Abstract

Title of dissertation: MATHEMATICS INSTRUCTION IN JUVENILE CORRECTIONAL FACILITIES DURING COVID-19

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Students with disabilities are overrepresented in correctional settings in the United States and there is a dearth of information in the professional literature about the adequacy of instruction for these youth. Moreover, during the recent COVID-19 pandemic (2020-2022), access to education was abridged for many youth including those in juvenile correctional facilities (JCFs). This dissertation addresses the adequacy of academic instruction in juvenile corrections with a specific focus on mathematics instruction for youth receiving special education services. After an introduction to the topic in this first chapter, Chapter II presents a systematic review of academic and vocational interventions in juvenile correctional facilities (JCFs). Chapter III presents a descriptive study of special education mathematics teachers in JCF. Among other things the survey attempted to provide a snapshot of curriculum choices, instructional contexts, instructional adaptations for students with disabilities, and barriers to instruction for students during the initial weeks (March 20, 2020, through July 31, 2020) of the COVID-19 pandemic. The survey was framed by the existing literature on evidence- based mathematical curriculum and instructional approaches found to be successful in traditional secondary school settings. Results showed that the 31 respondents infrequently used state and

locally based curriculum, frequently incorporated the use of student calculators when teaching, and found only a few barriers to teaching during the initial weeks of COVID-19 pandemic.

Chapter IV provides suggestions to practitioners working in JCFs in preparation for any future health emergency. While directed at special education mathematics teachers and administrators in these facilities, other practitioners who work in JCFs could benefit from these tips. Proactive planning is a theme present in all the suggestions created in response to the concerns and needs presented by both administrators and teachers working in JCF at the start of the COVID-19 pandemic. Chapter V summarizes and synthesizes information from the systematic literature review, the empirical study presented in Chapter III, and the suggestions for practitioners presented in Chapter IV. The final chapter also discusses implications that flow from the elements of the dissertation and suggests areas for future research.

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by

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Table of Contents

List of Tables

Chapter II

Chapter III

Chapter IV

Chapter l: Introduction

Providing a quality education within JCF has great potential to positively impact recidivism. Katsiyannis, Ryan, Zhang, and Spann (2008) reported that school success resulted in reduced rates of recidivism for those youth that already were considered to be juvenile delinquents. Katsiyannis et al. (2008) noted that "while academic performance may not directly cause delinquent behavior, rates of re-offending and recidivism are highly correlated with low levels of academic achievement" (Katsiyannis et al., 2008, p. 188). More importantly, Zhang, Barrett, Katsiyannis, and Yoon (2011) stated that for youth who are incarcerated, "improvement in academic achievement during incarceration has resulted in reduced levels of recidivism" (Zhang et al., 2011 p. 13). Education for students in JCF is complicated by the diverse characteristics of incarcerated youth which typically do not mirror the non-incarcerated youth population. The most recent national survey indicated that youth with special needs are overrepresented in JCF settings (Quinn et al., 2005). Quinn et al. (2005) found that 33.4 % of youth in JCF were receiving special education services. This was four times higher than the percentage of youth with disabilities in the general population (Quinn et al., 2005). Within this subset, the percentage of youth with Emotional Behavioral Disorder (EBD) was 47.7%, and the percentage of youth with a specific learning disability (SLD) was 38.6 % (Quinn et al., 2005). In the remainder of this chapter, I will address JCF curriculum and instruction issues, the importance of appropriate mathematics curriculum and instruction, and the impacts of COVID-19 on these issues. First I begin with the legal requirement of a free and appropriate education.

A free and appropriate public education (FAPE) provision of the Individuals with Disabilities Education Act (IDEA, 2006) was designed to ensure that any student with disabilities would receive an education comparable to the educational experience with students

that do not have disabilities. Despite the guarantee of FAPE for incarcerated students with disabilities, too often those students have received an inadequate education (Suitts, et al., 2014). A national survey of juvenile correctional agencies found that only eight states provided educational services of the same quality as the services youth received in the community (The Council of State Governments, 2015). Litigation has been used to ensure youth receive the services they need as a response to the "abysmal quality of education services in juvenile corrections" (Leone & Wruble, 2015, p. 592). There have been over 40 class action lawsuits filed in 28 states and Puerto Rico since 1975 alleging a failure to provide educational services (Leone & Wruble, 2015). This failure to provide any, not simply inadequate, educational services was an important aspect of many complaints (Leone & Wruble, 2015).

A common violation of free and appropriate public education (FAPE) in JCF schools is a lack of appropriate instruction (Gagnon & Ross Benedick, 2021). Broadly, there are four main ideas or aspects associated with FAPE. The first is that education must be free. Secondly the education should be appropriate for the student and includes an individualized educational plan (IEP) geared to the individual needs of the student. Thirdly, the education must be public which means the student with disabilities has all the same rights as any student that attends a public school. Finally, the student with disabilities must receive any need related services (see Gagnon & Ross Benedick, 2021 for additional information regarding FAPE and JCF). Many of these barriers to a quality education intersect and are compounded within JCF's. On top of these setting and system-based difficulties, as is the case outside of JCF's, mathematics education can specifically be a crux.

The challenges associated with mathematics learning for students, particularly students with disabilities incarcerated in juvenile correctional facilities (JCF) are immense. Throughout

this introduction, I will explore these challenges intimately. Following that, I will provide examples of research regarding curriculum selections and instructional practices intended to benefit students with disabilities in JCF. I will examine some of the impacts of the COVID-19 pandemic on the existing JCF system and include information about the need to ensure FAPE for students with disabilities despite these challenges exacerbated by COVID-19 to the educational setting. I'll conclude this chapter with an overview of the chapters and the theoretical framework utilized in this dissertation.

For youth to successfully navigate and enter the workforce in this complex world, well developed mathematics skills are essential (National Mathematics Advisory panel, 2008). The growth of the demand for mathematics intensive jobs has, at times, been greater than overall job growth (National Mathematics Advisory Panel, 2008). The ability to think mathematically is an important work force skill required for youth who participate in the labor market (Jitendra et al., 2018). All of this considered, students in the United States have struggled to demonstrate mathematics proficiency (National Center for Education Statistics, 2019, 2022; Organisation for Economic Co-Operation and Development, 2020) and U.S. mathematics performance is still below the international average of other developed countries (Barshay, 2019).

It is a great challenge to provide a quality mathematics education in general (Forbringer & Fuchs, 2014) and an even greater challenge to do so within juvenile correctional facilities. Some youth in particular, are at a greater risk for failure in mathematics than others. There is evidence that secondary students with disabilities have scored significantly below grade level in mathematics (Jitendra et al., 2018) and students with learning disabilities (LD) often lack mathematical skills, such as number fluency, making it difficult for them to as achieve goals set in the Common Core State Standards (Myers et al., 2015). More specifically, high school

students with emotional behavioral disorders (EBD) have performed three grade levels behind students without disabilities (Mulcahy et al., 2016). Compounding this problem, and in contrast to the Individuals with Disabilities Education Act (IDEA, 2006) requirement that students with disabilities have access to the general education curriculum, secondary special education teachers working with students with EBD and LD commonly focus on basic arithmetic skills and not on higher-level understanding in the context of real-world problems (Mulcahy et al., 2016). Thus, it is important to understand both curriculum selections and instructional practices that have been found to be effective for students with EBD and LD as both may benefit the mathematics education of these students in JCF.

Appropriate Mathematics Curriculum and Instruction in JCF

The degree to which JCF curriculum selections are based on local and state requirements is reported in previous research (Gagnon, 2010: Gagnon et al., 2009, Maccini et al, 2012). Gagnon (2010) reported findings from a survey of state level special education directors. Approximately one third of the directors reported that JCF schools used school developed or individualized curriculum (Gagnon, 2010). Principals of JCF schools indicated that their schools commonly used a local or state curriculum 68.2% of the time, with the percentage for mathematics curriculum at 73.6% (Gagnon et al., 2009). In the JCF context, Maccini, Gagnon, and Mason-Williams conducted a survey of special education mathematics teachers in JCF. The 121 respondents came from all four geographic regions: the Midwest, Northeast, South, and West. Maccini and her colleagues found that in 47% of the schools, the curriculum was not based on district or state curriculum (Maccini et al., 2012). Taken together the above studies indicate a wide range in the linkage between local and state requirements and the selection of curriculum. Irrespective of the basis of JCF curriculum selections, researchers have provided instructional

practice suggestions that could benefit youth in JCF including suggestions to benefit youth with disabilities.

In terms of instruction for youth in JCF, researchers have provided instructional practice suggestions that are grounded in literature found to be effective at the time for students with EBD or LD. Researchers (Maccini el., 2006; Maccini et. al., 2008) explored evidence-based practices that could benefit students in JCF. Maccini, Gagnon, Mulcahy, and Leone, (2006) provide a set of recommendations based on observations in JCF contextualized by the literature. These researchers navigate the extent to which teachers implemented evidence-based, promising practices through approaches such as advanced organizers, direct instruction, use of technology and real-world problem-solving, varied student grouping, instructional sequence and strategy instruction. In 2008 Maccini, Strickland, Gagnon, and Malmgren provided additional suggestions consistent with the earlier research (Maccini et al., 2006), but contextualized by a national survey of mathematics teachers in JCF and intended to apply to youth both in JCF and outside of JCF settings. These are two studies that provide practical suggestions, but generally there is a lack of literature focusing on mathematics instruction for struggling students (Forbringer & Fuchs, 2014). Hence the importance of appropriate mathematics curriculum selections as well as the use of effective instructional practices for JCF students with disabilities.

JCF Education and COVID-19

In January 2021, President Biden issued an executive order supporting the reopening and continuing operations of schools, to make sure that students receive a high-quality education during the COVID-19 pandemic (Exec. Order No. 14000, 2021). Part of that order directed the Civil Rights Department of Education to provide a report on the disparate impacts of COVID-19 on students. Findings of this report suggested that learning loss varied by subject with

mathematics skills “generally slipping more than reading” (Goldberg, 2021 p. 4). These findings suggest that the pandemic may have made it more difficult to effectively teach mathematics. In settings such as JCF where more students with disabilities (Quinn et al., 2005) may already be struggling to learn math, the pandemic provided another difficulty in the provision of mathematics education for students with disabilities.

The onset of the COVID-19 pandemic altered many aspects of education (Pace, et. al., 2020). In response to these alterations, the United States Department of Education issued a clarification of the legal requirements during COVID-19 for students with disabilities. This guidance stated that as long as the general student population is receiving educational opportunities during a school closure, the provision of FAPE must still be upheld, irrespective of the mode of instructional delivery (United States Department of Education, 2020). Many JCFs lacked the resources needed to maintain this standard following this shift (Buchanan et al., 2020). In June 2021. A United States District Court judge granted a plaintiff's motion for a preliminary injunction in the case of *Charles H. et al. v. District of Columbia et al.* (referred to as *Charles H.*). In this case, the basic aspects of special education services were denied to youth incarcerated in the District of Columbia jail. In some cases, students were provided with instructional packets without teacher instruction or support (Gagnon & Ross Benedick, 2021). The findings from this case constitute identifying administrative and instructional shortcomings such as the providing work packets without instruction as a denial of education for youth with disabilities in JCF during the COVID-19 pandemic. Reported in the survey (Chapter III) were instances of a denial of education such as this. This brings to light the importance of changing and upholding instructional, curriculum, and administrative practices in JCF both in general and in preparation for any subsequent pandemic.

Given these concerns, a more comprehensive understanding of educational programming in mathematics, a content area in which there is little research in general (Forbringer & Fuchs, 2014), is needed for youth in JCF. This is important, as progress with mathematics scores may be possible for youth in JCF if the educational programs are delivered effectively (Suitts et al., 2014). In the next section I will provide the theoretical framework and terminology used in this dissertation. This chapter will culminate with an overview of each chapter in the dissertation.

Theoretical Framework and Terminology

The exploratory and descriptive nature of this dissertation research lends itself to a combination of two broad ideas: The guaranteed access to the general education curriculum per IDEA (2006) and the notion that teachers should use evidence-based, and promising mathematics instructional practices (Forbringer & Fuchs, 2014).

Consistent with ideas surrounding FAPE throughout this dissertation, connections are made to evidence-based practices used outside of JCF and assertions made about the promising nature of those practices to be used in JCF. Given a lack of research in JCF setting, researchers have often utilized research for secondary students with disabilities such as LD to provide specific suggestions for youth in JCF (Gagnon & Barber, 2015; Maccini et al., 2008) and that approach is taken here.

The notion that access to the general education curriculum is required for students with disabilities will only be valuable to those students if teachers are using evidence-based practices shown to benefit the specific needs of students with disabilities is also present in the following chapters. The descriptive survey (Chapter III) and the practitioner paper (Chapter IV) in this dissertation are undertaken through the lens that FAPE is the goal for all students with disabilities and the use of evidence- based practices is one crucial vehicle to achieve that goal.

Qualitative Connection

In Chapter III, I present the findings from a descriptive survey that includes one open-ended question that gave respondents an opportunity to write in their own answer to this question. (E.g., Please describe the most challenging barrier(s) to your mathematics instruction during COVID-19. How did you or how would you have liked to solve the problem(s)?) The responses to this question were analyzed using qualitative methods that are aligned by constructivism (Creswell & Plano Clark, 2018; Lincoln & Guba, 2013).

Terminology

The following terms and definitions are relevant to the research question, accompanying results and discussion.

Constructivism is defined as follows: any meaning in the data comes from each individual response (Patton, 2015), which means respectively that each respondent will create their own meaning when answering the open-ended question (Chapter III). As a researcher, my goal with this open-ended question was to try and capture that individual meaning. Participant's direct quotes are incorporated in acknowledgment of the multiple reality perspective of a constructivist worldview (Creswell & Plano Clark, 2018). In the methods section that follows later (Chapter III), the process for coding this qualitative question is presented. Before proceeding to an overview of the dissertation, additional definitions of terminology are needed as there are specific terms used in the research questions in the descriptive survey (Chapter III).

Definition – Other Terminology

Instructional context factor is defined to be any factor (time, location, personnel, or materials) of the instructional setting that has the ability to impact instruction. For example, less total minutes (time) for a mathematics class than required by the state would be an example of

an instructional context factor that could play a role in instruction. A second example could be a lack of a student calculator (material) during mathematics instruction as an instructional context factor that impacts instruction.

Instructional adaptation is defined to mean any change made to the mathematics classroom environment. Instructional adaptations selected for use in this survey are those found to be effective in previous research (Myers et al., 2015) for assisting students with disabilities in the learning of math. For example, problems read to students, or if the students had extra time to perform their mathematics problems these would be examples of instructional adaptations. With that terminology in mind, I now provide an overview of each of the dissertation chapters.

Overview of the Dissertation

This dissertation is organized into five chapters: introduction, research synthesis, descriptive survey, practitioner paper, and conclusion. In the current chapter, I provided an overview of the importance of appropriate JCF mathematics curriculum, instruction, relevance of the COVID-19 pandemic, and introduce the problems addressed in the dissertation. Chapter II is a synthesis of academic or vocational interventions for detained or incarcerated juveniles. The term key features referred to in these research questions are defined in the second chapter. The research questions are: (1) What are the key features of academic or vocational interventions that are implemented in residential juvenile correctional or detention facilities? (2) Which of these features are also implemented with students with disabilities? (3) What learning outcomes and effect sizes are reported in this body of research and which of these are reported for students with disabilities? (4) What features of academic or vocational interventions implemented during the COVID-19 pandemic were necessitated by alterations in educational delivery due to the

pandemic from March of 2020 to December 2021? Findings of this systematic review lay the groundwork for the empirical study (Chapter III) and the practitioner manuscript (Chapter IV).

The empirical study (Chapter III) is a descriptive survey of special education mathematics teachers in JCF. This study is intended to provide a snapshot of curriculum choices, instructional context, instructional adaptations for students with disabilities, and barriers to instruction for students during the initial week's (March 20, 2020, through July 31, 2020) of the COVID-19 pandemic. It is framed by the existing literature on evidence-based mathematical curriculum and instructional approaches found to be successful in traditional secondary school settings. The research questions are: (1) What mathematics curriculum do special education teachers select for use in JCF during the initial weeks of the COVID-19 pandemic (March 20, 2020, to July 31, 2020)? (2) What are the instructional practices in use by special education mathematics teachers prior to, and/or during the initial weeks of the COVID-19 pandemic (March 20, 2020, to July 31, 2020)? (2a) What instructional context factors do special education mathematics teachers report are implemented in JCF that function as barriers to instruction prior to, and during the initial weeks of the COVID-19 pandemic (March 20, 2020, to July 31, 2020)? (2b) Which instructional context factors changed comparing the time prior to, and during the initial weeks of the COVID-19 pandemic (March 20, 2020, to July 31, 2020) used in mathematics instruction? (2c) What are the instructional adaptations for students with disabilities used in mathematics instruction during the initial weeks of the COVID-19 pandemic (March 20, 2020, to July 31, 2020)? (3) What barriers to the provision of instruction do special education mathematics teachers report in JCF other than those reported as an instructional context factor during the initial weeks of the COVID-19 pandemic (March 20, 2020, to July 31, 2020)?

Findings from the descriptive survey (Chapter III) motivated and informed the practitioner paper (Chapter IV).

