Male	Female	Total
Secondary School	Learn	9014	6855	15,869
	See	102	72	174
	Hear	239	167	406
	Language	1006	537	1543
	Physical/Motor Development	307	176	483
	Emotional/Social Development	4293	1084	5382
	Not Assigned a Focus	23	5	28
	Total	15,559	9374	24,933

*Information from Germany Statistics Bureau: https://www.destatis.de/DE/Home/_inhalt.html

(see Table 1) and 25,000 in secondary (see Table 2) with varying needs during the 2021–2022 school year.

In Germany, only 33.6% of children with disabilities are included in elementary schools, and 14.9% are included in secondary schools (Niemeyer, 2014). Students with mild disabilities are more likely to be educated with their nondisabled peers during the elementary school years up through the fourth year unless they reside in Berlin or Brandenburg, where they would be educated with their peers until their sixth year (see Figure 1). Of the secondary school options (see Figure 1), about half of students with disabilities who are in the inclusion setting will attend Hauptschule, which is considered the lowest of the schooling options and leaves little real job opportunities for these students (Niemeyer, 2014). Recently, inclusion schools have become more common in certain states, with a larger percentage of students with disabilities being included. Students with varying levels of disabilities can be included in elementary schools and Realschule (see Table 1). However, those with physical disabilities face unique limitations with the historical structures of some schools, which may not have typical accessibility features like ramps or elevators. In the German education system, including the Gymnasium, there are special education services available to support students with diverse needs, but it is much more difficult to get into these schools because it is the highest and most advanced of the three-tier system hierarchy (Niemeyer, 2014). Students with disabilities who do not attend one of the main public inclusive schools will attend Sonderschule. For those with severe disabilities, they may attend Sonderschule earlier than those with a moderate disability.

The process for qualifying for special education services in Germany is similar to that used for developing an individualized education program in the United States. A student who may require additional support is referred by their general education teacher or a parent (European Agency, 2023). The ensuing procedure is designed to assess and identify any special educational needs. It involves a comprehensive evaluation to determine whether someone requires special education support and, if so, what type of support is most appropriate. For example, one of these inclusive practices for students with disabilities is access to mobile services, or *Mobiler Sonderpädagogischer Dienst*. The Mobile Special Education Services offers support to students in schools that may have other funding priorities by diagnosing and promoting individuals, advising teachers and guardians, and coordinating special education support for these individuals. The process includes collaboration among teachers, special education specialists, parents, and sometimes the students themselves, aiming to create an individualized education plan tailored to each student's unique learning requirements. This process ensures that young individuals with disabilities receive tailored educational support to aid their learning and inclusion within the school system. This tailored learning could include a curriculum with thera-

peutic, technical, and disability-related measures integrated into the lessons. The process may vary slightly depending on the state in which the learner resides (European Agency, 2023).

Many public schools have transitioned to adopt an on-campus special education program so that learners can participate in classes with their same-age peers while still receiving specialized instruction. This is shown by the rising inclusion rate, with about 40% of individuals with disabilities in Germany attending public schools (German Education Server, n.d.; United Nations Educational, Scientific and Cultural Organization, n.d.). However, there is still room for improvement as this rate is considered moderate compared to other European countries. Inclusion can have many benefits for students with disabilities; however, there are also benefits to specialized schools, and the best fit depends on the student's needs. Paseka and Schwab (2020) found this when they researched the attitudes of parents on inclusive education. While many parents are supportive of integrating their children with physical or sensory disabilities, others are more skeptical when it comes to integrating their children with behavioral or severe cognitive disabilities into inclusion classrooms (Paseka & Schwab, 2020).

TEACHER PREPARATION IN GERMANY

The KMK guides policy-making and training for teachers. There are six kinds of teaching certificates that the KMK recognizes, a special education certificate being one of them. Teachers in Germany study at single-tier universities, with a combination of pedagogical courses and a teaching internship. Historically, only Gymnasium teachers obtained university education, but this changed in the 1970s to include all teachers (Cortina & Thames, 2013).

> In Germany, only 33.6% of children with disabilities are included in elementary schools and 14.9% are included in secondary schools.

Teacher education in Germany includes three key features: the distinction between types of schools, a two-phase training model, and the status of teachers as civil servants, similar to the tenure track in the United States (Cortina & Thames, 2013). This status grants them strong job security, access to private health insurance, and relatively high pensions, making teaching an attractive career choice. However, there is little pressure for professional development after one becomes a teacher. While there has been debate regarding the continuation of this status for teachers, no changes have been implemented. Additionally, options for teachers to switch careers or change school types are extremely limited, posing a challenge for those desiring a different professional environment (Barabasch & Watt-Malcom, 2013; Cortina & Thames, 2013).

