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An Examination Of The Relationship Between Instructional Modality And Pedagogy Licensure Exam Scores In Post-Baccalaureate Educator Preparation Programs in Indiana

Kelly Eckel

EXAMINING THE RELATIONSHIP BETWEEN INSTRUCTIONAL MODALITY AND PEDAGOGY LICENSURE EXAM SCORES IN POST-BACCALAUREATE EDUCATOR PREPRATION PROGRAMS IN INDIANA

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Abstract

The efficacy of the modality of instruction employed in higher education institutions has been a point of contention among students, faculty, administration, and other stakeholders in the educational realm. Since the COVID-19 pandemic, online and hybrid instruction has become a valued and desirable option for Educator Preparation Programs (EPPs) to offer for recruitment and retention purposes. The effectiveness of varying modalities in relation to teacher licensure exams has been limited in research and can serve as a critical quantitative measure for EPPs to assess. This longitudinal study examined the relationship between instructional modality and pedagogy teacher licensure exam scores in 18 EPPs across the State of Indiana as reported by the Indiana Department of Education over a four-year cycle in three grade bands (K-6, 5-12, and P-12). Data findings report hybrid models of instruction were superior in relaying pedagogical knowledge as evidenced in licensure exam results during pre-and post-pandemic years. Online and on-ground instruction were similar in scoring averages with trends evident among years and grade bands of pedagogy exams analyzed. EPPs must continue to monitor correlations between modality of instruction and licensure exam scores to ensure future educators are equipped to meet the unique and altering pedagogical challenges teachers face in the classroom.

Keywords: modality of instruction, instructional efficacy, online instruction, hybrid instruction, on-ground instruction, teacher licensure exams, educator preparation program (EPP), pedagogy training

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To all the women that came before me and will come after, your contributions to research and academia are treasured and of extreme value to the future of education. Also, to all teachers across the globe that dedicate their professional lives to better the lives of children and the personal sacrifices that ultimately come with the profession of teaching.

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CHAPTER ONE

Introduction

The field of education is constantly evolving, with educators and researchers continually seeking to identify effective instructional modalities, strategies, and curricula that enhance student learning outcomes. While enrollment in higher education institutions has been declining since the pandemic, institutions are eager to meet the needs of students to witness overall growth and ensure faculty retention (Camera, 2022). As a result of the pandemic in 2020, the United States has experienced a labor shortage and a decrease in higher education retention and enrollment which has many educational institutions in a crisis mode as they rapidly search for guaranteed sustainable long-term student enrollment (Powell, et al., 2023). Educator Preparation Programs (EPPs) in higher education institutions are no exception to this trend, as evidenced in the teacher shortage across the country. In a recent longitudinal study of a nationally representative cohort (National Center for Education Statistics, 2023), teacher turnover, as measured annually by the combined percentage of "movers" and "leavers," after five years was 46 percent (29 percent of teachers moved schools or districts and 17 percent stopped teaching).

To meet the teacher shortage the United States is currently facing, higher education institutions must convince prospective students that teaching is still a viable and rewarding profession and career, even when receiving negative attention across the country. For teacher preparation programs to be effective at retaining pre-service teachers, instructional approaches need to be tailored to meet the needs of a new generation and non-traditional students alike. Although preferences of students and faculty should play a role in deciding the modality of instruction, there is accountability that lies in determining the effectiveness of varying modalities upon completion of programs. In particular, the effectiveness of instructional delivery in

preparation for high-stakes examinations, such as licensing exams, has garnered significant attention in higher education communities. Licensing exams serve as critical assessments for professionals in various fields, ensuring that individuals possess the necessary knowledge and skills to practice their respective professions safely and competently. The professions that rely on high-stakes licensure exams range from medicine to law to accounting to education, but the purpose remains the same; to ensure consistency in the quality of the candidate and knowledge in the subject area being assessed.