In the practitioner manuscript (Chapter IV) I provide practical information to special education mathematics teachers and administrators in JCF. Suggestions are made in the practitioner paper regarding professional development to assist teachers in both student engagement and procurement and use of materials helpful in a move to teaching online that could be necessitated by a future health emergency. Professional collaboration is also explored as a means for practitioners to proactively work together prior to and during any future health emergency. The practitioner manuscript is also placed in the context of the literature including, but not limited to, known barriers to instruction in JCF prior to the COVID-19 pandemic and challenges with the use of online instruction. The last chapter (Chapter V) is comprised of a summary of the findings in the previous chapters and a conclusion with a discussion on next steps for researchers and practitioners. Finally, possible future research questions are presented stemming from the research within the entirety of the dissertation.

Chapter II: Academic or Vocational Interventions for Detained or Incarcerated Juveniles: A Systematic Review

Introduction

In the following section I will introduce some of the difficulties faced by youth involved in the juvenile justice system. This information helps to describe the type of student that could benefit from the findings of the synthesis that follows. I'll continue by providing a summary of the most recent research in juvenile correctional facilities (JCF) related to both academic and vocational interventions and curriculum ideally aligned with state academic and career and technical education standards. Consistent across this literature is the need for evidence-based practices found effective outside of juvenile corrections, to be implemented in JCF. Following the background information and identification of the research questions, the remaining sections of this chapter focus on the methods, results, discussion, and limitations of the synthesis. This chapter ends with a summary of the findings from the synthesis that motivated the descriptive study found in chapter three.

Youth involved in the juvenile justice system are often characterized by numerous challenges prior to entry into the system. These challenges can translate into risk factors that make achieving academic success in the system difficult. The larger the number of risk factors faced by each youth, the larger the chance of involvement in the juvenile justice system (Christle & Yell, 2008). Youth who have experienced external risk factors and structural disadvantages (Rodriguez, 2013), such as living in poverty, receiving public assistance, and living in a female headed household are more likely to become confined (Rodriguez, 2013). Risk factors are not entirely external, but may also be considered internal, such as identified disabilities. Research has shown that youth with disabilities are overrepresented in the juvenile justice system (Quinn, Rutherford, Leone, Osher, & Poirier, 2005). Rates vary by state with a median of 33 % (Quinn et al., 2005). Students with emotional or behavior disorders were the most reported disability (Gagnon, Barber, Van

Loan, & Leone, 2009). Quinn et al. (2005) found a disability classification of 47% with emotional behavioral disorder (EBD) and 39% with learning disability (LD) for youth in juvenile corrections.

Unfortunately, in the last decade it has been difficult to assist students with disabilities in JCF by providing specific academic and vocational recommendations in both areas (Gagnon et al., 2022), yet it is important both areas are addressed for youth to successfully transition out of JCF (House, Toste, & Austin, 2018). In terms of academic concerns many of these students have reading and mathematics levels that are several years behind in comparison to students without disabilities who are incarcerated (Krezmien, Mulcahy, & Leone, 2008). Access to effective education in juvenile corrections, especially for students with disabilities, has not been without difficulty. Burke and Dalmage (2016) noted the lack of research examining methods to improve the quality of special education services for youth in correctional settings. Concerning vocational and career training skills, in addition to providing youth with educational programs it is important vocational or career training skills be provided in JCF to help youth (DelliCarpini, 2010) prepare to exit JCF. Career training should include access to certifications outside of JCF to help youth find gainful employment once they leave JCF (Griller Clark et al., 2021). Both types of education need to occur in JCF and should target the specific needs of students with disabilities. In the section that follows I summarize the most recent academic and vocational research in juvenile correctional facilities.

Recent Synthesis, Meta-analysis, Literature Review in Juvenile Correctional Facilities

The following section summarizes previous research in juvenile correctional facilities. It is important for youth in JCF to experience both quality academic and vocational instruction; however, over the last decade very little research has been conducted that helps us understand how to improve academic and vocational curriculum and instructional

practices in JCF (Gagnon et al., 2022). The following summaries help us to understand the most recent state of academic and vocational intervention research as well as ideal best practices for both curriculum selection or instructional practices for use in JCF. I begin with a summary of a wide-ranging synthesis of academic interventions published by Wexler and her colleagues in 2014. This is followed by a summary of a meta-analysis (Steele et al., 2016) of both academic and vocational interventions, ending with a summary of a literature review of both quantitative and qualitative studies addressing curricula aligned with state academic and career and technical education standards for youth in JCF (Hunter et al., 2022). Each author(s) identified a need for additional research in these settings. Additionally, the use of evidence–based practices in the reviewed studies that have shown promise in settings outside of JCF are also present and relevant throughout this literature. Included study authors made the case that these practices found effective outside of JCF, should be used in JCF. It is with this information in mind that the following summaries are placed.

Consistent with previous research (Foley, 2001; Leone et al., 2005), Wexler et al. (2014) identified a general lack of research in JCF. Wexler et al. (2014) conducted a synthesis of academic intervention studies for incarcerated adolescents conducted between 1970 and 2012. The 16 studies that met the inclusion criteria included literacy, mathematics, written expression, and multi-component interventions. Studies were included if they contained at least one academic outcome. Wexler et al., (2014) found the potential of implementing explicit, targeted, academic interventions that have previously shown promise with adolescents in the general school setting. The authors identified three areas for further research: (a) delivery of instruction that is targeted and explicit; (b) intervention duration and session length; and (c) the size of the instructional group.

Steele et al. (2016) conducted a meta-analysis and synthesized evidence from 18 studies of educational interventions implemented in JCF. Findings indicated positive results

for computer-assisted instruction in raising reading comprehension, and for personalized learning in improving diploma completion. Five intervention categories were included: remedial academic instruction, computer-assisted instruction, personalized academic instruction, vocational education, and GED completion. The criteria for inclusion differed from Wexler et al., (2014) in that Steele et al. (2016) used her own researcher-generated quality indicator measures and expanded her search to include vocational interventions. Several studies that were synthesized by Wexler et al. (2014) were also included by Steele (2016). The corpus of studies was wider ranging than previous research (Foley, 2001; Leone et al., 2005; Wexler et al. 2014).

Hunter et al. (2022) conducted a literature review in order to explore research progress since the publication of *Guiding Principles for Providing High-Quality Education in Juvenile Justice Secure Care Settings,* a joint publication of the U.S. Departments of Education and Justice (U.S. DOE/DOJ) in 2014. This literature review focused on Principle IV: Rigorous and relevant curricula aligned with state academic and career and technical education standards that utilize instructional methods, tools, materials, and practices that promote college and career readiness (DOE/DOJ, 2014). Included studies were quantitative, qualitative, and descriptive, and results indicated a lack of information regarding participants, a lack of measures of fidelity, and an incomplete description of the interventions. Thus, Hunter et al. (2022) expressed concern regarding any generalizations from the included studies. Findings that support skepticism were that there were only a few female participants across all the included studies and many of the studies lacked enough information for replication.

Purpose and Research Questions

There are three reasons to synthesize the research concerning academic or vocational interventions in JCF. First, concerns exist that the implementation and results of academic or

vocational interventions may differ if participants have a disability (Forbringer & Fuchs, 2014). Second, the intervention design, implementation and replication may all be impacted by the specific type of student disability (Forbringer & Fuchs, 2014). In locating and synthesizing studies for the present synthesis, it was desirable to formulate research questions to uncover interventions that were implemented with students with disabilities. There is a need for a synthesis that does include a review of disaggregated data for students with disabilities and I am conducting this review because, with advances in the quality of research over the years (Odom et al., 2005), it may be possible to provided new insights into the effectiveness of instructional approaches for students with disabilities. This focus was in response to a limitation of the previous literature (Hunter et al., 2022; Wexler et al., 2014); reviewed studies may have noted if the included participants had a disability, but disability type was not consistently reported. Consequently, no intervention outcomes were reported by specific type of student disability. In addition to limitations in the previous research, an additional consideration in planning this synthesis was the onset of the COVID-19 pandemic.

This synthesis was conducted during the COVID-19 pandemic. The third reason for synthesizing academic or vocational interventions in JCF is that changes may have occurred in the educational setting of any located and reviewed studies as a result of the pandemic. Thus, a research question (4) was added to consider research updated due to the pandemic. Possible intervention alterations could have occurred in mode, dosage, or interventionist.

The intervention may or may not be possible if the mode of delivery was face to face and suddenly the COVID – 19 pandemic meant that instruction moved to online learning. Intervention dosage could also have been altered if the online delivery meant more or less time for student instruction. The interventionist may have changed due to the pandemic; this may not have been consistent with the intent of the intervention. All of these considerations were taken into account in formulating the purpose and research questions for this synthesis.

The purpose of this synthesis is to examine JCF research focused on academic and vocational interventions for detained or incarcerated juveniles. This paper considers participants with disabilities and examines the potential impacts on education in these settings that may be attributable to the COVID-19 pandemic.

The term key features are used in the following research questions and are defined as: intervention agent (aspect of intervention that demonstrated effectiveness previously reported in the research), setting (location of intervention) intervention dosage features (length of intervention and or frequency of intervention), intervention instructional delivery and mode of intervention delivery (how the intervention was delivered and who delivered the intervention).

The research questions are: (1) What are the key features of academic or vocational interventions that are implemented in residential juvenile correctional or detention facilities? (2) Which of these features are also implemented with students with disabilities? (3) What learning outcomes and effect sizes are reported in this body of research and which of these are reported for students with disabilities? (4) What features of academic or vocational interventions implemented during the COVID-19 pandemic were necessitated by alterations in educational delivery due to the pandemic from March of 2020 to December 2021? The time frame associated with the COVID-19 pandemic for the purposes of this research question is from the origination of the pandemic on or about March of 2020 through December 2021.

Method

Studies for this synthesis were identified using a multistep process. First, an online search was conducted using the APA PsycInfo, Educational Resources Information Center (ERIC), Criminal Justice abstracts, National Criminal Justice Reference Service Abstracts, Academic Search Complete and Google Scholar databases for peer reviewed articles. This

search was limited to studies conducted in the United States, in English and from the years 2012 to 2021. The year 2012 was used to locate any studies published since the synthesis completed by Wexler et al. (2014) and her colleagues. The search required at least one of the descriptive terms from the following sets: set (1) youth or juvenile; set (2) juvenile justice, prison, jail, incarcerate* (where the asterisk allowed for different word endings), detention center, or corrections; set (3) education, academic, diploma, GED, literacy, mathematics, reading, science, job skills, job training, apprentice*, vocational education, voc tech, occupational education, career and technical education, workforce development, workforce training, workforce preparation, or school to work. The search was conducted in August 2020 and January 2021 with a total of 735 potential studies identified. A search was conducted in April 2022 to check for any new studies. No new studies were located. A first screening was conducted by reading the abstracts to determine which articles met the following inclusion criteria:

1. The study was reported in a peer-reviewed journal between the years 2012-2021.
2. The study was written in English.
3. The age of the participants was from 11 to 21 years of age.
4. Studies had an academic or vocational outcome measure.
5. Studies were conducted in a residential detention or juvenile correctional facility (JCF). For the purposes of this synthesis a residential treatment center is included if participants had been adjudicated. All the following terms were coded equivalently, meaning any of these locations were included for the purpose of locating potential articles for the review: detention, incarceration, jail, or prison.

Second, a manual search of peer-reviewed journals was conducted for studies that were not identified in the electronic search: The Journal of Correctional Education, Criminal

Justice and Behavior, The Journal of Special Education, Behavioral Disorders, and Behavior Modification. No additional studies were identified during this manual search.

Additionally, an internet search of advocacy group and governmental agency websites was completed: Southern Poverty Law Center, The Council of State Governments Justice Center, U.S. Department of Justice, Office of Juvenile Justice and Delinquency Prevention, and Bellwether Education Partners. No additional studies were identified during this search. Finally, an ancestral search of the reference section for all located articles was conducted. This search produced no additional articles for potential inclusion. The study included all recent studies of academic or vocational interventions for juveniles conducted in a residential detention or correctional setting or a residential setting that housed adjudicated youth with an academic or vocational outcome. Studies that did not focus on school age youth and that did not report academic or vocational outcomes were not included.

Coding of Studies

A code sheet was created to indicate sample characteristics of the reviewed studies. These characteristics included study design, treatment condition, comparison condition, setting, demographics, sample size, intervention duration and frequency, measures, and intervention outcomes. I coded all sample characteristics. A doctoral student was trained in the use of this code sheet and served as the second coder for this code sheet. The second coder also coded all of the reviewed studies for sample characteristics.

Interventions were categorized as randomized controlled trial, quasi-experimental study, or single case design. Studies that did not meet one of these three criteria were excluded from the synthesized studies, but included for discussion. I coded each study for design designation and coding for study design type was then repeated by the second coder.

A second code sheet was created to evaluate the quality of both group-design studies and single case design (SCD) studies. Studies were assessed for quality using standards

published by the Council for Exceptional Children (CEC). These indicators were the Council for Exceptional Children: Standards for Evidence-Based Practices in Special Education (Cook et al., 2014). The use of these quality indicators provides consistency with the research questions ensuring quality is evaluated for students with disabilities. The CEC quality indicators contain eight categories including context and setting, participants, implementation fidelity, interval validity, outcome measures and data analysis. The second coder was trained in this process. After I coded each study, the second coder also coded the reviewed studies based on the CEC quality indicators.

Interrater reliability was calculated by taking the number of agreements and dividing them by the sum of the number of agreements and disagreements. This value was multiplied by 100 to obtain a percentage agreement between the two coders. Interrater reliability for all sample characteristics was 100%. Sample characteristics are presented in Table 1. Interrater reliability for the coding of study design was 100%. Table 1 includes information about the design of the reviewed studies. Interrater reliability for the coding of the quality indicators was 91%. All disagreements were discussed by the two coders and resolved to achieve a final interrater reliability of 100%. The percentage of quality indicators present was found by taking the total number of indicators and dividing this by the sum of possible indicators for each study. Quality indicator information for each reviewed study is provided in Table 2.

Results

Results are disaggregated by study design after an overview of all results. The four studies reviewed in the present synthesis had sample sizes ranging from 4 to 464 participants. The total number of sample participants across all studies was 502. The participants ranged from 12 to 18 years. The majority of the study participants were male, with only 3 the 502 participants reported as female. The age of participants was reported for all studies, but grade level in school was not reported. Ethnicity and disability or psychiatric classification was not

reported for all studies, and SES was not reported for any of the studies included in the systematic review. Treatment conditions and when appropriate, control conditions were described in all of the included studies, but without all demographic features reported. All academic intervention studies required participants to exhibit a demonstrated deficiency in reading (e.g., failure of the statewide reading test, Houchins et al., 2018; below 25th percentile for their age group on the Reading subtest of the Woodcock-Johnson Tests of Achievement, Warnick & Caldarella, 2016; failing percentage on researcher designed reading probe, Wexler et al., 2018). Across all reviewed studies some form of special education or exceptionality status was indicated. In three of the four included studies (Reed et al., 2017; Warnick & Caldarella 2016; Wexler et al., 2018) the type of exceptionality was noted. Sample characteristics are reported in Table 1.

Study Design and Quality

The reviewed studies were identified as randomized trial (*n* = 2), quasi- experiment (*n* = 1), or single case designs (*n* = 1). The reviewed studies were assessed across, (a) critical features of context and setting, (b) participant description, (c) intervention agent description, (d) description of the practices, (e) implementation fidelity, (f) internal validity, (g) outcome measures or dependent variable, and (h) data analysis. The group design studies were evaluated against 24 quality indicators. The three group design studies contained an average of 86% of the indicators. The single case study was evaluated against 22 indicators. The single case study contained 88% of the quality indicators appropriate for studies of this design.

Across all reviewed studies (*n* = 4), total percentages of quality indicators ranged from 83 to 88% with an average across all reviewed studies of 86%. Across all studies, 100% of the reviewed studies contained a description of the context and setting of the study. Across all studies, 75% (*n* = 3) of the studies contained a description of the study participants (Reed

et al., 2017; Warnick & Caldarella, 2016; Wexler et al., 2018) a description of the practices used during the intervention (Houchins et al., 2018; Reed et al., 2017; Warnick & Caldarella, 2016), a description of the outcome measures (Houchins et al., 2018; Reed et al., 2017; Warnick & Caldarella, 2016) and adequate data analysis (Houchins, et al., 2018; Warnick & Caldarella, 2016, Wexler et al., 2018). Half of the reviewed studies (n = 2) described the intervention agent (Houchins et al., 2018; Wexler et al., 2018) and all three measures of implementation fidelity (Reed et al., 2017; Wexler et al., 2018). Two studies were missing quality indicator 5.3 (fidelity reported at multiple times throughout study for all interventionists and all settings) (Houchins et. el., 2018; Warnick & Caldarella, 2016). One study contained all the quality items for internal validity (Warnick & Caldarella, 2016. In terms of missing internal validity quality indicators, indicator 6.1 (systematic control of independent variable) was missing for one study (Houchins et. al., 2018), indicator 6.4 (description of assignment to groups) was lacking for one study (Reed et al., 2017), and one study (Wexler et al., 2019) was missing indicator 6.7 (history and maturation). Please see Table 2 for the specific quality indicators for each reviewed study.