In Germany, there is a two-phase training model for teachers. The first phase focuses on academic training, with most German states utilizing university teacher training programs that award bachelor's and master's degrees (Cortina & Thames, 2013). The bachelor's program typically spans six semesters, followed by a four-semester master's program. Prospective secondary teachers start by choosing the level they wish to teach – Hauptschule, Realschule, or Gymnasium. University training focuses more on academic knowledge with less emphasis on pedagogy. Because of this, teaching practice accounts for only about 5-20% of their coursework. Conversely, elementary teacher trainees receive a larger portion of pedagogy instruction (Hofmann & Bohl, 2023). The first phase then ends with the first state examination, which focuses on their academic training. Previously, this first state examination could have been taken in place of obtaining a degree, but that has changed in the last decade (Hofmann & Bohl, 2023).

Once teachers have completed their first state examination, they complete the second phase of training, where they are offered a full-pay student training position called *Referendariat* (Cortina & Thames, 2013). The Referendariat is a highly structured 2-year in-school induction program where teachers can learn classroom management skills along with pedagogical content knowledge. Each year of the Referendariat has different responsibilities. During their Referendariat, teacher candidates have full responsibility for their classes while also receiving feedback and professional guidance from a mentor teacher. They develop curricula and set class expectations akin to a fully licensed teacher. Upon completing a final state examination, teachers receive certificates from state governments as opposed to universities or colleges (Cortina & Thames, 2013).

SPECIAL EDUCATION TEACHER TRAINING

There are some similarities between the training of a general education teacher and a special educator in Germany. Both complete a similar preparatory phase and internship. However, those trained to become special educators will typically do their internships

in a special education school, although there are internships in general or inclusive settings as well (Liebner & Schmaltz, 2021). They are certified for elementary and secondary but typically specialize in only one of these groups. During their bachelor's studies, they specialize in two or three academic subjects, such as mathematics, German, English, social studies, or physical education, to better understand and teach complex concepts to students with disabilities. Even though these subjects are emphasized in their bachelor's program, trainees also need the capability to instruct students with disabilities across a broad spectrum of subjects. As a result, they receive instruction in various other disciplines to ensure a well-rounded educational skill set.

Special education teacher training is unique in that the coursework at universities contains significantly more instruction on pedagogy and behavior management compared to other subjects (Resch et al., 2023). Trainees are equipped to handle emotional and behavioral disabilities and learning challenges more effectively. They learn principles of behavior analysis to help with behavior management and strategies to break down complex tasks. This special emphasis on pedagogical training is due to the division of the German secondary education system. As discussed previously, secondary schools in Germany are divided into different types, depending on whether students are preparing for vocational or university-based careers. Special education teachers teach more often in Hauptschule, Realschule, or Gesamtschule. Given the higher academic rigor at Gymnasium, students with disabilities enroll there less often (Niemeyer, 2014). Therefore, it is quite uncommon for a special educator to be employed at a Gymnasium. These students' needs can be met with proper support. Consequently, special education teacher training is predominantly pedagogical, preparing educators primarily for roles in elementary schools or vocational secondary schools (Resch et al., 2023).

GERMAN LAW AND POLICY ON SPECIAL EDUCATION

There have been multiple laws and policies that have impacted students with disabilities in the education system, which will prepare them to enter the workforce. After the reunification of Germany in 1990, public education was made free to all students, allowing more students with disabilities to enter the education system (Trines, 2021). A few years later, in 2006, Germany passed the General Equal Treatment Act, created to increase diversity and decrease disadvantages in the workplace (Yeh, 2015). A key focus of this legislation was facilitating the inclusion of individuals with disabilities in the workforce and ensuring that suitable accommodations are available for those who can no longer work. This act helped create awareness for individuals with disabilities in multiple settings, and soon after, many laws and policies were addressing the needs of individuals with disabilities.

To better serve persons with disabilities, the United Nations Convention of Rights of Persons with Disabilities (UN CRPD) was put into place worldwide in 2008 (Mannan et al., 2012). The UN CRPD was the first legally binding international group that focused on protecting and promoting the rights of persons with disabilities. Additionally, the UN CRPD examines the needs and circumstances of people with disabilities, allowing for a course of change in legal, moral, and political contexts. This convention allows persons with disabilities living in Germany more protection in the workplace, schools, universities, and communities. It can be difficult for individuals with disabilities to feel as though they have a voice or that they are recognized by their peers. However, these programs can increase peer recognition and self-determination among students with disabilities (Mannan et al., 2012). Self-determination is an important skill for students with disabilities to develop so that they can succeed in future education, employment, and independent living situations.

Germany has a more vocational-focused education system that can prepare students to have more self-determination by providing practical skills and real-world experience. Not only do they have special schools built for specific types of disabilities, but students who attend Hauptschule or Realschule are given vocational training to prepare them for apprenticeships or jobs that do not require a university degree. However, they may offer limited job opportunities. In 2013, North Rhine-Westphalia, a German state, passed the 9th School Law Amendment Act to implement an inclusive education policy (Barow & Östland, 2019). Through this policy, many special schools in that state were merged or closed, passing the responsibility of educating students in special education to general education schools, like Hauptschule and Realschule. The categories used to previously segregate special school types are now used to identify students with disabilities and the services they need within the general school setting (Barow & Östland, 2019). This inclusive policy helped give students with disabilities the option to be educated with their non-disabled peers and made it more feasible in that state.