Pre-service teacher licensure exams contribute to maintaining high standards in the teaching profession through a quality assurance system which is monitored by Departments of Education and through accreditation processes. By establishing a benchmark for competence, licensing exams help ensure only qualified individuals enter the field of education, thereby enhancing the overall quality of teaching. The role of one type of licensure exam, pedagogical knowledge assessments, are to ensure individuals entering the teaching profession are well-equipped to provide high-quality education and contribute to positive learning outcomes for students based on pedagogical competencies. In addition to licensure exam accountability monitored by state entities, the Title II of the Higher Education Act evaluates the academic preparation of teachers across grade levels and subjects through reviewing and analyzing multiple layers of data (Indiana Department of Education, 2023). The Indiana Department of Education also requires every Educator Preparation Program (EPP) to undergo a state review process every three years, which is a common practice among state Departments of Education. During this process, a review of licensure exam scores and trends are examined by appointed individuals to ensure compliance with state and federal mandates and legislation. Finally, all EPPs are required to obtain regional and national accreditation via a detailed and thorough

review of teacher preparation programs housed within an institution. In Indiana, these layered checks and balances provide a quality assurance process in which exam scores are monitored by the state, institutions, accreditors, and federal entities.

Problem Statement

Higher education institutions and Educator Preparation Programs (EPPs) are now competing to retain students and they must find methods to recruit pre-service teachers while remaining accountable to learning outcomes, standards, accreditation, and state requirements. While the effectiveness of EPP instructional modality has been explored in various educational contexts, limited research has examined its impact specifically on the relationship to pedagogical teacher licensing exam test scores. Understanding the relationship between the EPP modality of instruction and licensing exam outcomes is crucial for both educators and policymakers, as it can inform instructional practices and help to improve the preparation of pre-service teachers for the high-stakes assessments. Online instruction has been on the increase for decades and it is essential to ensure this form of modality is effective in preparing graduates for the workforce, particularly future educators in the K-12 schools systems. A survey of nearly 1,000 faculty members by Educause in the spring of 2023 found that only 53 percent preferred to teach a typical course completely on site (McMurtrie, 2023). In turn, when asked which course modality they preferred, only 31 percent of students chose face-to-face courses, according to a spring 2023 survey by Tyton Partners and others (McMurtrie, 2023). The desire for an increase in online learning is present in institutions across the country and advantages and/or disadvantages of modality of instruction needs to be addressed by higher education institutions. Unfortunately, there is a plethora of contradictory research indicating which modalities are more advantageous for students (Reeves & Lin, 2021).

Purpose of Study

Educator Preparation Programs (EPPs) are charged with preparing pre-service teachers to become effective educators once in the field after graduation and employed. EPPs aim to enhance their students' critical thinking, problem-solving abilities, and application of pedagogical knowledge, in addition to content knowledge on core subjects. The concept of teaching simultaneously in more than one delivery modality is not new, although recent events have caused a resurgence of interest in the topic (McMurtrie, 2020). The need to provide options for students who are unable to attend in-person courses has long driven innovation in course delivery, hence the increase in online programs at post-baccalaureate levels in EPPs.

All licensed teachers in Indiana are required to take one pedagogy licensing exam score in one of four grade bands (P-3, K-6, 5-12, or P-12) to be granted a valid initial teaching license by the Indiana Department of Education. When considering exam scores, it appears vital to ensure EPPs are educating future teachers to be effective in the classroom and exhibit dispositional attributes necessary to the successful art of teaching. In accordance with best practices of learner centered instruction, it appears students benefit from flexibility and choice in how, where and when they learn (Cornelius-White & Harbaugh, 2009). This study examined if the modality of instruction (online, on-ground, or hybrid instruction) significantly predict pedagogy licensing exam scores of institutional completers in three grade bands over a four-year cycle in post-baccalaureate teacher preparation programs in Indiana.

Importance of Study

This research holds several implications for the field of education, particularly in the context of professional licensure examinations and effectiveness of modality of instruction. The findings of this study will contribute to the existing body of literature on instructional modalities

and the corresponding impact on high-stakes assessments. This study's findings can inform instructional practices, curriculum development, and pedagogical strategies for teacher preparation programs to enact to graduate qualified teachers who exhibit effective classroom management skills in addition to content area knowledge. Educators can tailor their instructional methods to incorporate elements of strategies integral to student success while fostering active learning and critical thinking skills in their students. Policymakers can use the study's outcomes to inform decisions relating to licensing exam requirements and standards, ensuring assessments accurately measure the necessary competencies required for professional practice.