There were three group design studies synthesized. A randomized controlled trial with repeated measure design (Houchins et al., 2018), a pretest-posttest control group design with random assignment (Warnick & Caldarella 2016), and a pretest-posttest single group design (Reed et al., 2017).

All three reviewed group design studies (Houchins et al. 2018, Reed et al. 2017, Warnick & Caldarella 2016) contained a description of context and setting. Participant descriptions were clearly described for two of the studies (Reed et al., 2017, Warnick and Caldarella 2016), but none of the reviewed group design studies identified socioeconomic status (SES) of participants. Study participants were identified regarding special education status and two of the reviewed studies (Reed et al., 2017; Warnick & Caldarella, 2016) cited

a specific disability or exceptionality designation. Two of the reviewed studies (Houchins et al., 2018; Warnick & Caldarella, 2016) utilized a commercially available reading package and both of these study authors provided a clear description of the intervention agent used. The description of practices provided by three reviewed studies (Houchins et al., 2018, Reed et al., 2017, Warnick & Caldarella, 2016) as adequate to follow intervention steps. All three of the quality indicators for implementation fidelity were described by one of the three reviewed studies (Reed et al., 2017). A focus on attrition is a major component in the internal validity category of the CEC quality indicators. Houchins et al. (2018) reported no attrition Threats to internal validity were present in one of the other reviewed group design studies (Reed et al., 2017 indicator 6.4 assignment to groups). Outcome measures were clearly described in all three of the reviewed studies (Houchins et al., 2018, Reed et al., 2017, Warnick & Caldarella 2016). Houchins et al. (2018) used covariates in data analysis increasing the credibility of their findings. All three reviewed studies (Houchins et al., 2018; Reed et al., 2017; Warnick & Caldarella 2016) calculated an effect size.

There is one SCD reviewed in the present synthesis (Wexler et al., 2018). Wexler et al., (2018) employed a multiple baseline across four participants. The authors provided a clear description of the setting and general geographic location, but did not provide information on the SES of participants. Participants in this study were described sufficiently to demonstrate special education status. The critical features of the intervention agent were clearly described. Some of the materials used in the intervention (quality indicator 4.2) were not reported. Wexler et al., (2018) reported implementation of high fidelity, which the authors' defined as having an interrater agreement of 80% or above. The research design used provided sufficient evidence that the independent variable caused a change in the dependent variable; however, there was variability in the data. Additionally, a two-week break due to a hurricane provided opportunity for the threats of history and maturation to potentially impact

internal validity (quality indicator 6.7). Wexler et al. (2018) reported no attrition for the study participants. Social validity was reported for three of the four study participants. A calculation of percent of non-overlapping data was included by Wexler et al. (2018) as a means of effect size, but no other effect size calculation was conducted (quality indicator 7.3) To summarize, Wexler et al. (2018) met the majority of the quality indicators and a demonstration of effect was present, but was hindered by data variability.

Study Findings

Study findings are organized by research question. The first of which is, what are the key features of academic or vocational interventions that are implemented in residential juvenile correctional or detention facilities? Use of intervention features that had demonstrated some previous levels of effectiveness were present in all of the reviewed studies (Houchins et al., 2018; Reed et al., 2017; Warnick & Caldarella, 2016; Wexler et al., 2018). Collaborative or peer learning in the context of literacy instruction was a key feature in two of the four reviewed studies (Reed et al., 2017; Wexler et al., 2014). Explicit instruction was utilized by two studies (Warnick & Caldarella, 2016; Wexler et al., 2018). Blended learning that included text based and computer-based instruction was utilized by Houchins et al. (2018). Reed et al. (2017) used concept maps as part of embedded literacy instruction. Warnick and Caldarella (2016) used a multi- sensory phonics intervention. Wexler et al. (2018) used a peer- mediated reading intervention.

Intervention dosage features were reported for all of the reviewed studies. Houchins et al. (2018) conducted their study over 31 months with a typical participant spending between six to nine months in the facility. Participants spent 110 minutes 5 days a week in the intervention for the length of their stay in the facility. Reed et al. (2017) delivered their intervention for 45 minutes twice a week for 6 weeks. The participants in the study conducted by Warnick and Caldarella (2016) spent 50 minutes 5 days a week, for 8 weeks in the

intervention. Participants in the single case study (Wexler et al., 2018) spent 25 minutes per session, once a week after the school day over a 22-week period of time that included a break in intervention due to a hurricane. In summary the intervention dosage varied across studies from 6 to 31 months.

Intervention instructional delivery and mode of intervention delivery was reported for each of the reviewed studies. Interventionists were teachers, but not all were certified reading teachers (Houchins et al., 2018), a master's level graduate student (Reed et al., 2017), a school psychology intern (Warnick & Caldarella, 2016), and three female doctoral level graduate students who participated in three 4-hr training sessions (Wexler et al., 2014). Blended learning was incorporated in one study (Houchins et al., 2018). Explicit instruction was utilized in two studies (Warnick & Cardarella, 2016; Wexler et al., 2018). Two of the reviewed studies (Houchins et al. 2018; Warnick & Caldarella, 2016), used commercially available reading interventions.

The second research question is, which of these features are also implemented with students with disabilities? In all four studies some type of special education designation was indicated in the participants, thus key intervention features present for each study were also applied to students with disabilities. However, it is important to note that only one study reported outcomes by disability status and not specific disability (Houchins et al., 2018). Three of the reviewed studies (Reed et al., 2017; Warnick & Caldarella, 2016; Wexler et al., 2018) indicated a more specific disability, but did not report results based on disability.

The third research question is, what learning outcomes and effect sizes are reported in this body of research and which of these are reported for students with disabilities? Houchins et al. (2018) found that both treatment and control groups made statistically significant growth on The Woodcock Johnson measures of Brief Reading, Broad Reading, Letter-Word Identification, Oral Comprehension, Passage Comprehension, and Reading Fluency.

Significant differences were found in favor of the treatment group for the Woodcock Johnson III passage comprehension subtest with an effect size .22 and for the Aimsweb maze (comprehension) probes third grade, there was an effect size .284 and sixth grade effect size .408. Houchins et al. (2018) reported that special education classification was associated with slightly faster hourly growth rates for Basic Reading, Letter-Word Identification, and Word Attack than students without special education classification. Students with special education placements grew faster on the PPVT and slower on the TOWRE Phonemic Decoding measure (Houchins et al., 2018). Reed et al. (2017) found improvement on a researcher designed measure of document literacy from pre- to post-test. Reed et al. (2017) reported results of a T-test indicating student improvement in document literacy ($t(12) = 6.35$, $p < 0.001$, $d = 2.02$). Warnick and Caldarella (2016) reported the treatment group showed significant gain over the control group on the outcome measures of Woodcock Reading Mastery Tests–Revised (WRMT–R; Word identification p = .0, eta squared .24, Word attack, p = .001, eta squared .48, passage comprehension p = .01, eta squared .32, and total reading p = .008 eta squared .33). Wexler al. (2018) found that the main idea generation instruction improved students' probe scores, but with variability. Wexler et al. (2018) demonstrated experimental control in this single case design study and the effect was relatively immediate across participants. The percentage of non-overlapping data was reported as 67%, 86%, 44%, and 80% for each of the four participants. Social validity measures indicated moderate satisfaction when using the intervention. In summary three of the studies (Reed et al., 2017; Warnick & Caldera, 2016; Wexler et al., 2018) included students with disabilities in the treatment group, but outcome results were not reported by classification with a disability or type of disability.

The fourth research question is, what features of academic or vocational interventions implemented during the COVID-19 pandemic were necessitated by alterations in educational

delivery due to the pandemic from March of 2020 to December 2021? This research question cannot be answered by this synthesis as none of the reviewed studies took place during the COVID-19 pandemic. Since the onset of the pandemic no empirical research has been reported from these settings

Discussion

Results of this synthesis contained many consistencies with the reviewed studies. Explicit strategy instruction has the potential to meet student needs and was demonstrated in two of these studies (Warnick & Caldarella, 2016; Wexler et al., 2018). Additionally, Steele et al. (2016) found positive effects of computer assisted instruction consistent with the success of the blended intervention, as reported by Houchins et al. (2018). An overarching observation, however, was a lack of consistent intervention dosage necessitated to achieve positive outcomes (Wexler et al., 2014).

Reviewed studies differed in the participants, intervention agent, setting, and length of intervention of the instruction provided. Intervention instructional delivery and mode of intervention delivery following no pattern or trend. This was also reported by Wexler et al. (2014). This lack of consistency across reviewed studies preclude extrapolation to new settings and participants.

Results of this synthesis differ from previous syntheses (Wexler et al. 2014; Steele et al., 2016) in that the use of multilevel growth modeling was incorporated in one of the studies reviewed (Houchins et al. 2018) as a means to minimize threats to internal validity. Houchins et al. (2018) was the first randomized control trial with a large sample size to demonstrate significant improvement in the reading comprehension of incarcerated students. Also setting it apart from previous studies in these settings, Houchins et. al. (2018) used multi–dimensional fidelity and accounted for many of the methodological issues reported in

previous research (Wexler et al., 2014, Steele et al., 2016), setting a rigorous standard in terms of both experimental rigor, sample size, and study length.

All of the reviewed studies included information regarding special education status of study participants, which differed from previous research (Wexler et al, 2014, Steele et al., 2016). This is a positive difference that enables the research base to be more inclusive and therefore better represent and serve the communities that are relevant to it. Furthermore, there were only a few female participants across all reviewed studies. This differs from most previous syntheses (Steele et al., 2016; Wexler et al., 2014), but is consistent with the literature review conducted by Hunter and her colleagues (Hunter et al., 2022) and is concerning. The percentage of females in residential placement has held relatively constant between 13% and 15% since 2006 (Ehrmann et al., 2019). The lack of female participants may be due to the total number of females in any given facility at the time each intervention took place, but it would have behooved the intervention researcher to include more female participants. This is desirable as it is often the goal of social science research to make observations that would be observed if the research had occurred in different settings (Shadish, Cook & Campbell, 2002) such as outside of JCF.

The demographic information presented in each reviewed study varied and is inconsistent (Houchins et al., 2018; Reed et. al., 2017; Warnick & Caldarella, 2016; Wexler et. al., 2018). This provides more difficulties in terms of future replication, as the participants in the reviewed studies may or may not reflect the participant demographics the researcher intended in implementing their intervention (Majid, 2018). Furthermore, researchers need to ensure their study participants reflect the diversity found in the general population, as well as including sufficient female participants.

Previous research has demonstrated the need to prepare students for work in addition to a return to schooling (House, Toste, & Austin, 2018) and it is worrisome that there is a

complete lack of any STEM (science, technology, engineering, mathematics) oriented studies, writing studies, or vocational studies that address and facilitate career readiness of post incarcerated youth.

Though more research is needed to understand how the COVID-19 pandemic has altered both the policies and processes employed in juvenile justice facilities, three of the reviewed study authors (Houchins et al., 2018; Warnick & Caldarella 2016; Wexler et al., 2018) noted difficulty in conducting research in these settings during a period prior to COVID-19 restrictions. Warnick and Caldarella (2016) suggested that the difficulty conducting rigorous investigations in these settings could be due to difficulty gaining access. Houchins et al. (2018) reported that the provision of literacy instruction in these settings is complicated by a juvenile correctional system structured around security instead of educational need. Wexler et al. (2018) included an entire section in her study on the instructional and research challenges in juvenile justice facilities.

Limitations

There are several limitations to this synthesis, including the types of academic disciplines of reviewed studies, the information provided about the participants in each study, a lack of effect sizes, and the use of the Prisma guidelines. There is a lack of mathematics, science, or writing research in the reviewed studies. Vocational instruction, geared toward post incarceration employment, is also lacking. Only one study was located (Reed et al., 2017) that would enlarge the previous work of Steele et al. (2016) regarding vocational interventions in detained or incarcerated settings.

A lack of an equitable number of female participants is another significant limitation. The most recent 2019 bulletin from OJJDP includes statistics on girls in the juvenile justice system and as of the 2015 OJJDP Juveniles in Residential Placement Census, there were 48,000 youth offenders in residential placement. Only 15% of those youth were female, a

percentage that has held relatively constant since 2006 (Ehrmann et al., 2019). A concerted effort will need to be made in any future research to ensure equitable female participation in any future studies. If future researchers are unable to accomplish this, then any future findings should be reported as targeted mainly from evidence obtained with male participants (Holdcraft, 2007).

Inconsistent demographic information is another related limitation that prevents replication. Practitioners who may want to use information from these reviewed studies will not know if the study findings can apply to the students they teach. Ideally, the authors in each reviewed study should have selected participants that reflect the population in general. It is unclear if any information provided in each reviewed study regarding demographic information is culturally responsive to diversity (Fernandez et al., 2016) including all types of participant diversity such as race, ethnicity, sexual orientation, language, gender, age, and disability. Additionally, a lack of outcomes reported by disability classification is a significant concern within the reviewed studies. Finally, all of the reviewed studies did not provide information about sexual orientation.

A comparison of effect sizes across studies was not calculated. This is inconsistent with previous research (Wexler et al., 2014; Steele et al., 2016) and is a limitation of the current study. The inclusion of author calculated effect sizes provided credibility to previous research (Wexler et al., 2014; Steele et al., 2016). The Prisma guidelines (Page et al., 2021) were not used in this synthesis and this is a limitation.

While average study quality as evaluated by the CEC indicators is above average, it is difficult to extrapolate generalization from this small group of studies. The aforementioned limitations prevent this synthesis from enlarging the pool of evidence-based academic or vocational intervention studies. However, while severely limited my synthesis does provide information to suggest the use of evidence-based practices as reviewed study findings found

positive results when these types of interventions were in place. Additionally, my synthesis also provides information on the lack of disaggregated data for students with disabilities indicating there is still a need in the research to gain understanding of intervention findings broken down by both disability status and disability type. Both contributions, while small are important.

Conclusion

In the last decade, only four academic or vocational intervention studies in juvenile justice settings have been published. The reviewed studies demonstrate an increased interest in inclusion of youth with disabilities and in minimizing methodological challenges in these settings. Both findings are promising and ideally will expand any future pool of evidence-based practices for youth in juvenile corrections. Research for students with disabilities in these settings in mathematics, science, writing and vocational education needs to be conducted to add to the body of reading research currently in place.

Additional research needs to be conducted that examines the impact of COVID-19 restrictions in juvenile justice settings. These restrictions forced in-person education to being replaced by online, packet, and one-to-one learning (Pace et. al., 2020). These changes also had a dramatic impact on education in juvenile corrections, specifically (Chapter III). It is important that academic and vocational intervention research continues in these settings, despite the additional challenges with conducting research in this setting. How these changes may be accommodated, such that additional research may be brought to fruition in correctional settings, is a function of the intersection of several important factors. The security requirements in each facility has the potential to impact student education. At times security concerns may be prioritized over student learning. While at the same time policy makers, often outside of JCF can make decisions that in turn further impact the type of schooling students receive. On top of this the needs of learners (specifically special needs

learners) need to be taken into account given what may be a limited availability of resources available for education. Further research in all of these intersectional areas will be needed in order to provide the best academic and vocational education for detained and adjudicated students.

Tables

Table 1

Study design and sample characteristics

Citation and Design	Treatment and Comparison	Setting	Demographics	Sample	Duration and Frequency	Measures	Outcomes
Houchins, Gagnon, Lane, Lambert, & McCray 2018 Randomized trial with repeat measure	Read 180 (Scholastic) reading program TAU	Long-term medium security juvenile facility	A = 12 -18 M = 100% F = 0% AA = 48.6% C = 39.3% H = 10.7% O = 1.4% M = 57.0%. NM = 43.0% IEP = 57.0%. D = missing G = 5th: 0.3% 6th: 7.3% 7th: 14.8% 8th: 25.4% 9th: 27.3% 10th :14.2% 11th: 8.2% 12th : 0.3%	T = 225 C = 239	110 min.; 5 days a week, for one fall, spring, summer semester cycle less 3 two - week semester breaks	SRI. Wechsler Abbreviated Scale of Intelligence (WASI) Woodcock Johnson III. Test of Word Reading Efficiency (TOWRE). Peabody Picture Vocabulary Test (PPVT-4); AIMSweb. Curriculum based measures (CBM)	Woodcock-Johnson Treatment and Control made Statistically Significant (SS) gains in multiple measures of reading. Treatment made SS gains over control in Passage Comprehension. Curriculum-based measures Aimsweb maze (comprehension) Treatment made SS gains over control in third grade and sixth grade

(table continues)

Citation and Design	Treatment and Comparison	Setting	Demographics	Sample	Duration and Frequency	Measures	Outcomes
Reed, Miller, & Novosel 2017 Quasi-experiment Single group pretest-posttest	Explicit vocabulary instruction using a concept map No Control groups	Long - term medium security juvenile facility	A = 13-18 M = 100% F = 0% AA = 30.7% C = 53.8% H = 15.4% D: ED = 3.7% GT = 7.7% OHI = 7.7% G = missing	T = 13 C = N/A	45 min.; 2 times a week for 6 weeks	Pretest: Test of Silent Contextual Reading Fluency-2; (TOSCFR) Researcher designed measure: 24 item career readiness vocabulary measure – using a concept map	Students made gains pre to post on the researcher designed measure Pre-test M = 13.31 Post-test M = 17.31
Warnick & Caldera 2016 Randomized trial	Multi – sensory phonics: Spelling and Reading, with Riggs (based on the Orton-Gillingham approach) TAU	Long - term juvenile facility	A = 13 – 17 M = 85% F = 15% AA,C,H = missing D: CD = 65% PTST = 35% ADHD = 30% MD = 10% ODD = 10% G = missing	T = 10 C = 10	50 min.; 5 days a week, for 8 weeks	Outcome measure: Woodcock Reading Mastery Tests–Revised (WRMT–R) Word Identification, Word Attack, Passage Comprehension	The treatment group gained in all measures of WRMT-R from pre to posttest and improved more than the control for all the measures.