In terms of educational policy, each state has an especially high degree of autonomy, and schools are funded by the state. As a result, the education in each state varies in curricula and types of schools. However, the previously

mentioned KMK ensures a degree of harmony in the policies created throughout the country because of their efforts to unify and coordinate Germany's school system (Trines, 2021). This benefits all students attending schools in Germany, including those in special schools or special education settings. In March 2015, the KMK published a document consisting of recommendations for embracing diversity to show its support for inclusive education (Kultusministerkonferenz, 2015). It states how students with disabilities may receive financial help from social services, obtain vocational jobs, and/or work at specialized institutions at the end of their schooling.

CURRENT ISSUES IN SPECIAL EDUCATION

Germany's education system has evolved and advanced over the years for both general and special education. Its complex history has shaped the current system and inspired laws that have created the special education system we see today. However, there are still unresolved issues in the special education system. Some notable challenges are inclusion practices, funding, teacher perceptions, and the quality of schools for students with disabilities.

The first challenge is determining how to best support all students in general while still promoting inclusion at all levels. While numerous schools effectively merge special education with general education, others choose to maintain distinct systems. This separation can limit future educational opportunities for students with disabilities, potentially influencing their long-term academic and career paths. However, an inclusive environment may not be the best placement for all students with disabilities, and placement should instead be determined based on individuals' needs and preferences. Inclusive education can lead students with disabilities to have positive cognitive outcomes (Krämer et al., 2021). However, some downfalls to inclusive education are unfavorable peer comparisons (Düll, 2023) and social isolation (Heyder et al., 2020). In fact, recent discussions in Germany have indeed pointed out that a 100% inclusion rate might not be suitable for everyone, as some may require specifically designed environments to meet their unique needs.

Another issue is that the rationale for establishing specialized schools for students with disabilities lies in the provision of unique services and resources, often not accessible in general educational institutions. In Germany, these general settings grapple with limited and unstable financial funding. Consequently, it is challenging for schools that have traditionally not accommodated students with disabilities to secure funding for the necessary resources that facilitate their participation.

An important factor to consider is teachers' attitudes and perceptions and how those impact their students. Heyder et al. (2020) surveyed students with and without disabilities and found that physical inclusion does not automatically lead to social inclusion. However, they also found that the more positive attitude the teacher had about inclusive education, the more socially integrated students felt in that classroom. Teacher attitudes and perceptions directly impact the classroom environment and can thus lead to other factors of educational success.

Another significant factor that has impacted teacher perceptions is their experience with Multi-tiered Systems of Support (MTSS; Blumenthal et al., 2022). In areas of Germany where inclusion has been developing, some have tried implementing MTSS combined with assessing response to intervention (RTI). The execution of the process in the system was less than ideal, resulting in the MTSS/RTI model being perceived negatively by educators. This led to a further obstacle for students with disabilities, as this model is widely recognized as effective for accommodating these students and promoting inclusion practices (Blumenthal et al., 2022).

Lastly, of the secondary school options, about half of students with disabilities who are in the inclusion setting will attend Hauptschule, which is considered the lowest of the schooling options and leaves few real job opportunities for these students (Niemeyer, 2014). This is concerning because students with disabilities should have the option to attend any of the secondary schools of their choosing. Kleeberg-Niepage et al. (2022) stated that the German secondary school system presents a challenge to the implementation of inclusive education because of how ability-focused it is. This refers to the separation of vocational and university-prep schools. Specifically, the Gymnasium model, known for its lack of special services and rigid cultural ethos, makes the implementation of inclusive practices especially challenging (Kleeberg-Niepage et al., 2022; Niemeyer, 2014).

CONCLUSION

The German educational system has various school types that are stratified to accommodate the abilities of its students. Special education teachers are certified by the state after obtaining a university master's degree. Historically, students with disabilities have been excluded from public schools and instead attended specialized schools based on the type of disability. The educational system is currently experiencing a shift toward more inclusion of students with disabilities. This could redefine the role of special educators, from the main

teachers in special schools to interveners in general schools. Germany has come a long way in providing education to children with disabilities as educators continue to try to provide the best opportunities for all their students.

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Special Education Personnel Preparation in Singapore

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ABSTRACT

Special education in Singapore has evolved considerably during the past two decades with greater enrollments of students with special educational needs in regular mainstream schools. This progressive transformation in Singapore's education towards the inclusion of students with special needs in mainstream classes has been accompanied by concomitant changes in teacher preparation programs for both general and special education teachers and professionals. This article situates and describes special education in Singapore and its increasing role in partnering with mainstream education within Singapore's socio-historical context and evolvement as a nation since independence. Current issues related to special education and its expanding role in preparing teachers and related professionals for working with students with special educational needs in both mainstream and special schools are discussed with implications raised for future directions.