Understanding modality effectiveness may provide useful information in designing courses to meet students' needs with the increase in return to traditional on-campus classes, as well as equip educators with necessary information to plan for a rapid change to online learning should a future need arise again (Watson, et al., 2023). By understanding weakness and strengths of learning modalities, teacher preparation programs can adapt and reframe curriculum to meet the needs of students and faculty. Ferri et al. (2020) purported that the need for remote teaching during the COVID-19 pandemic opened new opportunities for educational institutions to develop new methodologies and pedagogical approaches as well as to develop technology specifically designed for online teaching and learning.

If one modality is shown to correlate with higher pedagogy licensing exam scores that are statistically significant, the results will provide a basis for EPPs in Indiana to review licensing exam score data on a deeper level to determine where gaps in instruction may be present. Knowledge is the key to improvement so acknowledging barriers that modalities may present in relation to instructional strategies and content knowledge can provide a source for change and potential improvement. Ultimately, the goal of this study is to present accurate data for EPPs to

identify potential imparities in pedagogical preparation based on modality of instruction to pre-service teachers reported through licensure exam scores.

Theoretical Framework

The theoretical framework seeks to explore the nuanced relationship between teacher licensure exams and the diverse teaching modalities being utilized in Educator Preparation Programs (EPPs) across the state of Indiana. Teacher licensure exams serve as a gatekeeping mechanism to ensure graduates possess the necessary knowledge and skills to be effective in the classroom. Drawing on the work of Darling-Hammond (2000) and Cochran-Smith and Zeichner (2005), teacher licensure exams are conceptualized as assessments designed to measure candidates' content knowledge, pedagogical skills, and ability to apply these skills in real-world teaching scenarios. The exams aim to ensure a baseline proficiency level and readiness for the challenges in the teaching profession and are assumed to serve as indicators of fundamental teaching competencies necessary for effective classroom instruction.

As education evolved with the integration of online and hybrid teaching modalities, it is crucial to explore the relationship between performance on licensure exams and the ability to adapt to and excel in diverse teaching environments. Teaching modalities encompass a spectrum of instructional approaches, including traditional face-to-face instruction, blended learning, and fully online instruction (Means et al., 2010). Each modality presents unique demands on pre-service teachers and faculty alike, requiring adaptability, technological proficiency, and a potential for nuanced understanding of student engagement and classroom management techniques. Instructional modalities are typically categorized into traditional on-ground classes, hybrid classes, and online classes. On-ground classes represent the traditional face-to-face classroom setting, while online classes involve instruction delivered through digital platforms,

requiring unique pedagogical strategies and technological proficiency (Means et al., 2010). Finally, hybrid instruction employs both on-ground and online modalities.

Theory of Transfer

Under the umbrella of the Theory of Transfer, Theory of Identical Elements Learning Transfer has become a significant research topic in educational psychology since Thorndike and Woodworth developed the theory of identical elements in 1901 (Singley & Anderson, 1989). According to this theory, learning can be transferred from one activity to enhance training and performance if the two activities are highly similar and share many common elements (Hajian, 2019). Teachers who score higher on licensure exams are more likely to demonstrate effective pedagogical transferability, applying foundational teaching skills across different instructional modalities, including both online and on-ground classes (Darling-Hammond, 2000). One of the primary goals of education is to ensure that learners can apply their acquired knowledge in various ways and under different circumstances, however, this expected "transfer" does not always occur and, therefore, the acquired knowledge cannot be flexibly employed in different contexts (Hajian, 2019). Hajian found one way to minimize this problem is to understand how transfer occurs and what learning conditions can improve this process. Hajian found that transfer was a multi-dimensional process that could occur at any stage of learning and could be enhanced through coaching, scaffolding, interacting, assessing and reflecting in situated learning environments. EPPs must optimize knowledge acquisition and transfer to prepare highly qualified teachers into enter into the workforce.