(table continues)

Citation and Design	Treatment and Comparison	Setting	Demographics	Sample	Duration and Frequency	Measures	Outcomes
Wexler, Reed, Barton, Mitchell & Clancy 2018 Single case MB across participants	Supplemental Peer-mediated main idea strategy and peer mediated practice TAU	Medium security juvenile facility	A = 16,18 M = 100% F = 0% AA = 100% Student 1: A = 16 D = ED Student 2: A = 18 D = OHI Student 3: A = 18 D = LD Student 4: A = 16 D = none	SCD T = 4	10 min. explicit strategy instruction, 25 min peer mediated practice once a week	Selection: Woodcock-Johnson Tests of Achievement III (WJIII) Passage Comprehension or Writing Fluency Outcome measure: Researcher generated main idea probe task	Students increased in identifying the main ideas, variability among the students were high; Students did show immediate effects from baseline

Note. TAU = treatment at usual: A = age in years M = number male, F = number female, AA = African American, C = Caucasian, H = Hispanic, O = Other, M = medication, NM = no medication, IEP = Individualized education plan, D = disability or psychiatric classification: ADHD = attention deficit/hyperactivity disorder, CD = conduct disorder, ED = emotional disturbance, GT = Gifted , LD = learning disability, MD = mood disorder, ODD = oppositional defiant disorder, OHI = other health impairment, PTSD = posttraumatic stress disorder, G = grade; T = number in treatment group, C = number in control group; Min = minutes

Table 2

Specific *Council of Exceptional Children Quality Indicators*

CEC Quality Indicator	Houchins et al.	Reed et al.	Warnick & Caldarella	Wexler et al.
1.0. Context and setting. The study provides sufficient information regarding the critical features of the context or setting.				
1.1 The study describes critical features of the context or setting relevant to the review, for example, type of program or classroom, type of school (e.g., public, private, charter, preschool), curriculum, geographic location, community setting, socioeconomic status, physical layout.	yes	yes	yes	yes
2.0. Participants. The study provides sufficient information to identify the population of participants to which results may be generalized and to determine or confirm whether the participants demonstrated the disability or difficulty of focus.				
2.1 The study describes participant demographics relevant to the review (e.g., gender, age/grade, race/ethnicity, socioeconomic status, language status).	yes	yes	yes	yes
2.2 The study describes disability or risk status of the participants (e.g., specific learning disability, autism spectrum disorder, behavior problem, at risk for reading failure) and method for determining status (e.g., identified by school using state IDEA criteria, teacher nomination, standardized intelligence test, curriculum-based measurement probes, rating scale).	no	yes	yes	yes
3.0. Intervention agent. The study provides sufficient information regarding the critical features of the intervention agent.				
3.1 The study describes the role of the intervention agent (e.g., teacher, researcher, paraprofessional, parent, volunteer, peer tutor, sibling, technological device/computer) and, as relevant to the review, background variables (e.g., race/ethnicity, educational background/licensure).	yes	no	yes	yes
3.2 The study describes any specific training (e.g., amount of training, training to a criterion) or qualifications (e.g., professional credential) required to implement the intervention and indicates that the interventionist has achieved them.	yes	no	no	yes
4.0. Description of practice. The study provides sufficient information regarding the critical features of the practice (intervention), such that the practice is clearly understood and can be reasonably replicated.				

(table continues)

CEC Quality Indicator	Houchins et al.	Reed et al.	Warnick & Caldarella	Wexler et al.
4.1 The study describes detailed intervention procedures (e.g., intervention components, instructional behaviors, critical or active elements, manualized or scripted procedures, dosage) and intervention agents' actions (e.g., prompts, verbalizations, physical behaviors, proximity) or cites one or more accessible sources that provide this information.	yes	yes	yes	yes
4.2 When relevant, the study describes materials (e.g., manipulatives, worksheets, timers, cues, toys) or cites one or more accessible sources providing this information.	yes	yes	yes	no
5.0. Implementation fidelity. The practice is implemented with fidelity.				
5.1 The study assesses, and reports implementation fidelity related to adherence using direct, reliable measures (e.g., observations using a checklist of critical elements of the practice).	yes	yes	yes	yes
5.2 The study assesses, and reports implementation fidelity related to dosage or exposure using direct, reliable measures (e.g., observations or self-report of the duration, frequency, curriculum coverage of implementation).	yes	yes	no	yes
5.3 As appropriate, the study assesses and reports implementation fidelity (a) regularly throughout implementation of the intervention (e.g., beginning, middle, end of the intervention period), and (b) for each interventionist, each setting, and each participant or other unit of analysis. If either adherence or dosage is assessed and reported, this item applies to the type of fidelity assessed. If neither adherence nor dosage is assessed and reported, this item is not applicable.	no	yes	no	yes
6.0. Internal validity. The independent variable is under the control of the experimenter. The study describes the services provided in control and comparison conditions and phases. The research design provides sufficient evidence that the independent variable causes change in the dependent variable or variables. Participants stayed with the study, so attrition is not a significant threat to internal validity.				
6.1 The researcher controls and systematically manipulates the independent variable.	no	yes	yes	yes
6.2 The study describes baseline (single-subject studies) or control/comparison (group comparison studies) conditions, such as the curriculum, instruction, and interventions (e.g., definition, duration, length, frequency, learner: instructor ratio).	yes	yes	yes	yes

(table continues)

CEC Quality Indicator	Houchins et al.	Reed et al.	Warnick & Caldarella	Wexler et al.
6.3 Control/comparison-condition or baseline-condition participants have no or extremely limited access to the treatment intervention.	N/A	N/A	N/A	yes
6.4 The study clearly describes the assignment to groups, which involves participants (or classrooms, schools, or other unit of analysis) being assigned to groups in one of the following ways:(a) randomly. (b) nonrandomly, but the comparison groups are matched very closely to the intervention group (e.g., matched on prior test scores, demographics, a propensity score; see Song & Herman, 2010). (c) nonrandomly, but techniques are used to measure differences and, if meaningful differences are identified—for example, statistically significant difference, difference greater than 5% of a standard deviation (What Works Clearinghouse, 2011)—to statistically control for any differences between groups on relevant pretest scores or demographic characteristics (e.g., statistically adjust for confounding variable through techniques such as ANCOVA or propensity score analysis); or (d) nonrandomly on the basis of a reasonable cutoff point (regression discontinuity design).	yes	no	yes	N/A
6.5 The design provides at least three demonstrations of experimental effects at three different times.	N/A	N/A	N/A	yes
6.6 For single-subject research designs with a baseline phase (alternating treatment designs do not require a baseline), all baseline phases include at least three data points (except when fewer are justified by study author due to reasons such as measuring severe or dangerous problem behaviors and zero-baseline behaviors with no likelihood of improvement without intervention) and establish a pattern that predicts undesirable future performance (e.g., increasing trend in problem behavior, consistently infrequent exhibition of appropriate behavior, highly variable behavior).	N/A	N/A	N/A	yes
6.7 The design controls for common threats to internal validity (e.g., ambiguous temporal precedence, history, maturation, diffusion) so plausible, alternative explanations for findings can be reasonably ruled out. Commonly accepted designs such as reversal (ABAB), multiple baseline, changing criterion, and alternating treatment address this quality indicator when properly designed and executed, although other approaches can be accepted if study authors justify how they ruled out alternative explanations for findings or control for common threats to internal validity	yes	yes	yes	no

(table continues)

CEC Quality Indicator	Houchins et al.	Reed et al.	Warnick & Caldarella	Wexler et al.
6.8 Overall attrition is low across groups (e.g., <30% in a 1-year study).	yes	yes	yes	N/A
6.9 Differential attrition (between groups) is low (e.g., ≤10%) or is controlled for by adjusting for noncomplete (e.g., conducting intent-to-treat analysis).	yes	yes	yes	N/A
7.0. Outcome measures/dependent variables. Outcome measures are applied appropriately to gauge the effect of the practice on study outcomes. Outcome measures demonstrate adequate psychometrics.				
7.1 Outcomes are socially important (e.g., they constitute or are theoretically or empirically linked to improved quality of life, an important developmental/learning outcome, or both).	yes	yes	yes	yes
7.2 The study clearly defines and describes measurement of the dependent variables.	yes	yes	yes	N/A
7.3 The study reports the effects of the intervention on all measures of the outcome targeted by the review (p levels and effect sizes or data from which effect sizes can be calculated for group comparison studies. graphed data for single-subject studies), not just those for which a positive effect is found.	yes	yes	yes	no
7.4 Frequency and timing of outcome measures are appropriate.	yes	yes	yes	yes
7.5 The study provides evidence of adequate internal reliability, interobserver reliability, test-retest reliability, or parallel-form reliability, as relevant (e.g., score reliability coefficient ≥ .80, interobserver agreement ≥ 80%, kappa ≥ 60%).	yes	yes	yes	yes
7.6 The study provides adequate evidence of validity, such as content, construct, criterion (concurrent or predictive), or social validity.	yes	yes	yes	yes
8.0. Data Analysis. Data analysis is conducted appropriately. The study reports information on effect size.				
8.1 Data analysis techniques are appropriate for comparing change in performance of two or more groups (e.g., t tests, ANOVAs/MANOVAs, ANCOVAs/MANCOVAs, hierarchical linear modeling, structural equation modeling). If atypical procedures are used, the study provides a rationale justifying the data analysis techniques.	yes	yes	yes	N/A

(table continues)

CEC Quality Indicator	Houchins et al.	Reed et al.	Warnick & Caldarella	Wexler et al.
8.2 The study provides a single-subject graph clearly representing outcome data across all study phases for each unit of analysis (e.g., individual, classroom, other group of individuals) to enable determination of the effects of the practice. Regardless of whether the study report includes visual or other analyses of data, graphs depicting all relevant dependent variables targeted by the review should be clear enough for reviewers to draw basic conclusions about the experimental control using traditional visual analysis techniques (i.e., analysis of mean, level, trend, overlap, consistency of data patterns across phases)	N/A	N/A	N/A	yes
8.3 The study reports one or more appropriate effect size statistics (e.g., Cohen's d, Hedge's G, Glass's Δ, $\chi 2$) for all outcomes relevant to the review being conducted, even if the outcome is not statistically significant, or provides data from which appropriate effect sizes can be calculated.	yes	no	yes	N/A

Chapter III: Juvenile Correctional Special Education Mathematics Educator Views on Curriculum, Instruction and Barriers to Teaching the During the Time of COVID-19

Introduction

The following study was conducted to add to the understanding of special education mathematics teachers' curriculum choices and instructional adaptations in use at the onset of the COVID-19 pandemic. This was undertaken because the COVID-19 pandemic likely resulted in alterations of the educational settings that could lead to additional instructional barriers. As such, questions will be posed that permit comparison prior to, and during the pandemic. Previous research identified a lack of access to mathematics classes in JCF (Korman et al., 2019) and a lack of use of instructional adaptations for students with disabilities in these settings (Maccini et al., 2012). Issues regarding curriculum, instructional setting during the pandemic, and barriers to instruction will be presented followed by research on mathematics curriculum and instruction for students in JCF followed by research for students with emotional behavioral disorders (EBD) or learning disabilities (LD) outside of JCF and this section will end with the research questions addressed in this chapter.

Issues Regarding Curriculum

More students within juvenile correctional facilities (JCF) are classified with EBD or LD, than youth in the community (Quinn et al., 2005). Access to the general educational curriculum has often been shown to be one way to ensure a quality education for students with disabilities ((Maccini et al., 2012) and is guaranteed under IDEA. Recent research has shown that students in JCF do not have the same access to advanced mathematics classes as do their counterparts in the community (Korman et al., 2019).

Issues Regarding Instructional Context during COVID-19

In order to facilitate student access to the general education curriculum, teachers should use empirically validated instructional practices for all students (Mancini et al., 2008). However, it is not clear what types of instructional practices are in place in JCF during the COVID-19 pandemic, including how frequently teachers meet with student's face-to-face and what sorts of instructional adaptations may be in place if learning is now online. During COVID-19, researchers have noted learning loss attributable to the change in instructional practices often accompanied by a shift to online teaching in place of face-to-face instruction (Goldberg, 2021). A Department of Education report on the disparate impacts of COVID-19 on America's students indicated differential aspects of this learning loss (Goldberg, 2021). Goldberg (2021) found that mathematics skills were more in decline, as compared to reading during the pandemic. Mathematics scores have declined everywhere in the county on the most recent results from the National Assessment of Educational Progress (NEAP) tests (National Assessment of Educational Statistics, 2022). It is within this context that an understanding of mathematics curriculum choices, instructional context, and instructional adaptations for students with disabilities is increasingly necessary to address this learning loss.

Issues Regarding Barriers to Instruction

Barriers to the delivery of instruction in JCF have been described by researchers (e.g., Gagnon et. al., 2009; Houchin et al., 2009). Gagnon and Bottge (2006) identified that the competing interests of other professionals in JCF could be a difficulty for teachers (Gagnon & Botte, 2006). For example, issues of safety can be an important concern for the youth in these settings, and concerns for youth safety may take precedence over issues of education. The COVID-19 pandemic impacted youth safety and introduced more safety concerns into the educational picture for youth in JCF.

In the following section I summarize research for curriculum and instruction outside of JCF and within. This research has indicated the need to engage with evidence-based practices outside of JCF for secondary students with LD and as a means to help students in JCF (Gagnon & Barber, 2015) due to the limited research on students within JCF. This is specifically important because students with EBD or LD are overrepresented within JCF (Quinn et al., 2005) and are at increased risk of academic underperformance in mathematics.

Research for students with LD and EBD outside of JCF

The following two summaries provide information about instructional practice for students with LD (Myer et al., 2015) and students with EBD (Mulcahy et al., 2016) outside of JCF as a means to facilitate our understanding of what may be possible for these students within JCF regarding instruction.

In 2015 Myers, Wang, Brownell, & Gagnon updated the literature pertaining to secondary students with LD outside of JCF in order to identify effective instructional practices for teachers to assist the learning of mathematics for this population. In terms of recommendations for practice, these authors found that two strategies had moderate evidence and were recommended for classroom use: Enhanced Anchored instruction, and cognitive and metacognitive strategy instruction. Myers et al. (2015) described Enhanced Anchored Instruction (EAI) as an instructional approach that used interactive computer-based lessons and hands-on projects. These authors recommended one cognitive program; Solve It! In this program students were taught strategies for comprehending, representing, and planning solutions for mathematical problems through explicit instruction.

A review for students with EBD was published in 2016 by Mulcahy, Krezmien, and Travers: *Improving mathematics performance among secondary students with EBD: A*

methodological Review. Mulcahy et al. (2016) found a limited number of studies that examined mathematical interventions and most of the studies lacked methodological rigor. Hence, there is a limited amount of useful information regarding best mathematics practices for students with EBD or LD. More research is needed to gain an understanding of both curriculum choices and instructional practices that could benefit this population.

Research regarding curriculum and instruction within JCF

In 2012 Maccini, Gagnon, and Mason-Williams queried mathematics special educators in JCF. The authors of this study investigated special education teacher views regarding class level curriculum policies for students with a LD and EBD in secondary JCF. Findings indicated that 47% of respondents did not use a curriculum that was based on district or state curriculum (Maccini et al., 2012). More than 60% of special education teachers noted that grade level expectations should not apply to every student with LD or EBD (Maccini et al., 2012).

The most targeted paper is the set of recommendations describing instructional approaches presented by Maccini and her colleagues in 2006. Maccini et al. (2006) based the recommendations for students with EBD and LD on an observation of mathematics instruction in a juvenile commitment facility and current best practices research. The focus of each topic is contextualized by a specific example followed by a discussion that facilitated practitioner use. The six key topics were (a) advance organizers; (b) direct instruction; (c) use of technology and real-world problem-solving tasks; (d) use of varied student grouping; (e) presenting information in a graduated instructional sequence; and (f) strategy instruction. The recommendations for all six topics were provided in a way useful to a classroom teacher.

In 2008, Maccini and her colleagues provided recommendations for research-based mathematics instructional approaches that could apply across school settings and were consistent

with earlier research (Maccini et. al., 2006). Maccini et al. (2008) created a set of mathematics lesson plans that included these key instructional approaches (listed above) based on information from a national survey of mathematics teachers in JCF. These specific approaches were targeted for youth in JCF. More generally, the United States Departments of Education and Justice (U.S. DOE/DOJ) collaborated on a joint report aimed at improving educational services for students in JCF in 2014. This jointly released report included a set of guidelines for improving educational services in JCF in 2014.