KEYWORDS

Disabilities, personnel preparation, Singapore, special education, teacher education

Singapore is a small island country in Southeast Asia located on the north of the equator at the southern tip of the Malayan peninsula between Malaysia and Indonesia. Described as "the world's only fully functioning city-state" (The Economist, 2015) with full sovereignty since its independence in 1965, Singapore is one of the most densely populated countries in the world with 6 million people in a total land area of about 734 square kilometers (285 square miles), which is almost a quarter of Rhode Island, the smallest state in America or less than half the size of London, England. Its favorable position at the crossroads for trade and commerce between the West and the East has drawn people from near and far to settle into what is now one of the world's most peaceful, harmonious, and tolerant multiethnic, multicultural, multilingual, and multireligious societies (Global Finance, 2024; Miner, 2023). Singapore's diverse citizenry is comprised of four main ethnic groups: Chinese, Malay, Indian and Eurasian, and there are four official languages that represent them and Singapore's colonial British heritage, namely, Mandarin, Malay, Tamil, and English, with English being the lingua franca in society and medium of instruction in schools (SG101, 2024).

Singapore's ascent from third world to first world status over a period of four decades (Lee, 2000), from its fledging years as a new nation beset with socio-political and economic unrest, high unemployment, housing shortage and racial tensions, to a highly advanced and influential global economic powerhouse, has won much international recognition and acclaim (Marine & Oceans, 2023; World Bank, 2019). Under the leadership of Mr. Lee Kuan Yew, Singapore's first prime minister after independence, and his pioneering team members, the foundations for Singapore's economic growth were laid by his government's key priority to attract foreign investments and capital investment flows into industries that would provide job creation and employment for its populace living in a land lacking in natural resources, including sufficient water. Singapore's people were the only natural resource for growing its economy during its formative years and have remained crucial to Singapore's success. Education and training for a growing

workforce continues to be imperative for Singapore's economic development (SG101, 2024).

In its 58th year as a nation as of August 9, 2023, Singapore has become one of the richest, most prosperous, globally competitive, and economically successful countries in the world with a stellar reputation as a global hub for finance, commerce, shipping, aviation, technology, innovation startups, and education. Singapore's excellent attainments in education are known the world over with student performances, from primary to tertiary education, being consistently ranked among the top globally as reflected in the Performance for International Student Assessment (PISA) international exercises conducted by the Organization for Economic Cooperation and Development (OECD) and the International Baccalaureate (IB) diploma examinations conducted by the Swiss-based IB organization. Besides its economic and educational achievements, there have also been many impressive social developments and accomplishments in Singapore that are very highly ranked in the world such as its healthcare, personal safety, quality of urban living, modern infrastructure, home ownership (a rate of 89 percent), life expectancy (86.6 years), low corruption, and human development.

Singapore has a unitary parliamentary republic structure based on a multi-party democracy and free elections with a prime minister as the head of the government. The People's Action Party (PAP), which has governed Singapore since independence, is one of the longest continuing governing party among multi-party parliamentary democracies in the world to oversee the development trajectory of a country from its beginning as an independent nation (Jayakumar, 2022). Singapore subscribes to a merit-based ethos that has been long championed by the PAP as a fundamental principle that is highly relevant in a multiracial society and has focused on developing individuals based on the values of diligence, self-effort, and self-reliance as key to success and a better life (Bellows, 2009; Lee, 2000; Choo, 2019). In Mathew's (2016) study on the views of ethnically diverse Singaporeans on meritocracy, the majority of participants indicated strong consensus and support for attributing hard work, independent of race, as contributing to economic success. There is a meritocratic ethic, prevalent in education and society, that pairs economic success that is marked by a better life of highly sought after material possessions with competitiveness and social esteem; this provides the motivation and incentive to persevere and excel, and has been explained as the driving force for Singapore's global competitiveness and economic prosperity (Cheang & Choy, 2023).

Evolution of Special Education in Singapore

The historical development of special education in Singapore can be categorized into two time periods – pre and post 2004. The turbulence and scarcity of Singapore's early years as a nation and the urgent priorities then to efficiently educate and develop a workforce for economic survival led to the responsibility of the education of students with disabilities falling primarily upon the social welfare sector. Services for children with various disabilities were started and provided by welfare organizations, religious bodies and concerned philanthropists, or were part of follow-up rehabilitation services delivered by health authorities after medical diagnoses of disabilities (Quah, 2004). Over the decades, more voluntary welfare organizations were established to cater for the education of growing numbers of students with various types of disabilities, resulting in the building of more special schools that evolved into a special education system.