Situated Learning Theory

Although some of the major transfer theories developed simultaneously, it was the theory of "situated learning" (Lave, 1988) that integrated most of the separate branches of investigation

into a more complete theory of learning and transfer. In this view, learning and cognition are situated and developed through purposeful authentic activities in social contexts. Therefore, learning and transfer occur when learners are given an opportunity to "observe and practice in situ" (Brown et al., 1989, p.34). This theory is founded on the principle that knowledge is constructed if the learner becomes an active participant of a connected community in which knowledge and culture are integrated. In an online or hybrid learning community, being an active participant can be challenging due to restrictions in communication practices and the lack of synchronous learning opportunities among peers in the virtual classroom.

Student Outcomes

Ingersoll & Strong (2011) found there was a positive correlation between teacher licensure exam performance and student outcomes in both online and on-ground classes, suggesting that teachers with strong licensure exam scores contribute to positive student learning experiences and academic achievement once in the classroom. The curricula in EPPs may cover skills needed for the teacher candidates to improve student achievement, but the candidates may be unable to put those skills into practice after they graduate and reach the classrooms as teachers. Abbott (1988) suggests that expert labor involves three interrelated abilities: (1) the ability to diagnose or assess a situation; (2) the ability to infer and reason, using specialized knowledge, about a problem; and (3) the ability to effectively treat a diagnosed problem. Effectiveness in all three abilities will allow a profession to maintain its professional jurisdiction (Tomasik, 2022).

It seems reasonable to attempt to assess uptake of the skills that are learning objectives for institutional coursework as a means of measuring the quality of the instruction in the EPP, including the clinical experiences, as recommended by Diez (2010). However, in a study

conducted by Wenzel, Hovey, and Ittner (2023), they found teacher participants stated that pedagogical knowledge - planning, teaching, assessing - gained from their EPP is translating into classroom practice in varying degrees based on the teacher and their classroom environment. According to Darling-Hammond (2000), no consistent relationship has been established between scores indicating subject knowledge on the National Teacher Examinations (NTE) and teacher performance as measured by students' outcomes. Additionally, Wasley and McDiarmid (2004) added that the attempt to link standardized tests to student achievement and teacher accomplishment is problematic because tests of teacher knowledge cannot determine high quality teaching will equate to higher achievement in students' scores.

Research Question and Research Design

The following research questions will be addressed in this study: the main question examines the relationship between instruction modality and pedagogy licensing exam scores in post-baccalaureate educator preparation programs over a four-year cycle while the sub-question examines the relationship between modality of instruction and exam scores across grade bands in pedagogy licensing exams.

A quantitative research methodology was used to determine if there were statistically significant differences in licensure exam score averages associated with one or more of the three learning modalities (online, on-ground, and hybrid) currently employed in post-baccalaureate programs by Educator Preparation Programs (EPPs) in Indiana. Additionally, the data was analyzed to determine if a correlation was more prevalent among any of the three pedagogy grade band teacher licensure exams (K-6, 5-12, and P-12) over the four-year cycle and within specific years. More information on the research design is provided in Chapter 3 of this dissertation.

The study examines four academic years of Pearson pedagogy licensure exam scores and pass rate data made publicly available by the Indiana Department of Education through mandated federal and state accountability reporting and systems. Baccalaureate programs were excluded from the study due to all but one program in Indiana during the time frame being on-ground. Post-baccalaureate programs (master's degree and transition to teaching programs) were varied in the modality of instruction therefore an analysis was performed on these programs exclusively, as opposed to inclusion of baccalaureate programs. Aggregated average scores for each of the three licensure exams was assigned to the corresponding Indiana EPP and further disaggregated by the learning modality employed by the EPP (on-ground, online, or hybrid). The analysis includes quantitative comparisons of average licensing exams scores to determine if trends were present among EPPs that utilize the same modality of instruction or if the data presents clear links to grade band performance on the pedagogy licensing exams. Additionally, by reviewing four years of testing data, the researcher determined if any particular EPP instructional modality or exam grade band was showing improvement in scoring over the four-year cycle. The study also compared EPP average scores to the State of Indiana average scores for each exam and years examined. If sufficient data was not present ($n<10$) by an EPP in Indiana during the time frame and therefore not available to the researcher, the EPP was excluded from the study to ensure measures of consistency and accuracy relating to reliability and validity.