Despite the attention given to JCF students in the report: *Guiding Principles for Providing High-Quality Education in Juvenile Justice Secure Care Settings,* little evidence-based research focusing on academic interventions for this population exists to date (Gagnon et. al., 2022; Wexler et al., 2014). Additionally, based on the most recent national survey of students within JCF settings, students with EBD or LD are often overrepresented in JCF (Quinn et al., 2005). Mancini, Gagnon, Mulcahy & Leone (2006) recognized that one promising approach to help students in JCF learn mathematics was to rely on systematic reviews in mathematics for both students with EBD and LD in non- JCF settings.

The present study aims to add to the understanding of the curriculum choices and instructional practices used by special education mathematics teachers in JCF. First, I will provide the research questions for this study. In the sections that follow, I will provide the methods used in the descriptive survey that follows, summarize and discuss the survey results, as well as provide suggestions for both practitioners and researchers. Please see the earlier introductory sections for definitions of the terminology used in these research questions.

The research questions are: (1) What mathematics curriculum do special education teachers select for use in JCF during the initial weeks of the COVID-19 pandemic (March 20,

2020, to July 31, 2020)? (2) What are the instructional practices in use by special education mathematics teachers prior to, and/or during the initial weeks of the COVID-19 pandemic (March 20, 2020, to July 31, 2020)? (2a) What instructional context factors do special education mathematics teachers report are implemented in JCF that function as barriers to instruction prior to, and during the initial weeks of the COVID-19 pandemic (March 20, 2020, to July 31, 2020)? (2b) Which instructional context factors changed comparing the time prior to, and during the initial weeks of the COVID-19 pandemic (March 20, 2020, to July 31, 2020) used in mathematics instruction? (2c) What are the instructional adaptations for students with disabilities used in mathematics instruction during the initial weeks of the COVID-19 pandemic (March 20, 2020, to July 31, 2020)? (3) What barriers to the provision of instruction do special education mathematics teachers report in JCF other than those reported as an instructional context factor during the initial weeks of the COVID-19 pandemic (March 20, 2020, to July 31, 2020)?

Method

Research Design

A descriptive survey was designed to provide an initial understanding or snapshot of mathematics curriculum choices, instructional practices, instructional context, instructional adaptations for students with disabilities and barriers to instruction in juvenile correctional settings during COVID-19.

Setting and Participants

The target population consisted of special education mathematics teachers working in juvenile secure correctional commitment facilities throughout the United States. Detention, wilderness or boot camp facilities were excluded. Paraeducators or instructional assistants were also excluded. An existing list of facilities was used that had been previously identified (see

Swank & Gagnon, 2016, 2017). If there was no special education teacher, respondents were asked to fill out the survey based on their teaching of mathematics. The final sample that met the inclusion criteria included 158 facilities, with 31 returned surveys or a 19.6% response rate.

Respondent Characteristics

Just over half (51.6%, *n* = 16) of the survey respondents indicated they were special education teachers who teach mathematics. If respondents answered no (3.2%, *n* = 1) to this question they were instructed to give the survey to a special education teacher that teaches mathematics. If there was no special education teacher in the facility (35.5%, *n* = 11), respondents were asked to base their answers on the teaching of mathematics. Several respondents (9.7%, *n* = 3) did not answer this question. A majority of respondents reported that their highest degree was a master's (67.7%, *n* = 21). The discipline of this degree was most frequently reported as education (61.2%, *n* = 19). One reported "other" and this response was coded as training, not in education or mathematics. The most frequently reported teaching credential was special education (*n* = 17). The most frequently reported "other" teaching credential was coded as administrative (*n* = 3). There were two most frequent responses for current teaching responsibilities: general mathematics or basic skills high school level (*n* = 21) and Algebra (*n* = 21). The most frequently reported other teaching responsibility was coded as business (*n* = 3). Please see Table 1 for respondent characteristics.

Instrument

I developed a survey to question special education mathematics instructors on their current practices and perceptions of these practices during COVID-19. The approach to survey preparation presented by Dillman, Smyth and Christian (2009) was utilized. The initial survey was developed based on a review of the literature and collaboration with an expert in juvenile

correctional settings. These initial survey questions were shared with researchers who have expertise in juvenile corrections. These experts were asked to provide recommendations on the survey layout, directions for each survey question, clarity of each question, match between research question and survey questions, and suggestions for additional questions (Gagnon & Swank, 2021; Yan & Wilkerson, 2017). Their recommendations were incorporated into the revised survey.

The revised survey was assessed for content validity. The item-level content validity index (I - CVI) as suggested in Polit et al., (2007) was calculated. I sent the survey to a panel of eight experts (Armstrong et al., 2005) who reviewed the survey items excluding basic demographic information and rated the relevance of each item using a four-point ordinal scale (1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, 4 = highly relevant). An item-level content validity index (I-CVI) of .78 or higher is considered good content validity (Polit et al., 2007). Each item had an I-CVI higher than .78. Averaging all item- level CVI's to calculate a scale- level content validity was also recommended (Polit et al., 2007). Values of .90 or greater are considered to be acceptable evidence of scale level content validity. The scale level content validity for this survey was .91.

Data Collection

Institutional review board (IRB) approval was obtained prior to initiating the study. Procedures were utilized to try to increase the response rate that included five survey mailings (Dillman et al., 2009). The survey, with a consent form attached, a consent form for the participant to keep, a small financial incentive, and a return envelope was mailed to the principal at each facility indicating and requesting that the special education mathematics teacher be the intended survey participant. If more than one special education mathematics teacher was

employed in each facility, the principal was direct to give the survey to the first special education mathematics teacher on a random list of all mathematics instructors. Participants also received a link to an online version of the survey using the Qualtrics software. Information including an assurance of confidentiality and anonymity was provided. All principal contact information was verified prior to survey mailings. Data was entered into an excel file and R was used. Procedures were implemented during the data entry to check for date entry errors. A random sample of at least one third of the returned surveys was checked by the second coder against the data entered into the software.

Data Analysis

The intent of the survey is to provide a broad picture of special education mathematics practices and special education mathematics teacher perceptions, as such the analysis consisted of descriptive statistics including frequency and percentage. For the questions that included "check all that apply," only frequency data was calculated.

For any responses that permitted "other" as a response choice the following four-step set of procedures was followed (Lincoln & Guba, 1985). I was assisted by a doctoral student for all parts of the coding and interrater reliability. The author and the doctoral student both independently categorized and then coded each response as the first step. In the second step, both the author and the doctoral student discussed the categories and the coding into each category to identify and alter the categories or the coding. In the third step the author and the doctoral student re-coded all the data. A final discussion occurred between the author and the doctoral student. Reliability was calculated by counting the total number of responses per code and found to be 100%.

Qualitative methods were used for the analysis of the open-ended question even though this data is collected via the survey. Open-ended responses were analyzed by thematic analysis (Patton, 2015) and open coding (Merriam, & Tisdell, 2016) was done using inVivo procedures (Saldana, 2021). The author and the graduate student both read and created a set of codes or categories for the data. These codes were created using the actual words of the participants. This was done to highlight the voice of the participants, so that the participants were giving meaning to the data. An inductive approach was used to generate the codes and no preconceived themes or codes were considered, rather codes or themes were formed based on the language used by the participants.

Both the author and graduate student met and discussed the list of codes and categories to reach consensus. Both the author and the graduate student then re-coded the data. A second meeting occurred to calculate interrater agreement. The initial interrater agreement was 87% and final interrater agreement was 100%. The following results are organized by research question.

Results

Curriculum

RQ (1) What mathematics curriculum do special education teachers select for use in JCF during the initial weeks of the COVID-19 pandemic (March 20, 2020, to July 31, 2020)?

The first curriculum question asked respondents to indicate if they followed a prescribed curriculum. For those responding positively (77.7%, $n = 24$), they were then asked to indicate how the curriculum was developed. The most frequently reported response was that the curriculum was school developed (29.0%, $n = 9$). This was followed by the entire school following the prescribed curriculum of the state (24.1%, $n = 7$), the entire school follows the prescribed curriculum of the local district (12.9%, $n = 4$), and other (12.9%, $n = 4$). Respondents

had the option of responding "other." The most frequent "other" response was coded as based on standards (n = 2). Respondents were asked about the method for the school staff to receive information on the prescribed curriculum and were allowed to check all that apply. The most frequently reported response was that the information was from district and state standards (n = 19). When responding as "other," the most frequent response was coded as online instruction *(n* = 2). When queried about the method of selecting the school's text and other curriculum materials, respondents were allowed to check all that apply. The most frequently reported response was that the selection was based on group teachers' judgment (n = 12). Respondents were given the option of selecting "other." There was not a most frequent "other" response. The other responses were coded as partnership (n = 1), state level (n = 1), psychology (n = 1). Please see Table 2 for prescribed curriculum information.

If respondents indicated that the curriculum was not prescribed (19.4%, n = 6), they were then asked to indicate how the curriculum was developed and were allowed to check all that apply. The most frequently reported response was that the non-prescribed curriculum was based on available textbooks (n = 5). An equal number of respondents indicated the non-prescribed curriculum was based on the student IEP (n = 4), what was readily available online (n = 4), collaboration with other facilities (n = 4). There was one "other" response. This response was coded as individualized instruction.

Instructional Practices

RQ (2a) What instructional context factors do special education mathematics teachers report are implemented in JCF that function as barriers to instruction prior to, and during the initial weeks of the COVID -19 pandemic (March 20, 2020, to July 31, 2020)?

Respondents were asked about the degree to which each instructional context factor is a barrier to teaching. Respondents were asked to respond for the time before the COVID-19 pandemic and then during it. Prior to COVID-19 the most frequently reported instructional context factors that respondents agreed or strongly agreed provided the greatest barrier to teaching were restrictions on Internet (agree *n* = 9, strongly agree *n* = 8), followed by ability to group students based on academic needs (agree *n* = 9, strongly agree *n* = *5*). The most frequently reported instructional context factors that respondents disagreed or strongly disagreed provided the greatest barrier to teaching were students not being brought to school due to insufficient custody staff (strongly disagree *n* = 15, disagree *n* = 9), followed by length of school day being shorter than required by the state (strongly disagree *n* = 16, disagree *n* = 6), and the length of instructional time less that required by the state (strongly disagree *n* = 13, disagree *n* = 8).

For the time period during the pandemic the most frequently reported greatest barrier to teaching were restrictions on the Internet (agree *n* = 7, strongly agree *n* = 12), followed by restrictions on Intranet (agree *n* = 6, strongly agree *n* = 7). The most frequently reported instructional context factors that respondents disagreed or strongly disagreed provided the greatest barrier to teaching were students not being brought to school due to insufficient custody staff (strongly disagree *n* = 13, disagree *n* = 4), followed by length of school day being shorter than required by the state (strongly disagree *n* = 11, disagree *n* = 6), and length of instructional time being less than required by the state (strongly disagree *n* = 10, disagree *n* = 7). The Internet includes access to information on the world wide web outside of JCF, whereas Intranet refers to a local network within a JCF that may include pre-loaded content for student use.

RQ (2b) Which instructional context factors changed comparing the time prior to, and during the initial weeks of the COVID -19 pandemic? (March 20, 2020, to July 31, 2020) during mathematics instruction?

Comparing the time before the COVID-19 pandemic to the time during the COVID-19 pandemic, respondents indicated an increase in agreement or strong agreement for several instructional context factors. The instructional context factors that became more of a barrier to instruction were students not being brought to school due to insufficient custody staff, the length of school day is shorter than required by the state, the length of instructional time is less than required by the state, and graphing calculator use. The specific factors that increased the most were that the number of minutes of student contact were less than required by the state due to standing outside student cells (agree $n = 1$, strongly agree $n = 0$) became (agree $n = 3$, strongly agree $n = 2$) during the pandemic, and the number of minutes of student contact was less than required by the state due to the use of assignments on a tablet or work packets (agree $n = 0$, strongly agree $n = 1$) became (agree $n = 2$, strongly agree $n = 3$) during the pandemic. See Table 3 for the instructional context factors as barriers to teaching.

RQ (2c) What are the instructional adaptations for students with disabilities used in mathematics instruction during the initial weeks of the COVID-19 pandemic (March 20, 2020, to July 31, 2020)?

Respondents were asked about their use of instructional adaptations during COVID-19. The instructional adaptations respondents indicated the most frequently for daily use were calculators (48.4%, $n = 5$) followed by extended time (41.9%, $n = 13$). The adaptations most frequently used 2 to 4 times a week were problems read to students (54.8%, $n = 17$) followed by the use of metacognitive strategies (51.6%, $n = 16$). Respondents reported that several different

adaptations were used 1 to 4 times a month. The most frequently reported was color coding or bolding of text (54.8%, *n* = 17). Please see Table 4 for the instructional adaptations.

The instructional adaptations indicated most frequently as never in use were Enhanced Anchored Instruction (25.8% , *n* = 8), followed by cue cards of strategy instruction (22.6%, *n* = 7). If the instructional adaptation was never used during COVID-19, respondents were asked to indicate the reason and were allowed to check all that apply. For the adaptation Enhanced Anchored Instruction, the most frequently reported reason was that this adaptation was not permitted in the facility (*n* = 4). For the adaptation of cue cards of strategy instruction, the reasons most frequently given were lack of materials/resources (*n* = 2), and not possible due to instructional approach (e.g., students get packets) *(n* = 2). Please see Table 4 for the instructional adaptations.

Barriers to Instruction

RQ (3) What barriers to the provision of instruction do special education mathematics teachers report in JCF other than those reported as an instructional context factor during the initial weeks of the COVID-19 pandemic (March 20, 2020, to July 31, 2020)?

The barriers respondents indicated they agreed or strongly agreed impacted instruction were lack of space to social distance during COVID-19 (agree 16.1%. *n* = 5, strongly agree 16.1%, *n* = 5), and difficulties with physical safety during instruction regarding COVID-19 (agree 16.1 %, *n* = 5, strongly agree 16.1%, *n* = 5). When asked to consider the following barriers and indicate your level of agreement many respondents either disagreed or strongly disagreed for the barriers of difficulty getting appropriate textbooks and other curriculum materials (disagree 45.2%, *n* = 14, strongly disagree 19.4%, *n* = 6), and lack of information sharing regarding COVID-19 procedures for instruction (disagree 25.8%, *n* = 8, strongly

disagree 38.7%, *n* = 12). Please see Table 5 for the barriers to instruction during the COVID-19 pandemic.

Respondents were asked to "Please describe the most challenging barrier(s) to your mathematics instruction during COVID-19. How did you or how would you have liked to solve the problem(s)?" Two respondents reported no challenge. The challenges were coded as social distancing and the inability to mix student groups (*n* = 2), not enough calculators for student use (*n* = 2), the inability to work as a team (*n* = 2), the inability to support students (*n* = 3), student behavioral problems (*n* = 3), student struggles with new learning environments including problems with computer connections (*n* = 3), and teacher inability to enter the facility (*n* = 6).

Discussion

In this study I aimed to examine JCF special education mathematics teacher's curriculum choices and instructional practices within the backdrop of the COVID-19 pandemic. Concerning the first research questions, approximately 37.0% of JCF mathematics teachers that used a prescribed curriculum noted the use of a local or state approved curriculum in the current survey. This is a large decrease and in contrast to previous research findings of 53% (Maccini et al., 2012). For those teachers not using a prescribed curriculum, available textbooks were the most frequently used source of curriculum followed equally by the student IEP, what was readily available online, and collaboration with other facilities. It is concerning that so few facilities were using local or state curriculum, as its lack of use in exclusionary settings has been identified in the previous research as problematic (Gagnon et al., 2009; Gagnon & McLaughlin, 2004; Gagnon et al., 2011). This is problematic in that students leaving JCF will often return to their home school and the home school is likely using rigorous curriculum (Gagnon et al., 2004) that is based on either local or state requirements. These students will have a hard time when they

return to their home school earning high school credits and meeting graduation requirements if, while in JCF, they were not exposed to local and state linked curriculum (Gagnon et. al, 2004). The same can be said of the textbook and curriculum materials used in JCF. Previous research has shown that teachers in JCF are likely to select these materials in a multi-disciplinary team (Gagnon et al., 2004) but it is not clear who is on this team and how they choose materials. Instructional materials should be linked to the local or state requirements to ensure access to the general education curriculum giving students in JCF a greater chance to earn a high school diploma (Gagnon et al., 2009). It is not clear the role the pandemic may have played in each facility's choice of mathematics curriculum and more research will be needed to understand how to mitigate this finding moving forward.

Concerning research question 2a, the top instructional context factor that functioned as an instructional barrier both prior to the COVID-19 pandemic and during it was restrictions on the internet. Teachers did not indicate difficulties with students being brought to class due to a lack of custody staff or challenges with the length of the school day or instructional time prior to the pandemic. However, teachers responded differently for the time period during the pandemic. Research question 2b provided teachers the opportunity to indicate which instructional context factors changed comparing the time prior to, and during the initial weeks of the COVID -19 pandemic. Two findings warrant discussion. Teachers noted that the number of minutes of student contact was less during the pandemic due to standing outside of student cells and the number of minutes of student contact was less than required by the state due to the use of assignments on a tablet or work packets. This is troubling as research has indicated that work packets are only a part of instruction but do not fill the role of instruction itself (Gagnon & Ross Benedick, 2021). Teachers in JCF needed ways to provide instruction to students beyond these

work packets in order to ensure that denial of FAPE is not occurring during any future health emergency. Regarding the use of educational adaptations, research question 2c, JCF mathematics teachers reported that calculators and extended time were used daily, and problems were read to students 2 to 4 times a week. This finding is encouraging in comparison to previous research (Maccini et al., 2012). Maccini and her colleagues found that teachers frequently reported using extended time, problems read to students, and the use of calculators for assessment (Maccini et al., 2012), but a high proportion of JCF special education mathematics teachers were not using such adaptations during instruction (Maccini et al., 2012). Thus, the findings of this current survey indicate a marked increase in their use during instructional time. The finding that JCF teachers were using metacognitive strategies 2 to 4 times a week is positive as it is supported by previous research (Myers et al., 2015). These authors recommended cognitive and metacognitive strategy instruction for classroom use.