Prior to 2004, students without disabilities were perceived as belonging to the regular mainstream education under the purview of the Ministry of Education, while students with disabilities were seen as belonging to the special education system. Special Education services were therefore primarily provided via special schools run by voluntary welfare organizations, now known as social service agencies (SSAs), many of which also operate adult disability services. A few of the voluntary welfare organizations also assisted in providing services to integrate and support students with disabilities (e.g., those with physical disabilities and autism) within mainstream school settings (Lim & Nam, 2000; Lim, Nomanbhoy & Vasudev, 1999; Nomanbhoy, Lim & Vasudev, 2000). A dual system of education where special schools operated apart from mainstream schools was clearly in place (Lim & Nam, 2000) prior to 2004, which largely influenced public and societal notions about special education.

For students with special education needs that were in the mainstream education system, the focus was on integration, rather than inclusion, in the pre-2004 period (Lim & Nam, 2000; Lim & Quah, 2004; Lim & Wong, 2021; Quah, 2004). The onus of responsibility was on the students to cope and keep up with the academic rigor and performance expected of all mainstream education students and, especially, to pass national examinations. "Opportunities for the Disabled" by the Advisory Council of the Disabled (1988), the most significant special education-related report existing at that time emphasized this integration, by stating that "whenever appropriate and

feasible, special education should be provided within the regular educational system. A child should only be placed in a special school if he cannot be well educated in a regular school" (p. 37–38). A recommendation of this report also stated that: "integration should fit the disabled child to the most suitable educational environment" (p. 38).

In reality, however, special education services were generally provided outside the mainstream education system during this period (Quah, 1993), which meant that an appropriate education for students with disabilities with the requisite special education support and intervention within mainstream schools was untenable. Mainstream schools also had the prerogative to decide whether to admit students with disabilities based on the school's interpretation of the Advisory Council of the Disabled's recommendation (Lim & Thaver, 2018). Unlike countries like the United States, Singapore does not have any legislation nor laws regarding the provision of special education services within mainstream education.

The year 2004 has been described as the watershed year for special education in Singapore (Lim & Thaver, 2018). Prime Minister Lee Hsien Loong, in his inauguration speech, explicitly mentioned persons with disabilities as part of his envisioning of Singapore as an inclusive society (Ibrahim, 2004). A month after his inauguration, Prime Minister Lee called for better efforts to integrate students with disabilities into mainstream schools (Teo, 2004). Since then, there has been an unprecedented progression of developments in the fields of special education and disability that have continued to evolve till the present [please refer to Lim & Thaver (2018) for a detailed description of these developments].

The government supported the creation of a series of comprehensive 5-year national roadmaps for persons with disabilities known as Enabling Masterplans. These were designed to create an inclusive society where persons with disabilities can be supported and empowered to maximize their potential and be embraced as equal citizens. The first from 2007-2011 was followed by a second from 2012-2016, and a third from 2017-2021. The current Enabling Masterplan, which has a longer period for envisioning, the setting of goals, and implementation to achieve a more inclusive society, will be enacted from 2022-2030 (Ministry of Social & Family Development, 2021). Singapore also signed the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) in 2012 and ratified it the following year in 2013 (Ministry of Social and Family Development, 2016). By ratifying the UNCRPD, which contains Article 24 on the right to inclusive education, Singapore recognized its role and responsibility to make progressive realizations towards inclusive education.

Special Education Preparation of Teachers and Professionals

While the number of special schools has grown to 22, with a further six to become operational in the 2030s (Elangovan, 2023), the current educational stance has been to view them not in terms of a dual system of education like the pre-2004 period, but as part of the continuum of educational services within one national system (Enabling Masterplan Steering Committee, 2016). The Compulsory Education Act of 2019 emphasized this by including the requirement that all students with Special Educational Needs (SEN) attend either mainstream primary schools or government-funded special schools (Ministry of Education, 2020a).

Over the past two decades, the number of students with disabilities attending mainstream schools has risen dramatically from 2500 students in 2005 (Chan, 2005) to 13,000 in 2013, to 24,000 in 2018 (Toh, 2018), and to the current reported figure of 35,500 (Elangovan, 2023). About 80% of all students with special needs are served in mainstream schools with the remaining 20% with higher support needs attending special schools (Ang, 2020b). This exponential increase in the number of students with special needs attending mainstream schools spurred on by developments following the watershed year of 2004 has progressively redefined public notions about special education in Singapore and its status as a viable and important field across the national education system and within teacher education (Wong & Lim, 2021).

In the aftermath of PM Lee's 2004 key speeches advocating for persons with disabilities, a flurry of developments concerning the preparation of school personnel to support students with special educational needs soon followed. At the National Institute of Education (NIE), Singapore's sole teacher accreditation body, training began in 2005 for a new cadre of personnel, initially called Special Needs Officers. These were renamed in 2009 as Allied Educators (Learning & Behavioral Support) and again in 2022 and after as Special Educational Needs Officers (SENOs) (Lim & Thaver, 2023). In the early years of this scheme, training at NIE for the Special Needs Officers focused on preparing them to support students with dyslexia and autism (in the mild range) in mainstream schools (Chan, 2005). The types of students with disabilities supported by these support personnel subsequently expanded to students with other disabilities, including attention deficit hyperactive disorder, physical impairment and sensory disabilities. Services included in-class support or individual and/or small group interventions (MOE, 2023b). To become SENOs, candidates attend a one-year

full-time Diploma in Special Education (for SENOs program), which equips them with the skills to identify special educational needs, diagnose and assess learning and behavioral difficulties, and plan interventions (NTU, 2023c).