Limitations

It is important to acknowledge the limitations of this study. The findings may be influenced by various factors, such as sample size, participant characteristics, and the specific context in which the study was conducted. Additionally, the study's generalizability is limited to

the specific professional field of education and knowledge assessed on the pedagogy licensure exam content. Data analyzed in this study is primarily composed of pre-COVID-19 licensure scores, with the exception of 2020-2021 data. All participants in the study were attending institutions located in Indiana with exam scores specific to Pearson assessments, which are no longer utilized in Indiana since September 2021. This study does not examine the relation of licensure exam score results relative to K-12 student growth once the graduate is employed in a school system, which may be a stronger predictor of institutional effectiveness in preparing students in pedagogical practices and content. Considering, a REL Northwest report found that teaching exams are not strong predictors of teaching effectiveness, and there is little evidence that testing translates to better teachers overall, some believe the evidence for the predictive value of teacher certification exams is mixed at best (RSS, 2021).

Overview

This dissertation is inclusive of five chapters. Chapter One discusses problem and importance of the study at hand, as well as the limitations the study. Chapter Two reviews the related literature on Educator Preparation Programs, modalities of instruction, and licensure exams. The literature review includes analysis on online, on-ground, and hybrid modalities in addition to prior comparisons of the modalities on teacher preparation outcomes, including licensure exam scores, in research. Literature is also presented on the importance and role of accreditation on EPPs in Indiana. Licensure exam design and interpretation is addressed in this chapter as well. Chapter Three contains explanation of the research question including the conceptual framework. An explanation of the independent and dependent variables is presented. Data sources, participants, and research design are explained in this chapter to guide the remainder of the dissertation.

CHAPTER TWO

Literature Review

Post-Baccalaureate Educator Preparation Programs

Educator Preparation Programs (EPPs) play a critical role in preparing future teachers to enter the workforce by shaping their pedagogical knowledge, classroom management skills, and content knowledge. The national teacher shortage is forcing teacher preparation programs in the United States to review program types, structures, curricula, and requirements to guide EPPs to create a pipeline to K-12 schools in desperate need of qualified teachers (U.S. Dept. of Education Fact Sheet, n.d.). To address the teacher shortage by recruiting and educating future teachers, it is imperative EPPs have measures to determine the efficacy of the programs through multiple means of assessment and measurements. EPPs in Indiana can be characterized by the modality in which instruction is delivered: on-ground, online, or hybrid.

Characteristics

During the years examined, Indiana was home to 38 educator preparation programs, in which the majority have a brick-and-mortar corresponding location within a higher education institution within the state. Educator Preparation Programs (EPPs) generally include coursework covering a range of topics, such as educational psychology, learning theories, instructional strategies, assessment, and classroom management (Darling-Hammond et al., 2005). Universities are committed to ensuring a high-quality education for all teacher candidates through accreditation and state oversight, and a key component of the overall mission is the preparation of effective teachers through licensure track preparation programs. The undergraduate and post-baccalaureate programs often require content-specific coursework in the subject area(s) candidates plan to teach and a wide array of knowledge, based in strong pedagogical practices. In

the case of an elementary generalist, students are trained in a variety of subject areas due to the grade band in which they will be licensed (kindergarten through sixth grade) can be inclusive of tremendously varying levels of expectations. Field experiences, including classroom observations and student teaching placements, are a critical component of educator preparation programs. These experiences allow pre-service teachers to apply the knowledge and skills they have gained through coursework in real-world classroom settings and preparing them for licensing requirements (AACTE, 2017). Indiana EPPs are required to align their curriculum with the state's content and developmental standards, accreditors, as well as the Interstate Teacher Assessment and Support Consortium (InTASC) Model Core Teaching Standards (Indiana Department of Education, n.d.). According to Carroll (2007), many new teachers leave the profession because the teaching practices they have been taught are reflective of the past. He asserted that, "Schools of education and the colleges and universities that host them are under increasing criticism for the gaps between their teacher preparation programs and the needs of today's schools. These gaps have significant consequences for teaching quality and K-12 student achievement (p. 52)." As the field of education continues to evolve, it is essential for universities to stay current on best practices and innovative approaches to effectively train future educators (Cochran-Smith & Zeichner, 2005). Research has shown that incorporating evidence-based practices in teacher education programs leads to improved teacher effectiveness and student outcomes (Darling-Hammond, 2017). Universities must stay abreast of current research findings and best practices to ensure their graduates are equipped with the latest knowledge and skills (Ball & Forzani, 2009). Innovation in teacher education programs involves the integration of emerging technologies, creative pedagogies, and interdisciplinary approaches (Wang, Moore, Roehrig & Park, 2011). Incorporating digital resources, such as online learning platforms and