The adaptation of Enhanced Anchored Instruction was most frequently reported as never in use in instruction in the present survey. In comparison to the previous literature review for mathematics interventions for students with learning disabilities (Myers et al., 2015), the lack of use of Enhanced Anchored Instruction is worrisome as this adaptation was one of the two recommended in the previous research (Myers et al., 2015). It is important to note that the reason for this lack of use was that this adaptation was not permitted in the facility. Perhaps this is not surprising given the restrictions on face to face learned resulting from the COVID-19 pandemic. Enhanced Anchored Instruction (EAI) involves student collaboration facilitated by teachers assisting in problem solving while using computers as a tool in the process. The types of student collaboration needed to make EAI work were likely not available with online instruction. This coupled with restrictions on the use of the internet reported by teachers in the survey points to

the loss of this type of adaptation. This result speaks to two needs. The first is the need for facilities to find ways to provide physically safe spaces for student collaboration, and the second is the need for facilities to find ways to work through and around their concerns surrounding student use of the internet. Professional development may assist in finding other instructional adaptations that can be utilized while meeting facility security regulations.

It is important to recognize that only slightly more than half of the survey respondents (51.6%) were special education endorsed mathematics teachers. Maccini and Gagnon (2006) reported on mathematics instructional practices used by secondary special education and general education teachers. Specifically, special educators reported frequent use of problems read to students whereas this was not frequently used by general educators (Maccini & Gagnon, 2006). In the present study 54.8% (n = 17) of teachers reported reading problems to students 2 to 4 times a week while the percentage for daily use was 18.4% (n = 6). Professional development targeted for teaching mathematics to students with EBD or LD may assist teachers in learning how to incorporate this adaptation more frequently and effectively. This suggestion is consistent with the previous research (Maccini and Gagnon, 2006) in that general education teachers could benefit from more preparation in instructional practices for learners with special needs (Maccini & Gagnon, 2006). The use of instructional adaptations may increase for teachers lacking special education credentials with more training. Professional development can play a role in increasing both teachers' knowledge and use of evidence-based practices.

The top instructional context factor functioning as an instructional barrier both prior to the COVID-19 pandemic and during it was restrictions on the internet. Considering this finding contextually, according to the United States Department of Education, 77 percent of public schools reported moving instruction to an online format during the COVID-19 pandemic in the

spring of 2020 (United States Department of Education, 2022). In this sense, schools in JCF faced the same difficulty with access as other schools across the country (Pace et al., 2020). However, the lack of access was likely compounded by security concerns in JCF facilities making it even more challenging to teach in the JCF setting during the pandemic. This finding raises policy issues that need to be addressed by those governing bodies making decisions regarding who has internet access in each facility. Both teachers and students should be able to access material that can facilitate the mathematics education of youth in JCF. Beyond professional development for teachers, the practitioner manuscript of this dissertation (Chapter IV) aims to address some of this topic.

In summary, the impact of COVID-19 on these facilities cannot be understated. Looking at the change in reporting of instructional context factors playing a role as a barrier to instruction prior to during the pandemic, it is clear teachers found it more difficult to teach during the COVID-19 pandemic. The time needed to provide instruction was less both in terms of the length of the school day itself and instructional time and as students were not brought into the school due to insufficient custody staff. Some teachers reported they were standing outside of a student's cell without the benefit of needed student calculators, distributing work packets instead of teaching. Leone and Weinberg (2012) noted that the use of worksheets lacked documented evidence. Even more importantly, the use of work packets has been identified as only one aspect of the teaching and learning process and not instruction itself (Gagnon & Ross Benedick, 2021). It is clear JCF facilities need to be better prepared in the face of the next health emergency regarding instruction.

Study Limitations

Limitations to this research begin with the limitations of survey research in general. Representation and measurement errors due to survey research depending on self-reported data (Coughlan et al., 2013; Dillman et al., 2009) could exist. The findings that are presented in this chapter are limited to perspectives reported by those who chose to participate. Findings of this study may also only apply to researchers with an interest in teaching mathematics. If a different content area teacher had been selected, for example science teachers, the types of responses would potentially differ.

One major limitation is the response rate for the survey. The 19.6% response rate is lower than the accepted rate of 50% (Baruch & Holtom, 2008). There are several theories around survey non-responsiveness in the survey methodology literature. For instance, the person level theory of social exchange suggests that people make decisions about their social behavior based on a cost benefit analysis (Blau, 1964). From this perspective the value the individual gets from responding to the survey may or may not be worth their time to complete it. Commitment or involvement theory suggests that if a person feels committed to the survey they are more likely to respond (Becker, 1960). Either of these theories could account for some of the non-response behavior of the intended respondents. One specific reason for not responding to this survey could be due to the time that has passed since the pandemic lockdowns. Teachers may have felt that they no longer recalled teaching at the start of the COVID-19. Teachers may also have left their teaching position in JCF since the initial weeks of the pandemic. Teacher turnover meant that some of the current teaching staff was not present at the start of the pandemic. Another reason for non-response could be convenience for the intended participants. The link to the online survey was not provided with a quick response (QR) code and that may have also impacted the choice regarding whether or not a teacher responded. The survey may have taken a while to

complete for some participants resulting in their failure to finish it and return the survey. My own, resulting inability to compare respondents with nonresponses is a large limitation. It was not possible to compare respondents and nonrespondents due to a lack of information on the returned surveys which means that nonresponse bias could have occurred if there was a systematic difference in the characteristics between those responding and not responding (Sedgwick, 2014).

It is important to include that another limitation impacting the data has to do with the universe of facilities. When gathering information, the universe of facilities is smaller by one state due to the legal department of that state being unable to reach a memorandum of understanding with my university. Consequently, the universe is absent from all facilities in that state. In other states, education directors of JCF facilities indicated that they did not? have students during the initial lockdowns, as youth were all placed into one facility in their state, and thus they did not respond to the survey.

Next Steps for Practice

- Teachers may need assistance to select mathematics topics to teach that are consistent with the requirements of the local or state mathematics curriculum. Professional development for teachers to locate and utilize local and state mathematics curriculum, as lack of use in exclusionary settings, has been identified in the previous research as problematic (Gagnon et al., 2009; Gagnon & McLaughlin, 2004; Gagnon et al., 2011).
- Administrators should facilitate the creation of internet controls in each facility that will permit teachers and students access and allow for online synchronous instruction while maintaining the level of security required to uphold safety within JCF. This process may be facilitated by future researchers.

- Development professionals in each facility or administrative district need to prioritize locating the funds to ensure purchase and maintenance of tablets for all students. Any transition to online teaching may only be made easier if tablets are already available.
- Secretarial staff in conjunction with teachers in each facility need to establish schedules that permit synchronous online instruction for all students. It may not be easy to find days and times that permit all the teachers and all the students in any facility to learn online in real time. This type of proactive planning occurring before any future health emergency may enable more synchronous mathematics instruction to take place.
- Teachers need to recognize instruction may need to shift to online (Pace et. al., 2020); in preparation teachers need to undertake professional development specifically geared to strategies for engaging students during online mathematics instruction (OJJDP, 2021). Research has shown that teaching online is different than just taking a face-to-face lesson and presenting it in front of a computer (Rice, 2022).

Next Steps for Research

There are several survey findings that could be addressed in future research. Teacher curriculum choices, collaboration, and use of manipulatives are all possible topics for future researchers. The finding in this survey that teachers were not using local and state mathematics curriculum is concerning and is a topic for further research. Previous research (Gagnon et al., 2009; Gagnon & McLaughlin, 2004; Gagnon et al., 2011) has identified problems when teachers in exclusionary settings are not using local or state curriculum. Researchers could investigate the reasoning teachers used behind this selection. Once this reasoning is understood by researchers, follow up research could focus on the best methods to assist mathematics teachers in making curriculum selections.

The survey finding that teachers were not able to collaborate once the COVID-19 pandemic began is another topic for future research. Researchers could seek to understand what type of communication amongst mathematics practitioners presently occurs in JCF. This would be done in preparation of a move to online instruction. Researchers could then explore the best methods for teacher communication, including the use of technology to assist special education mathematics teachers prepare to communicate with each other if they find themselves once again shut out of their facility.

Teachers in the survey stated that there was a loss of the use of manipulatives when teaching switched to online instruction. This loss made teaching difficult. Teachers indicated they would have liked some methods to continue the use of manipulatives once the facility shutdowns due to the COVID-19 pandemic occurred. Future researchers could seek to understand what types of technology and specific manipulatives could best be used online mathematics instruction.

The most frequently reported challenge by teachers in this survey was restrictions on the internet. There are a host of interconnecting professionals associated with the effective and safe use of the internet in JCF schools, all of whom could benefit from researchers revisiting current practices for teachers and students in JCF facilities. Specifically, future researchers could seek to understand methods for synchronous instruction that permits maintenance of security measures in each facility. Internet controls could be located and used in a way that would allow for teachers and students to learn online in real time. Researchers could assist practitioners by helping to understand how to accomplish this task. Additionally, when learning is not in real time but may consist of prerecorded teacher lessons, future research could assist in understanding what sort of content could be recorded without reducing the effectiveness of instruction. Does

the content meet local or state curriculum standards? Does the content seek to present the material in a culturally diverse fashion? Does the content meet any requirements of Universal design for learning (UDL) if each facility chooses to go that route? All of these are questions researchers could seek to understand that would in turn facilitate use of the internet in JCF facilities.

Conclusion

My purpose of this study was to begin to address two problems specific to JCF. The first is inadequate research for mathematics instruction in these settings (please see Chapter II). The second is the degree that the COVID-19 pandemic impacted the type of curriculum choices and instructional practices for special education mathematics teachers in these settings. In any future planning for a mathematics intervention study in JCF, an understanding of the mathematics curriculum, instructional practices and instructional adaptations is important. Survey research is one component that helps to paint a clear picture of the mathematics educational setting. The current study aims to add to some of that understanding. Mixed methods research with follow up interviews would further help to clarify mathematics instructional practices used in JCF.

Tables

Table 1

Respondent Characteristics

Variable		n (%)
Special Education teacher who teaches mathematics	Yes	16 (51.6)
	No	1 (3.2)
	There is no special education teacher – my answers are based on teaching mathematics	11 (35.5)
	No response	3 (9.7)
Gender	Woman	11 (35.5)
	Man	18 (58.0)
	No response	2 (6.5)
Highest degree earned	Bachelor's	7 (22.6)
	Master's	21 (67.7)
	Doctorate	1 (3.2)
	No response	2 (6.5)
Discipline of highest degree	Psychology	1 (3.2)
	Education	19 (61.2)
	Special Education	7 (22.6)
	Mathematics	1 (3.2)
	No response	2 (6.5)
	Other	1 (3.2)
Teaching Credential (all that apply)	Secondary mathematics	16
	Elementary mathematics	7
	Special education	17
	Other	8

(table continues)

Variable		n (%)
Current Teaching Responsibility (all that apply)	General Mathematics or Basic Skills Middle School Level	16
	General Mathematics or Basic Skills High School Level	21
	Pre-Algebra	19
	Algebra	21
	Geometry	18
	Algebra II	17
	Trigonometry	6
	Teaches Integrated/Unified High School Mathematics	4
	Other	8

Table 2

Prescribed Curriculum Information

For those schools following a prescribed curriculum – Method for school staff to receive information on curriculum (all that apply)	n
District and state standards	19
Personal communication with district teachers and principals	9
Teachers attend district staff development	10
Local education agency liaison	5
Principal provides information	11
Staff do not receive information on curriculum	0
Other	5
For those schools following a prescribed curriculum – Method of selecting school/s text and other curriculum materials (all that apply)	
Local district	10
Individual teacher judgment	9
Group teacher judgment	12
Administrator or administrative board judgment	5
Local education agency liaison	3
Principal provides information	7
Multidisciplinary team	6
Other	3
For those schools not following a prescribed curriculum – curriculum is based on (all that apply)	
Student IEP	4
Available textbooks	5
Readily available online	4
Collaboration with other facilities	4
Other	1

Table 3

Instructional Context as Barriers to Teaching

Instructional Context Factor	DEGREE TO WHICH EACH INSTRUCTIONAL CONTEXT FACTOR IS A BARRIER TO TEACHING (check all that apply) n											
	PRIOR TO COVID- 19						DURING COVID- 19					
	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree	N/A	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree	N/A
Students not being brought to school due to insufficient custody staff	15	9	2	1	1	3	13	4	4	2	5	3
Students not being brought to school for unit behavioral reasons	4	10	6	8	1	1	4	8	7	6	4	2
Student absence for other reasons	4	7	5	6	4	4	4	7	5	4	5	5
Length of school day is shorter than required by the state	16	6	5	1	1	4	11	6	1	3	5	5
Length of instructional time is less than required by the state	13	8	3	2	0	4	10	7	3	2	4	5
Restrictions of textbooks and other curriculum materials in students' cell	1	10	6	5	3	5	1	9	6	5	6	4

(table continues)

Instructional Context Factor	DEGREE TO WHICH EACH INSTRUCTIONAL CONTEXT FACTOR IS A BARRIER TO TEACHING (check all that apply) n											
	PRIOR TO COVID- 19						DURING COVID- 19					
	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree	N/A	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree	N/A
Restrictions on Internet (global network with access outside of JCF)	1	4	3	9	8	5	1	5	3	7	12	3
Restrictions on Intranet (private network only within JCF – may contain preloaded material for student use)	1	3	7	5	5	7	0	4	6	6	7	6
Restrictions on graphing calculator or other math technology	8	5	6	4	1	6	7	4	5	5	6	4
Ability to continue student behavioral interventions	2	7	5	6	5	2	2	8	9	3	4	3
Ability to group students based on academic needs	4	4	3	9	5	2	2	8	4	6	5	3
The number of minutes of student contact is less than required by the state due to standing outside student cell	12	7	2	1	0	5	8	7	2	3	2	5

(table continues)

Instructional Context Factor	DEGREE TO WHICH EACH INSTRUCTIONAL CONTEXT FACTOR IS A BARRIER TO TEACHING (check all that apply) n											
	PRIOR TO COVID- 19						DURING COVID- 19					
	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree	N/A	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree	N/A
The number of minutes of student contact is less than required by the state due to the use of assignments on a tablet or work packets	12	7	3	0	1	4	7	8	4	2	3	4
The number of minutes of student contact is less than required by the state due to interruptions such as showers scheduled during instructional time	11	10	1	2	1	3	10	9	3	3	1	4
The number of minutes of student contact is less than required by the state due to interruptions because of lockdowns	10	8	4	4	2	1	10	6	3	3	5	3
The number of minutes of student contact is less than required by the state due to court appearances during instructional time	8	9	7	2	2	0	9	9	7	3	1	1

(table continues)

Instructional Context Factor	DEGREE TO WHICH EACH INSTRUCTIONAL CONTEXT FACTOR IS A BARRIER TO TEACHING (check all that apply) n											
	PRIOR TO COVID- 19						DURING COVID- 19					
	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree	N/A	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree	N/A
Other: counseling + med/psych clinic.	0	1	0	0	0	0	0	1	0	0	0	0
Other: textbook assignments consistent regular time	0	0	0	0	1	0	0	0	0	0	1	0

Table 4

Instructional Adaptations

Instructional Adaptation	In teaching mathematics, I use this strategy (check one for each adaptation) n (%)				If NEVER, why not? (check all that apply) n				
	Always (daily)	Often (2-4 per week)	Sometimes (1-4 per month)	Never	Need more training	Lack of materials/ resources	Does not meet my students' academic needs	Not possible due to instructional approach (e.g., students get packets)	Not permitted in the facility
Graphic Organizers (e.g., concept maps, visual display)	5 (16.1)	12(38.7)	11 (35.5)	1 (3.2)	0	1	0	2	0
Extended Time	13 (41.9)	9 (29.0)	5 (16.1)	3 (9.7)	0	1	0	1	2
Modified Assignments (e.g., reduced classwork, reduced homework)	10 (32.3)	7 (22.3)	12 (38.7)	0 (0)	0	0	0	0	0
Color Coding/bolding text	5 (16.1)	4 (12.9)	17 (54.8)	3 (9.7)	0	0	1	1	0
Guided Notes	6 (18.4)	9 (29.0)	10 (32.3)	2 (6.5)	0	0	0	2	0
Problems Read to Students	6 (18.4)	17 (54.8)	7 (22.3)	1 (3.2)	0	0	0	1	0
Calculators	15 (48.4)	12 (38.7)	2 (6.5)	0 (0)	0	0	0	0	0
Cue Cards of Strategy Steps	4 (12.9)	4 (12.9)	13 (41.9)	7 (22.6)	1	2	1	2	0
Peer Tutoring	3 (9.7)	11 (35.5)	13 (41.9)	2 (6.5)	0	0	0	1	2
Cooperative Groups	2 (6.5)	8 (25.8)	14 (45.2)	3 (9.7)	0	0	0	3	1