Another milestone development for special education preparation in the mainstream teacher education space that was launched in 2005 was a new in-service professional development program in special education. This program provides mainstream primary and secondary school teachers with the understanding, knowledge, and skills to work with and support students with special needs in their classrooms. Known as the Certificate in Special Needs Support, this professional development program is comprised of a foundational course introducing existing school frameworks and systems in supporting students with special educational needs followed by a selection of three electives among courses on learning disabilities, attention deficit hyperactivity disorder, autism spectrum disorder, physical and sensory difficulties, and emotional and behavioral difficulties (NTU, 2023b). The objective of the initiative was to have 10% of teachers in all primary schools and 20% in all secondary schools take the Certificate in Special Needs Support training in order for the knowledge and skills acquired by these teachers to spread through the system. In-service teachers who successfully complete this certificate, known as "Teachers Trained in Special Needs" (TSNs), contribute to building the capacity of their schools to include students with special needs in their own classrooms and by collaborating with other school personnel such as SENOs (Lim, Poon & Thaver, 2022; Lim & Thaver, 2023).

In March 2020, the Ministry of Education launched a professional development roadmap for all mainstream educators to gain basic knowledge and skills in the area of special educational needs for the aim of better supporting students with disabilities in mainstream schools. This roadmap delineates core competencies that all mainstream teachers are expected to attain in pre-service (i.e., 'emergent level') and in-service (i.e., 'proficient' level) through bite-size online learning and professional development courses (Ang, 2020a; Ministry of Education, 2020b, 2020c). Currently, all teachers in mainstream schools can access up to six hours of online bite-size modules on supporting students with special needs across a range of topics such as common special needs conditions and working with parents (Ministry of Education, 2022b). Within the mainstream teacher education programs at NIE, it is now compulsory for all pre-service trainee teachers at NIE to take some coursework to develop their foundational understanding of the needs of diverse students including students with special educational needs for the purpose of supporting them in mainstream classrooms (Ministry of Education, 2022b).

The earliest teacher preparation program in special education began in 1984 at the then the recently established Department of Education for Children with Special Needs in 1982 and was led by its founding head, Dr Marilyn Mayling Quah. This Certificate in Special Education (CISE) program, offered at the Institute of Education (later renamed as the National Institute of Education), was a three-year part-time program for teachers who were teaching in special schools (Quah, 2004).

To this day, in Singapore's special schools, teachers, including untrained ones, are recruited by the social service agencies to work with students and then sent to NIE for training and accreditation as formally trained special education teachers (Fu, 2008 NTU, 2023c). Admission into the CISE required three credit passes in the Cambridge-Singapore General Certificate in Education Ordinary Level (GCE 'O' in English – equivalent to high school diploma in the US) and six months of teaching experience in a special school (Quah, 2004).

In 1991, when the Institute of Education became NIE and an institute of the Nanyang Technological University, and after it was observed that many of the candidates admitted into the CISE had higher educational qualifications beyond secondary schooling (i.e., 'A' levels from junior colleges or polytechnic diploma or even university graduates), the CISE was replaced by the Diploma in Special Education (DISE) for teachers in special schools, a two-year part-time shortened and upgraded program with minimum entry requirements at the 'A' level or polytechnic equivalent with at least six months teaching or related experience in a special school (Quah, 2004). In both the CISE and DISE, teachers taught in their special schools for half a day for five days of the week while attending these programs. The current version of the DISE program for special school-teachers (SSTs) and SENOs is a full-time one-year program of coursework and teaching practicum co-developed with the Ministry of Education (NTU, 2023c).

After completing the DISE program, SSTs and SENOs can proceed to enroll in the Advanced Diploma in Special Education (ADISE) program with the recommendation of their school principals along with at least two years of teaching experience in special education. The emphasis in the ADISE is on deepening the 'reflective-practitioner' capacities and skills in evidence-based classroom-based and school-level practices in either mainstream or special schools. Five courses comprise the ADISE program conducted over two semesters with course participants being exposed to evidence-based research

literature in special education to inform their translation of research into practice to meeting concerns within their classroom and school contexts (NTU, 2023a).

The ADISE can also be used as consideration for entry into NIE's full-time Bachelor of Arts (Education) / Bachelor of Science (Education) or part-time Bachelor of Education programs – which are pre-service undergraduate programs for becoming mainstream teachers (NTU, 2023a). Beyond the ADISE program is the master's in education (Special Education) which requires applicants to have the prerequisite background in education and field experience in special education. The master's in education can be taken full-time or part-time and completed within four semesters or two years (NTU, 2023d). Students aspiring to proceed to a doctoral program can focus on a piece of special education research at NIE [through the doctorate in philosophy (PhD in Education) or doctor in education (EdD)].