virtual simulations, can enhance teacher preparation (Sandholtz, Ringstaff, & Dwyer, 2010). Programs that promote critical thinking, problem-solving, and collaboration can better prepare teachers for the demands of the 21st-century classroom (Ingersoll & Strong, 2011).

Traditional EPPs are typically housed within public or private universities and completion of a program involves a combination of coursework and field experiences, culminating in a student teaching placement and licensure (Darling-Hammond et al., 2005). These programs typically lead to a bachelor's or master's degree in education and may have varying entrance requirements, such as a minimum GPA or standardized test scores that are clearly defined during the application process. Alternative certification programs offer a non-traditional route to teacher certification for individuals who already hold a bachelor's degree in a field other than education (Feistritzer, 2011). Transition to Teaching programs across the state and the American Board for the Certification of Teacher Excellence (ABCTE) program are examples of alternative routes that prepare career-changers and those with subject-area expertise for teaching in Indiana (Indiana Department of Education, n.d.). Alternative programs are often characterized by accelerated coursework and may be delivered through online, on-ground, or hybrid formats, and typically place an emphasis on practical, in-classroom experiences. Participants in alternative programs in Indiana typically obtain an emergency teaching license and work under the supervision of a cooperating teacher or act as the teacher of record concurrently while completing a teacher preparation program (IDOE, n.d.). Upon completion of a program, such as a master’s degree or transition to teaching program, candidates must pass state licensure exams, which typically include assessments of content knowledge and pedagogical skills to obtain their teaching certification (Darling-Hammond et al., 2005). The process of content delivery and a supervised student teaching placement has remained fairly

consistent over decades with little to no deviation from past practices.

Field Experiences

Field experiences and mandatory classroom observations are integral components of EPPs by providing opportunities for pre-service teachers to apply their knowledge and skills in real-world settings. Bullough and Gitlin (2013) studied secondary teacher certification programs at Boston College utilizing a cohort model of about 25 students for an entire academic year. During the academic year, students were responsible for curriculum, general-method courses, and practice or student teaching field experiences. The cohort students were also enrolled in a weekly, two-hour seminar that provided a setting for posing questions about practice and theory for considering courses of action for issues they faced in field experiences. They found experiential learning opportunities, such as student teaching field experiences offer numerous benefits, enabling aspiring teachers to bridge the gap between theory and practice and develop essential teaching skills (Bullough & Gitlin, 2013). At the Massachusetts Institute of Technology, Schon (1987) introduced the concepts relating to reflective practice, such as reflection-on-action and reflection-in-action which explain how professionals meet the challenges of their work with a kind of improvisation that is improved through practice. In 1983, Schon explained reflective practice as the ability to reflect on one's actions so as to take a critical stance or attitude towards one's own practice and that of one's peers, engaging in a process of continuous adaptation and learning. In his book, Schon examined the thinking, talking, and interacting processes through a series of case studies including primary and secondary educators in the classroom. He found student teaching and field observations promote reflective practice, allowing pre-service teachers to critically analyze their teaching practices, reflect on their strengths and weaknesses, and make improvements (Schon, 1987). The National Center for