(table continues)

Instructional Adaptation	In teaching mathematics, I use this strategy (check one for each adaptation) n (%)				If NEVER, why not? (check all that apply) n				
	Always (daily)	Often (2-4 per week)	Sometimes (1-4 per month)	Never	Need more training	Lack of materials/ resources	Does not meet my students' academic needs	Not possible due to instructional approach (e.g., students get packets)	Not permitted in the facility
Mnemonics	1 (3.2)	5 (16.1)	16 (51.6)	3 (9.7)	0	1	0	1	0
Use an instructional sequence that includes concrete manipulatives, then pictures, then numbers and symbols	1 (3.2)	5 (16.1)	16 (51.6)	4 (12.9)	0	2	0	3	1
Use metacognitive strategies (e.g., paraphrasing, visualizing, hypothesizing, estimating the accuracy of responses)	5 (16.1)	16 (51.6)	5 (15.1)	1 (3.2)	0	0	1	1	0
Use of Enhanced Anchored Instruction (e.g., computer based interactive lessons and hands on applied projects)	5 (16.1)	6 (19.4)	11 (35.5)	8 (25.8)	2	2	0	2	4
Additional Practice	8 (25.8)	14 (45.2)	6 (19.4)	2 (6.5)	0	1	1	1	0
Other: (Please describe)									
Projects-use quadratic equations to design house room sizes length, width, height to do the percent	1 (3.2)	0 (0.0)	0 (0.0)	0 (0.0)	0	0	0	0	0

Table 5

Barriers to Instruction during COVID-19

BARRIER	DEGREE TO WHICH BARRIER IMPACTED TEACHING DURING COVID- 19 n (%)					
	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree	N/A
Difficulty receiving information on the curriculum of local schools	7 (22.6)	6 (19.4)	4 (12.9)	4 (12.9)	2 (6.5)	7 (22.6)
Difficulty getting appropriate textbooks and other curriculum materials	6 (19.4)	14 (45.2)	2 (6.5)	2 (6.5)	2 (6.5)	4 (12.9)
Lack of Space to Social Distance	8 (25.8)	6 (19.4)	5 (16.1)	5 (16.1)	5 (16.1)	1 (3.2)
Difficulties with physical safety during instruction	8 (25.8)	9 (29.0)	3 (9.7)	. 5 (16.1)	. 5 (16.1)	0 (0)
Lack of Information sharing regarding COVID- 19 procedures for instruction	12 (38.7)	8 (25.8)	4 (12.9)	2 (6.5)	3 (9.7)	1 (3.2)

Chapter IV: Practical Suggestions For instructional Practice in Juvenile Correctional Settings

In the juvenile correctional facility, students had to remain in their living units while teachers dropped off daily assignments and pre-recorded lessons on thumb drives. Teachers were then available by phone or via video chat to answer student questions. As the special education teacher, I completed progress monitoring in the same manner -I would "work" with the student via phone on their math goals. Working with a special education student via phone (no contact due to JJS rules during COVID-19) was very difficult due to the rapport SpEd teachers have with their SpEd students. During the pandemic, I was able to FaceTime on my personal cell phone with my students (only once, though) when JJS staff was available. It was nice to see their faces and vice versa . .

The above response is from a special education mathematics teacher in a juvenile correctional facility (JCF) regarding barriers to instruction experienced while trying to teach during the first few weeks of the COVID-19 pandemic. It is clear that “seeing” their students was important to this teacher as in-person instruction was occurring before the start of the pandemic. The Office of Juvenile Justice and Delinquency Prevention (OJJDP) offered *Guidance for Juvenile Justice Facilities During COVID-19 Pandemic* that included the move to virtual instruction if on site services are not feasible until safety protocols are in place (OJJDP, 2021), but it is clear that many JCF facilities were not ready to shift to virtual instruction when the first COVID-19 lockdowns occurred.

In approximately the last 100 years there have been five pandemics that have impacted education (Zancanella & Rice, 2021) and it is likely there will be one again (Rice, 2022). For students with disabilities who were being served under the Individuals with Disabilities Education Act (IDEA, 2004), it became harder for teachers to ensure that these students were receiving a Free and Appropriate Education (FAPE), specially designed instruction, and any other services deemed necessary by education experts who had delivered these services face-to-face before the pandemic.

The purpose of this chapter is to provide suggestions to practitioners working in JCFs in preparation for any future health emergency. While directed at special education mathematics teachers and administrators in these facilities, other practitioners that work in JCF could benefit from these tips. Many of the following suggestions rely on the utilization of advice given by the OJJDP regarding a switch to online teaching during any future health emergency or pandemic, however, this advice assumes that each facility has the ability to deliver instruction online. The lack of digital resources as well as ongoing security concerns regarding internet use in JCF facilities are, in reality, a policy issue.

Ultimately, internet connectivity and the degree to which any facility permits internet access and synchronous teaching is beyond the scope of this paper. It is the hope, and the aspirational intention, that future special education mathematics teachers working in JCF will have the ability to connect via the internet in real time with their students should any future health emergency occur resulting in a facility shutdown. It is from this perspective that the following paper is framed.

First, I present some of the background surrounding barriers to instruction in JCF before COVID-19, mathematics learning loss during the COVID-19 pandemic, and alternative educational delivery mechanisms used during the pandemic. This is followed by some of the challenges to online teaching shared by teachers who made the transition to remote teaching at the start of the COVID-19 pandemic in the form of tips for addressing some of the barriers to instruction in JCF during a future health emergency.

Previous Barriers to Educational Services in JCF

Before the pandemic, teachers working in JCF shared what they felt made it difficult to teach in these settings. Some of their concerns were a lack of physical space, insufficient time for

classes, and disruptions to the daily schedule (Gagnon et. al., 2009; Gagnon & Barber, 2010). Additionally, a lack of teacher access or preparation to provide evidence-based instructional interventions (Gagnon et al., 2012) could also function as a barrier to the successful provision of education.

JCF teachers have expressed a disconnect between what they felt should be taught to students and the curriculum that was actually in use (Houchins et al., 2009). Teachers suggested that the expectations for some of the students were not appropriate, as the curriculum that the facility used did not meet the needs of the students (Houchins et al., 2009). A concern with a lack of academic rigor in JCF prior to the pandemic may only be worsened as the COVID-19 pandemic is only adding difficulty to the provision of an education that is already lacking in JCF (Buchanan et al., 2020).

Mathematics Learning Loss

Researchers have only just begun to describe the changes in education due to the COVID-19 pandemic. Researchers from the Office of Civil Rights studied the learning loss during the current pandemic as it impacted underserved populations (Goldberg, 2021). One finding from this study compared learning loss by content area and the learning loss in mathematics was greater than in other subjects, such as reading (Goldberg, 2021). Any assistance for mathematics teachers, especially special education mathematics teachers, in JCF during any future health emergency may help mitigate mathematics learning loss.

Other Types of Educational Delivery

The rapid shift to online learning was one means to continue instruction during COVID-19. However, other forms of educational delivery occurred, as well. In one example, individual packets of worksheets were dropped off to students and then collected for grading (Buchanan,

2020). However, work packets are only one part of the provision of instruction, and are not instruction itself (Gagnon & Ross Benedick, 2021). Even if facilities did have the ability to use online learning, it was not always so easy for teachers to deliver instruction this way. The concerns and lessons from some of the individuals working at the start of the COVID-19 pandemic can help inform suggestions for those teaching in JCF in a future health emergency.

Online Learning Outside of JCF

The transition made to online learning at the onset of the current pandemic provided many teachers with opportunities to increase their technological skill set. Not all teachers found this transition to be easy, and not all teachers felt their students could learn as well online in comparison to face-to-face instruction (An et al, 2021; Kraft & Simon, 2021; Trust & Whalen, 2020).

Teachers responded to surveys early in the pandemic and shared their concerns about teaching online. From the Upbeat organization, a survey entitled *Teaching From Home* asked K-12 teachers to share their thoughts about their experiences while teaching from home. Teachers expressed that they faced many challenges. These teachers felt that the schools they worked for could play a key role in supporting them and that they were on their own to best understand how to instruct online. This was especially true for schools serving low income and communities of color that had been most impacted by the pandemic (Kraft & Simon, 2020). Teachers that had already used technology frequently in their instruction, including blended learning, reported an easier transition, however most teachers seemed to be learning remote teaching strategies while teaching online. This lack of preparation created more stress and barriers to teaching remotely (Trust & Whalen, 2020). There was a sense that more professional development for both the teachers and the students would have helped. Some teachers also wanted more open lines of

communication during the school shutdowns (An et al., 2021). It was clear that those teachers that did feel good about online teaching did so because of collaborative relationships and administrative support (Glessner & Johnson, 2020).

Teachers early in the pandemic did not feel prepared to switch to online learning and they were not confident that their students were able to learn in this fashion. It is not clear if teachers used the same content that had been used face-to-face, just delivered online, or if the teachers used different content. One major concern is the use of instructional adaptations for students with disabilities. Special education mathematics teachers need to be prepared to be successful with their students irrespective of the mode of instructional delivery. One of the guiding principles of the Individual with Disabilities Act (IDEA, 2006) is implementation of each student's individual education plan (IEP). Planning for instruction, using instructional adaptations, and collaborating with peers to accomplish this goal was severely impacted by the lack of in person education resulting from COVID-19 lockdowns. Administrators, as well as teachers faced new challenges at the start of COVID-19 pandemic.

Several members from The Council of Juvenile Justice Administrators (CJJA) were interviewed early on during the pandemic about the challenges they faced as a result of COVID-19. Experiences they shared, combined with the concerns and suggestions provided by special education mathematics teachers surveyed (Chapter III), provide the backdrop for the following research-based suggestions for teaching in JCF during a future health emergency.

In preparation for a future health emergency, I am seeking to address some of the barriers to instruction for these teachers and administrators posed by the COVID-19 pandemic. The following tips are organized by timing and as such, the tips that should be done prior to any health emergency (tip 1 and tip 2) are presented first. These are followed by tips that should be

used both prior to, and during the next potential health emergency (tip 3 and tip 4). Finally tip 5 should be utilized during a future health emergency. Teachers can use all of the tips and administrators will be able to benefit from tip 3 and tip 5. Any professionals that provide behavioral support will be best served by tip 4. I start with suggestions that can benefit special education mathematics teachers working in JCF in a future health emergency if completed before the start of the next pandemic. Please see Table 1 for a summary of the tips, whom each tip may benefit, and when to utilize each tip.

Tips for use Before the next Health Emergency

Tip 1: Professional development

One special education director in a private, special education school shared that teachers she supervised had to decide what to teach during synchronous online instruction during COVID-19 lockdowns. These teachers were not able to cover all the material they would have during face-to-face instruction. This director would like her teachers to experience professional development in order to help them make good curriculum choices for their students with disabilities should they need to move to synchronous instructions during a new pandemic. While her advice is from outside a JCF setting it can also benefit those teaching in JCF.

Teaching online can be a struggle for teachers who may not feel they have the skills needed to engage students or the materials for successful instructional adaptations. Specifically, teachers felt they did not know how to hold student attention online. Teachers need ideas for student engagement that helps them make the learning more interesting so that students do not turn off their cameras and mute themselves during class. The length of the lessons taught online also seemed to be a problem. Teachers felt that they had to shorten the original face to face lesson to work with the limited student attention span while teaching it online. Teachers need

assistance in fully altering lessons that would have been taught in person to something entirely different for online use.

Before the next pandemic, the guidance provided by the OJJDP https://tinyurl.com/2zbxd7m9 can be put into place via professional development for special education mathematics teachers. The section on programming and education in the above report has several useful links such as Issue Brief: Enhancing Facility-Based Education Programs Through Digital Learning, which includes information about an innovative program for students in secure care settings through the use of an IPAD application. This recommendation is to supplement classroom instruction and is not intended to replace it. The successful usage of IPAD or tablet technology could be acquired through professional development that occurs prior to the next health emergency. It is important to note that the use of a tablet is just one aspect of instruction and cannot replace face- to- face, or if necessary, synchronous online instruction. All professional development should be geared toward successful synchronous instruction in terms of both content covered, and student engagement geared toward those that teach in JCF.

There are four specific factors that those working in JCF can use that will facilitate successful professional development (Mathur et al., 2009). These factors are the using backward mapping, evaluating the relevance of the curriculum, fostering enthusiasm and commitment, and instituting follow up (Mathur et al., 2009). Backward mapping is a multistep process that starts with identifying youth needs and evidence-based interventions to be used as the basis for any professional development. The curriculum used for professional development that is selected should be relevant to the teachers who will use it in JCF. After relevant materials have been identified it is important that there is a commitment to professional learning to ensure successful professional development implementation. Finally, there needs to be follow-up. Monitoring

progress is an important part of any professional development. Coaching and mentoring are especially important for professionals in JCF, and professional development should include individualized enhancement opportunities that meet the needs of beginning professionals in JCF (Mathur et al., 2009). These individualized learning opportunities for teachers should also include the use of online or virtual materials.

Tip 2: Locate online resources for instructional adaptations

When responding to an opened ended question posed in the survey described in chapter three of this dissertation, one teacher expressed their concern that the " ability to use manipulatives was gone w/COVID" and another worried that during the lockdown their biggest concern was "teachers' inability to address students learning styles for success in mathematics lessons." The use of manipulatives as part of an instructional adaptation should not be lost due to the next health emergency. The National Council Teachers of Mathematics (NCTM) is one resource special education mathematics teachers can use to locate online resources prior to the next pandemic (Index - National Council of Teachers of Mathematics (nctm.org) . One helpful article found at this website is Promoting Student Understanding through Virtual Manipulatives in: The Mathematics Teacher Volume 111 Issue 7 (2018) (nctm.org). Another resource can be found at the National Library of Virtual Manipulatives (National Library of Virtual Manipulatives (usu.edu). This library is a National Science Foundation (NSF) project that consists of web – based virtual manipulatives or concept tutorials. Prior to the pandemic researchers had started to recognize the value virtual manipulatives may have for students with disabilities. (Please see Bouck & Flanagan, 2010 for other suggestions).

Tips for use Before and During the next Health Emergency

Tip 3: Use collaboration and information sharing

When CJJA administrators were interviewed about the early days of the COVID-19 pandemic they expressed the value in collaboration and the sharing of information (Ross Benedick et al., 2023). The ability to talk to one another both horizontally as peers, and vertically between and above organizations helped these administrators feel empowered and more able to deal with the challenges of the pandemic. One administrator shared that they felt that one of the "strengths of our system is that we have ongoing and open communication with all aspects of individuals in our facility" and this was very helpful to them (Ross Benedick et al., 2023). Administrators in JCF that felt the most able to manage the challenges early on in the COVID-19 pandemic did so due to collaboration. This collaboration facilitated a can-do mindset they felt only benefited the students they intended to serve. This "connectedness" and the ability to "collaborate as a whole" (Ross Benedick et al., 2023) expressed by CJJA administrators can be used proactively amongst special education mathematics teachers and others working in a JCF facility.

A similar set of thoughts was expressed by special education mathematics teachers when they responded to a survey question in the first dissertation study about the greatest barriers they found for instruction during the pandemic. Survey respondents indicated the inability to work as a team was a barrier to instruction. Special education mathematics teachers were desirous of team interactions*:* "Facility would not allow technology in the living unit and staff were not allowed on the grounds, so they worked from home and sent work electronically to the principal." Teachers were funneling material to the principal and being able to work with other staff, like behavior support personnel was a challenge.

Ensuring the ability to collaborate during any future pandemic by proactively opening the channels of communication is the first step for both special education mathematics teachers and

administrators towards preparedness. It is of utmost importance that each team, including the special education mathematics teacher, has the ability to communicate with their colleagues to plan for the delivery of instruction. The value of collaboration has been recognized in other professions other than the education profession. The use of an interprofessional practice model that puts collaboration in a proactive position instead of as a reactionary behavior has been suggested in the speech language field (Rosa-Lugo et. al., 2017). Leaning on the health care community and gleaning suggestions from their models can also help facilitate this type of planning. One framework for action on interprofessional education & collaborative practice is from the World Health Organization (2010). This model has been suggested to overcome inequality in schools (Pfeiffer et al., 2019). Nursing organizations further envisioned interprofessional collaborative practice by identifying four key competencies, one of which was interprofessional communication (Core Competencies for Interprofessional Collaborative Practice: 2016 Update (memberclicks.net). These core competencies are presented with potential modifications for use in JCF in Table 2. Recognition of the need for collaboration within the education community could further foster planning for collaboration if instruction once again switched to online. Developing a facility specific model that permits information sharing while working toward any required professional competency prior to the next health emergency may make communication easier during the next health emergency.

Tip 4: Model for remote access to behavioral supports

Student behavioral concerns were indicated by teachers in the survey in chapter three. One teacher shared that the “security staff did not feel like it was their responsibility to help with education, so we had a lot of behavior problems.” Another teacher stated that, “The hardest part would be getting the students to adjust to the classroom setting and how to act.” A third felt that

"students were anxious" and it would have been helpful to be able to provide students with "small group instruction/ support," but the student behaviors were getting in the way of successful mathematics teaching during the initial stages of the COVID-19 pandemic.