Contextual Influences: On Policy Implementation, Partnerships and Practice

Impressive strides have been made within mainstream education in the past two decades to support the inclusion of students with special needs within mainstream settings. In the pre-2004 period, it was common for mainstream schools to reject the admission of students with special educational needs based on limited resources such as manpower to support these students. Students were also rejected based on perceived difficulties in their coping with mainstream school environments, the readiness for mainstream schools to accept them, and perceptions of how successful these students would be able to integrate or fit within a school environment primarily meant for students without disabilities. With many educators themselves having grown up and studied in the mainstream education system, which separated them from students with disabilities and which prioritized academic learning and performance over other types of learning, special education in the pre-2004 mindset seemed a distant field that did not relate nor pertain to their role and responsibilities as a mainstream teacher (Lim & Tan, 1999; Quah, Lui, Tan & Yip, 1982; Thaver, 2013).

The progressive penetration of special education into mainstream education was made possible top-down from Prime Minister Lee in his envisioning of Singapore as an inclusive society. His call for better supports for students with special needs in mainstream schools led to the development of new teacher preparation programs and courses as well as personnel schemes (such as the SENOs) in special education for mainstream schools; and with supports found in mainstream schools, more students with special needs have enrolled. In this sense, the *integration* of students with special needs within mainstream schools has shifted towards their *inclusion* due to these schools reforming their beliefs and practices to create a more accommodating and inclusive learning environment for them (Lim & Thaver, 2023).

The Ministry of Education's policy direction over the past few years has been for mainstream schools to develop their own school-wide systemic response through the tiered system of support in supporting student with special needs (Aljunied, 2021). This policy initiative has shifted the responsibility and accountability to support special needs from special education-related personnel like SENOs to collaborative school teams involving teachers, SENOs and relevant school personnel such as counsellors and psychologists. Through the tiered system of support implemented in mainstream schools, the partnership between special education and mainstream education has also grown closer based on their mutual benefits on enhancing the school organizational and structural delivery of manpower for all students including those with special needs (Dutt, Lim & Thaver, 2019; Lim et al., 2022; Lim & Thaver, 2023).

The developments in special education and teacher preparation discussed in this paper have been instrumental in the evolution of special education as a field in Singapore, which, in turn, is situated within the larger context of Singaporean society with its own unique socio-historical and socio-political legacies, influences and national priorities (Lim, Thaver & Strogilos, 2019; Walker, 2016). The reforms of mainstream education towards greater inclusivity of students of special needs and partnership with special education have been made possible through the influence of Singapore's unique feature of tripartism in its education system. Tripartism in Singapore is a hallmark approach adopted by employers, unions and the government towards achieving shared economic and social goals (Ministry of Manpower, 2024). Over the decades, a close tripartite relationship has been built between the Ministry of Education (MOE), its sole teacher certification body (i.e., the National Institute of Education) and all government schools, which facilitates and enables systemic changes to be more effectively rolled out and reinforced (Kwek, Ho & Wong, 2023). Another contributing feature to Singapore's education system is how the government, through MOE, centralizes policy control and infrastructure while simultaneously decentralizing the system to schools to develop their own capacities and capabilities as learning organizations with the autonomy to

self-appraise for continuous improvement (Kwek et al., 2023), an apparent paradox in the education system (Ng, 2017).

The series of developments in the fields of special education and disability as well as mainstream education has included continuous building upon prior efforts over the past twenty years. This is a rarity among many countries and education systems, where discontinuities are often experienced due to changing governments (Kwek, Teng, Lee & Chan, 2020). The uninterrupted rule of the PAP government has also built an education system that has evolved continuously without facing a change of government in its fifty-eight years. Current efforts of educational leaders (i.e., education ministers) are built upon the work of previous leaders that have permitted long-term educational policy planning to occur accompanied with a longer, wider and deeper expansion and impact in implementing educational policies (Lim & Thaver, 2021; Ng, 2017). This relatively stable and predictable modus operandi for change has heavily influenced special education in Singapore and its current issues.

Salient Issues in Special Education and Teacher Preparation

Although the significance and relevance of special education in Singapore has advanced tremendously since independence and especially during the past twenty years, there are several salient issues, as influenced by the local context, that can affect the development of special education and the preparation of its teachers and personnel. These issues are as discussed in the following themes:

Purview Matters

While special schools are described now as part of the national education system and are government funded, they are still run and operated by social service agencies. The recruitment and hiring of untrained special education teachers for the special schools followed by their enrolment in the DISE (SST) program after a few years of teaching service means that schools need to have their own eco-systems of coaching and support for these untrained teachers when they begin. As aforementioned, special education teachers from special schools are recruited by the social service agencies running the special schools unlike their mainstream counterparts who are under the purview of the Ministry of Education. Compared with mainstream teachers, special education teachers from special schools generally receive lower salaries.

This matter of special schools and their teachers coming under the purview of the Ministry of Education has been repeatedly raised by concerned stakeholders. A recent reply by the Minister of Education, Mr. Chan Chun Sing, to a nominated member of parliament, indicated that the Ministry of Education is prepared to explore new models in working with SSAs and the community that would deliver better outcomes for (i) children with special needs, (ii) their families, (iii) the professional development of special education teachers, (iv) engaging the community, and (v) continuum of support from pre-school to post-school life. The minister also cited the ensuing plan from the Enabling Masterplan 2030 for the Ministry of Education to partner with SSAs to establish five new special schools by 2030, in addition to the current 22 special schools (Ng, 2022). If special schools and their teachers were to come under MOE's umbrella, the status and identity of special education in Singapore would reflect the common practice in many developed countries of housing special education under the education body.

Continuum of Special Education Options and the Interaction between Students with and without Disabilities

With more students with milder disabilities included within mainstream schools, opportunities for them to interact with diverse others have greatly opened up. For students with moderate to severe disabilities or higher support needs who attend special schools that are physically separate from mainstream schools, various initiatives have provided opportunities for students in special schools to interact with students from mainstream schools. The co-location of several special schools next to or near mainstream schools has been a strategy deployed to increase the interaction of their respective students with each other. The Satellite Partnerships initiative (Ministry of Education, 2022a) provides opportunities for students from both special schools and mainstream schools to interact meaningfully through joint activities with each other to develop an appreciation for differences and develop values such as patience, kindness and empathy. This initiative, which has existed since 2008, is currently being enhanced by MOE, to expand and deepen these partnerships, under the renamed School Partnership (General Education-Special Education) model. This revision of the partnership model between mainstream/general education and special education emerged from MOE's recent "Learn for Life" movement to nurture diverse talents, expand pathways, strengthening support for lifelong learning, and build strong partnerships in education (Ministry of Education, 2023a).

Lim and Quah (2004) noted the lack of a continuum of special education options beyond special schools, such

as special classrooms within mainstream school, resource classrooms for students with special needs, and the provision of special education support for students with special needs within mainstream classrooms. While progress has been made in the provision of special education support for students with mild disabilities in mainstream schools, the provision of special education support and options for students with higher support needs within mainstream school environments remains limited. For instance, beyond the special school setting, a special classroom option for students with moderate to severe disabilities that is located within a mainstream school is nonexistent. This option would increase the opportunities for these students to interact and learn with their peers without disabilities and vice versa due to their proximity with each other within the same school environment and routines. Greater opportunities for regular interaction between both these groups of students can facilitate the learning of appropriate social and life skills as well as relationships and friendships which are foundational to an inclusive society.

Preparation of Special Educators

Over a decade ago, Poon, Musti-Ra and Wettasinghe (2013) highlighted a need for special education teachers in Singapore to "receive training equal, if not greater, in intensity to that which their counterparts in mainstream education receive" (p. 63). While there have been key program developments in teacher education in special education, special education preparation continues to be less comprehensive in its coverage as mainstream teacher preparation program in terms of its depth in discipline-specific and curricular content knowledge due to the shorter length of the DISE program. There is still no undergraduate degree offered in special education at NIE, although there is now a minor in special education that is available to undergraduates. Since the robustness of a discipline depends on the quality, amount, and duration of preparation of its student teachers, these limitations in teacher preparation for special educators can affect the quality-of-service delivery.

To further improve the competencies of teachers in special education and increase the attractiveness of special education as a sustainable career, there is a need to periodically review the hiring requirements, salary scales, career progression, and the duration of special education teacher/personnel programs. In recent years, the Ministry of Education has attempted to redress some of these issues by offering more avenues for the career progression and training of teachers in special education schools (Teng, 2020) and reviewing remuneration (Goh, 2024).

CONCLUSION

The Singapore education system has been evolving from a focus on fulfilling economic needs and an emphasis on academic development and performance to broader and more holistic student development and outcomes, such as character education, socio-emotional growth, social and self- awareness, mental health, and social participation and relationships with diverse others (Kwek et al., 2023; Ministry of Education, 2023a). MOE launched the next phase for education in Singapore (from 2020 onwards) in the "Learn for Life" movement to move away from an over-emphasis on academic performance and results to a more holistic and student-centric preparation for students to become future-ready through nurturing lifelong attitudes and skills (Ministry of Education, 2018). These educational shifts, in response to the uncertainties of global challenges and changing local realities (such as the rapidly aging population: by 2030, almost one in four Singaporeans will be 65 and older, thereby heightening the vulnerability quotient in society), signal a greater thrust towards fostering a more "inclusionary space" (Lim & Thaver, 2021) within mainstream education and society for diverse citizens including those with special needs. In light of these directions in education, it is anticipated that the role of special education in Singapore to prepare teachers both within special and mainstream schools, will continue to expand in partnership to serve all students.

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