Special education mathematics teachers expressed concerns about student behaviors when trying to teach remotely. Students with disabilities will best be served if all aspects of their IEP are followed irrespective of the mode of instructional services. Mathematics teachers may find greater success in meeting their student's mathematics goals if behavioral goals are also being addressed. One school developed a model for students that had been receiving special education behavior analytic supports during face-to-face instruction. These authors (Frederick et al., 2020) shared what they had created to help other teachers assist their students, with special behavioral needs, to ensure access to their behavioral supports throughout any future school closures. Not all parts of this model could apply in JCF due to the unique nature of these facilities, but a modified set of steps could be put into place by any professionals who are trained to deliver behavioral support within JCF. One possible set of modified steps of this model are presented in Table 3 (Please see Frederick et al., 2020 for the original model).

Tips for use During the next Health Emergency

Tip 5: Follow CDC guidance including limiting isolation

At the start of the pandemic, JCF administrators were looking for guidance for all aspects of how to manage the day-to-day aspects of working in JCF (Ross Benedick et al., 2023) and this included accessing state public health websites. In the survey described in chapter three of this dissertation, one JCF special education mathematics teacher stated that " The most difficult situations took place when students were in their rooms, locked up, for extended time during the

height of the COVID-19 because they did not get enough instructional time." Physical safety concerns translated into student quarantine that meant lost instructional time.

Fortunately, the Center for Disease Control (CDC) now has guidance specifically designed for the type of settings found in juvenile corrections. The suggestion is for teachers and administrators and comes from the CDC https://tinyurl.com/4auj4pcz . Suggestions for the length of quarantine time are found in this guidance. The specific steps that teachers and administrators in JCF can take are the following: Step 1 Test for COVID-19 at student intake into JCF, Step 2 Test at student transfer within and release from JCF, Step 3 Provide high quality masks at no cost to residents and staff, Step 4 Ensure that any medical isolation and quarantine are operationally distinct from administrative or disciplinary segregation, Step 5 when possible, maximize access to opportunities for in-person visitation and programming.

When the next health emergency occurs, guidance from the CDC should be acknowledged and followed. Ideally, JCF facilities will utilize the shortest quarantine time possible that ensures the physical safety of all involved which will allow for as much face-to-face instructional time for students as possible as we know that even though the social isolation due to the COVID-19 pandemic does not have the same intent as punitive solitary confinement, social isolation for youth in JCF is comparable to solitary confinement (Gagnon, 2020). Minimizing any amount of time students need to be in quarantine consequently minimizes the need for alternative instructional formats such as synchronous online instruction.

Tables

Table 1

Tips for JCF Special Educators and Administrators for the next pandemic

Tip Number	Type of Suggestion	Who it serves	When it may be most effective
Tip 1	Professional development	Teachers	Before the next health emergency
Tip 2	Locate online resources for instructional adaptations	Teachers	Before the next health emergency
Tip 3	Use collaboration and information sharing	Teachers and Administrators	Before and During the next health emergency
Tip 4	Model for remote access to behavioral supports	Teachers and Behavioral Support Professionals	Before and During the next health emergency
Tip 5	Follow CDC guidance including limiting isolation	Teachers and Administrators	During the next health emergency

Table 2

Core Competencies for Interprofessional Collaborative Practice (2016 update)

	Specific actions to achieve the competency	Modification for JCF Setting
Competency 1 Values/Ethics for Interprofessional Practice	Work with individuals of other professions to maintain a climate of mutual respect and shared values.	As suggested in the competency.
Competency 2 Roles/Responsibilities	Use the knowledge of one's own role and those of other professions to appropriately assess and address the health care needs of patients.	Concentrate on the education needs of the students with disabilities.
Competency 3 Interprofessional Communication	Communicate with patients, families, communities, and professionals in health and other fields in a responsive and responsible manner that supports a team approach.	Include parents, families and other professionals such as case managers or behavioral specialists in JCF to work together as an educational team.
Competency 4 Teams and Teamwork	Apply relationship-building values and the principles of team dynamics to perform effectively in different team roles to plan, deliver, and evaluate patient/population centered care.	As suggested in the competencies to best meet student needs using a student-centered education.

Table 3

Modifications of online behavioral support model

Steps from Frederick et al., 2020	Limitations due to JCF Setting	Modification for JCF Setting
Step 1. Parent interview and accessibility assessment	Parents may not be available to provide the support to their children as suggested by Frederick so a replacement will need to be utilized.	Case workers may be trained to assist in the role that parents undertake in this model; the assessment of available technology could be done similar to that suggested by Frederick.
Step 2. Board Certified Behavioral Analyst (BCBA) program preparation	BCBA may not be available in each facility; thus, one BCBA may need to serve more than one facility.	Program preparation as suggested in the Frederick model.
Step 3. Behavioral Interventionist (BI) training in distance support strategies	There may not be two separate professionals available (BCBA, BI) thus the same professional essentially provides both the program preparation (Step 2) and any training (Step 3) for other professionals who will provide the actual remote behavioral support model.	Professional development to prepare to provide behavioral supports online similar to what is suggested in the Frederick model.
Step 4. Distance support intervention sessions	As stated above there may only be one professional to provide all the steps including providing the actual sessions for each student as well as undertaking any additional training needed in online strategies and student engagement.	As suggested in the Frederick model.
Step 5. BCBA supervision and parental support	In the Frederick model parents are given access to the videos used with their children and given weekly training themselves to assist their children. There will need to be a replacement for this support.	As suggested by Frederick with appropriate parent or guardian substitution (caseworks or paraprofessionals who have been trained in this model).

Chapter V: Conclusion

This dissertation extends our understanding of mathematics curriculum choices, instructional context, instructional adaptations for students with disabilities, and barriers to instruction in juvenile correctional facilities (JCF) specifically during the COVID-19 pandemic. The aim of this research was to begin to address two problems. The first of which was in the findings of the research synthesis (Chapter II) that revealed no mathematics intervention studies in JCF for the past decade. This lack of research, however, cannot be addressed without consideration of the context of the COVID-19 pandemic. The second was the impact of COVID-19 on the already lacking system of mathematics instruction in place within JCFs. In order to make suggestions regarding the planning and execution of any future mathematics interventions in JCF, both issues must be navigated with each other in mind. First, I conducted a descriptive survey to provide a snapshot of the curriculum and instructional landscape for special education mathematics instruction in JCF during the initial weeks of the COVID- 19 pandemic. This first empirical study was framed by the existing literature on evidence- based mathematical curriculum and instructional approaches found to be successful in traditional secondary school settings. I then wrote a practitioner manuscript to address some of the barriers to instruction that were reported during the first study. The purpose of the practitioner manuscript was to provide feasible, research-based information to special education mathematics teachers and administrators in JCF about barriers to the delivery of instruction (Houchins, et al., 2009: Gagnon & Barber, 2010; Marchitello, & Korman, 2020). This included the mathematics curriculum approaches and instructional practices in preparation for any future health emergency. The practitioner manuscript was also placed in the context of the literature, including known current barriers to instruction in JCF prior to the COVID- 19 pandemic and challenges with the use of online instruction.

In this chapter I will summarize the findings of my research synthesis (Chapter II) and descriptive survey (Chapter III). I will also explain how the practical implications informed the practitioner manuscript (Chapter IV). I will conclude by discussing the implications for practitioners and exploring future research directions.

Research Synthesis

In the seven years since Steele et al. (2016) published their meta – analysis, only four academic or vocational intervention studies in JCF have been published. None of the four studies I reviewed used a mathematics intervention, thus I am unable to add to the evidence base for best practices specific for mathematics instruction, however, general findings of my reviewed studies did suggest that instructional practices found to be effective in non- JCF settings; explicit strategy instruction (Warnick & Caldarella 2016; Wexler et al., 2018) or computer assisted instruction (Steele et al., 2016) showed promise.

There were several limitations to my synthesis. The demographic information was varied across the reviewed studies making it difficult for practitioners to know if the reviewed study findings could apply to their students specifically. The lack of female participants was a significant difficulty that I discussed in the limitation section of chapter two. Also troubling, only half of the reviewed studies had measures of fidelity. This limitation makes it difficult for teachers in JCF to trust the study findings. On a positive note, one conclusion of my synthesis is that teachers in these settings should continue to look for guidance in evidence- based practices found to be effective outside of JCF. Educators in various settings can share expertise, research findings, and best practices, as well as some lessons that can be learned from teachers in JCF during the COVID-19 pandemic.

First empirical study – descriptive survey

Findings from my descriptive survey indicated that special education mathematics teachers in JCF reported difficulty providing instruction during the initial weeks of the COVID-19 pandemic. One of their primary concerns was they could not get into the facility and that their students were locked in their rooms. Their inability to enter the facility posed two difficulties: first, an inability to have face- to- face instruction with their students made it difficult to work on student IEP mathematics goals, an occasional facetime call was not a replacement for instruction), second, the inability to collaborate with other professionals meant parts of the educational process were changed.

The loss of both behavioral support and access to manipulatives impacted teachers' ability to provide mathematics instruction during the initial weeks of the COVID-19 pandemic. It is important for students to have all the support they may need for learning, but student behaviors can present obstacles. Results from the survey (Chapter III) indicated teachers felt students had trouble learning mathematics due to behavioral problems. Behavioral supports, that may have been in place before the pandemic started, were absent during online teaching and this was problematic. Ideally, teachers can learn ways to provide these same supports online in case a shift to online learning happens again in the future. Teachers also expressed a similar concern about the loss of manipulatives during pandemic lockdowns. Manipulatives were a needed part of their instruction. Calculators were used daily at times, and the loss of this instructional adaptation was troublesome for teachers.

It is likely that preparation for this type of health emergency had not been considered and many parts of instructing students with disabilities were altered. Several instructional context factors that functioned as barriers to instruction increased during COVID-19 (Chapter III)

making it more difficult to provide mathematics instruction to students with disabilities. Specifically, teachers found themselves providing less minutes of student contact than required by the state due to standing outside of the student's cells, and using assignments in work packets instead of actual instruction which cannot be a replacement for instruction (Gagnon & Ross Benedick, 2021).

More than anything else, restrictions on the internet were reported to be a problem for teachers in the survey (Chapter III) both prior to and during the initial weeks of the COVID-19 pandemic. These difficulties need to be overcome in order for teachers to have synchronous online instruction at their disposal in any future health emergency. Researchers can play a role in identifying internet controls that can satisfy the security requirements of each JCF facility to enlarge the number of facilities that will be able to move to online instruction. All of these concerns led to the writing of the practitioner manuscript (Chapter 4) as a means to assist teachers and other practitioners in JCF in a future health emergency.

Practitioner manuscript

The need for proactive planning was a potent theme throughout the tips I provided in the practitioner paper because special education mathematics teachers need the ability to collaborate and plan. First, teachers need professional development to prepare to teach online. Access to and experience with virtual manipulatives, before a shift to online learning, will help teachers meet the individual needs of their students. Additionally, the use of facility specific models for practitioner collaboration and provision of online behavioral supports are strong suggestions for any future health emergency.

In this paper I presented each tip along with a target audience and a timing for which the tip may be beneficial for special education mathematics teachers and others such as administrators or behavioral support personnel. In order to meet all the requirements of IDEA for mathematics students in JCF during any future health emergency, special education mathematics teachers need adequate resources and training. Behavioral support personnel can also prepare to switch to online instruction as their role in supporting students can also assist with mathematics education. Administrators and others working in these settings may also benefit from the suggestions I presented in this paper (Chapter IV) by way of understanding the importance of providing, facilitating, and prioritizing these resources.

Implications for Practitioners

The findings from the synthesis (Chapter II) suggest some important next steps for teachers in JCF. The tips presented in the practitioner manuscript (Chapter IV) lend themselves to additional thoughts on future suggestions for practitioners as well as those specific to the findings of the survey (Chapter III) presented in earlier chapters.

- Teachers in JCF, particularly those teaching mathematics to students with disabilities, should continue to follow the guidance provided in the earlier research (Maccini & Gagnon, 2006; Myers, 2015) regarding selecting best instructional practices. This is important due to the lack of recent academic research in JCF (Hunter et al., 2022).
- Teachers should undergo professional development to assist them in interprofessional collaboration (Pfeiffer et.al., 2019). Teachers indicated concerns in the survey that they could not talk to one another once the lock downs started due to the COVID-19 pandemic. Assisting teachers in setting up modes of communications before any future health emergency is highly recommended.

- Teachers in JCF would benefit from the location of online materials such as virtual manipulatives (National Library of Virtual Manipulatives (usu.edu). Teachers noted in the survey the loss of manipulatives when teaching mathematics during the initial days of the COVID-19 pandemic. As this loss impacted teachers' ability to teach mathematics, it is very important teachers are not caught off guard in any future health emergency.
- Mathematics teachers, specifically those teaching students with disabilities, could benefit from assistance given by behavioral support personnel in JCF during any future health emergency. It is important for practitioners in JCF to consider using online behavioral support models that are prepared prior to any future health emergency. professional development may assist in the development of such models.
- Teachers and students will want to maintain physical safety during any future health emergency while maximizing the amount of face-to-face instructional time and minimizing student isolation. It is recommended that practitioners become familiar with the use of CDC guidelines, specifically those for youth in settings such as JCF https://tinyurl.com/4auj4pcz.

Future Research

This dissertation contains several findings that can be addressed in future research. The lack of mathematics intervention research (Chapter II) is indicative of the need for researchers to undertake mathematics intervention studies in JCF. This is not a simple suggestion as security concerns in JCF have made it difficult for intervention researchers (Wexler et al., 2018) but nonetheless needs to occur. Researchers planning any future math intervention studies can better understand the possibility that instruction may need to move to an online format. The lack of teacher preparation to do so, reported in the findings of the survey (Chapter III), provides

incentive for future researchers to consider ways to successfully provide online instruction (OJJDP, 2021). This is particularly important as research has shown that a different type of teaching is needed for online instruction in comparison to face to face learning (Rice, 2022). Selections of survey respondents that could be explored further include the infrequent choices between local or state math curriculum and notation of the loss of manipulatives to be used in instruction at the onset of the COVID-19 pandemic (Chapter III). Understanding why these selections were made can be a trove for future research and direct it towards the implementation of successful professional development as well as increasing the availability and usage of useful online materials.

Restrictions on the internet was reported by teachers as the most frequent barrier to instruction. This inadequacy provides several possibilities for future research. Identification of appropriate internet controls to facilitate online instruction is one topic. This could increase the number of JCF facilities that are able to provide synchronous instruction. Methods to ensure that any pre-recorded mathematics material meets local and state curriculum requirements provides another avenue for researchers. All facets of the implementation of online instruction require planning that researchers could investigate such as the best use of resources like manpower and technology. Finally, the actual location and purchase of technology such as tablets for student use could be facilitated by future researchers.

Regarding future research questions stemming from this dissertation, the results of the descriptive study (Chapter III) did not provide an understanding behind some of the educational choices made by the teachers that responded to the survey. Future research could delve deeper into what types of assistance via professional development could be utilized for both math curriculum choices or for location and use of materials for instructional adaptations. For

example, one possible future research question could ask: What types of professional development do special education math teachers in JCF feel would best help them in the selection of math curriculum, specifically the successful use of local or state approved curriculum? Another future research question could regard the use of instructional adaptations as such: What types of professional development do special education math teachers in JCF feel would best help them in the location and use of online instructional adaptations, such as virtual manipulatives?

Conclusion

The intent of this dissertation is to provide information about one aspect of the experience youth have while in JCF, their mathematics education, in the hopes of strengthening this part of their experience. In general, there is a lack of studies focused on mathematics curriculum for struggling students (Forbringer & Fuchs, 2014). Youth in JCF often function below their grade level peers and have more mathematics deficiencies (Gagnon & Barber, 2010). It is important that the education received while in JCF schools aims, not just to address any mathematics deficits (Griller Clark et al., 2016), but also to work towards all aspects of a successful transition out of JCFs. Transition planning should begin while in JCF for youth with disabilities and should reach beyond successful reentry into the local public schools to include career and vocational preparation accomplished in a culturally appropriate way intended to help youth succeed in various aspects of their lives once they leave JCF (Griller Clark et al., 2016).

The chapters in this dissertation drive home what has already been described for youth in JCF: there is insufficient research for both those studying, and practicing within these facilities (Gagnon et al., 2022). The synthesis (chapter II) identifies a complete lack of mathematics intervention studies within JCFs consistent with previous research (Hunter et al., 2022) as well as

an insufficient number of students with disabilities within the studies that have taken place. The first empirical study (chapter III) provides updated information regarding the mathematics curriculum and instructional adaptations for those students with special needs, however, it represents a time period during which a pandemic resulted in numerous alterations of teaching in this country. More research is needed to understand how JCF mathematics teachers exited the pandemic and with new mathematics instructional skills they did so. Practitioners need to be more prepared for the next time a pandemic results in facility lockdown. The second paper within this dissertation (Chapter IV) is an attempt to facilitate that readiness. Professional development and professional collaboration both need to play a role moving forward for those working inside JCF.

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