Research on Teacher Education in the Michigan State University College of Education conducted research on socialization theories and reviewed teacher socialization literature and found these field experiences contribute to the development of a professional identity, shaping pre-service teachers' understanding of their roles and responsibilities within the teaching profession (Zeichner & Gore, 1990). They examined influences on teacher socialization (a) prior to formal teacher education, (b) during preservice teacher education, and (c) during the in-service years of teaching. They found socialization of pre-service teachers is critical to teacher retention, particularly in low socio-economic and urban school districts. Field experiences provide the opportunity for socialization and allow pre-service teachers to integrate both theory and practice to better accommodate student needs. Cruickshank (2022) conducted an online survey (n=954) and interviews (n=62) exploring professional strengths, needs and experiences of teachers at the University of Sydney in Australia. The study focused on internationally trained teachers in Australia and examined the impact of experiential learning. He found student teaching and field observations encourage lifelong learning and ongoing professional growth, fostering a commitment to continuous improvement (Cruickshank, 2022). In their book, Cochran-Smith & Zeichner (2005) utilized data from the American Educational Research Association to examine issues in teacher education and teacher quality in the United States. Research was compiled from educator preparation programs and from practicing teachers with literature reviews ranging from the topics of accountability processes to pedagogical approaches to research on methods courses and field experiences. They found clear expectations, guidelines, and evaluation criteria for student teaching are essential for effective implementation (Cochran-Smith & Zeichner, 2005). Additionally, adequate support and supervision from experienced educators help pre-service

teachers navigate challenges, provide constructive feedback, and ensure a valuable learning experience.

Accreditation and Accountability

Indiana Educator Preparation Programs (EPPs) are expected to meet high standards of excellence and rigor through regular reviews and annual reporting to the Indiana Department of Education (n.d.) to ensure EPPs are providing high quality education and preparation for future Indiana educators. All programs within an EPP leading to licensure are required to be reviewed as part of the state and national accreditation processes. Reviews are conducted via the Specialized Professional Association (SPA) review process, state review process, Council for the Accreditation of Educator Preparation (CAEP), and/or the Association for Advancing Quality in Educator Preparation (AAQEP) Program Performance Review. The data in this study originated prior to the inclusion of AAQEP as an accreditor in the state of Indiana, therefore considerations regarding this association will not be discussed.

State of Indiana Reviews, as well as Specialized Professional Association (SPA) reviews, are utilized by EPPs to maintain programmatic integrity externally and provide data to guide improvement in their teacher education programs (IDOE, n.d.). These reviews are in addition to the mandatory national accreditation requirement through CAEP or AAQEP and one option is compulsory for EPPs to complete in conjunction with national and Higher Learning Commission (HLC) regional accreditation (IDOE, n.d.). In addition to national accreditation, SPA reviews, and state reviews, Indiana EPPs are required to complete and submit three annual reports (Title II, HEA 1388, and CAEP Annual) reviewed, and two compiled by the IDOE, and posted to EPP websites for public viewing and accountability purposes (University of Saint Francis, 2023).

Council for the Accreditation of Educator Preparation

In the United States, EPPs must be nationally accredited by a recognized accrediting body, such as the Council for the Accreditation of Educator Preparation (CAEP), to ensure that they meet established standards for program quality and effectiveness to advance equity and excellence in EPPs through evidence based continuous improvement to strengthen P-12 student learning (CAEP, 2020). CAEP (2020) implores six strategic goals to meet the increasing demand for quality instruction: Continuous Improvement; Quality Assurance; Credibility; Diversity, Equity and Inclusion; Strong Foundation; and Innovation. CAEP (2020) reviews EPPs in Indiana every seven years through an intense evaluation process to ensure adherence to applicable standards, which include (1) content and pedagogical knowledge, (2) clinical partnerships and practice, (3) candidate recruitment, progression, and support, (4) program impact, and (5) quality assurance systems. The review process consists of a Self-Study Report and a Site Visit (either on ground or virtually) in which areas for improvement, stipulations, or probationary periods are identified. Potential repercussions and adverse actions for not meeting initial or advanced standards can result in closure or dissolution of education licensure programs (CAEP, 2020). CAEP states peer reviewers, program evaluators, and volunteer governance representatives allow for accountability among EPPs and provide avenues for innovative ideas and practices to be shared between institutions across Indiana and the country. Accreditation attempts to assure EPPs are implementing best practices in the classroom and modifying curriculum appropriately to meet the needs of P-12 schools.

State of Indiana Reviews

The state of Indiana conducts program reviews for purposes of state approval and to inform national accreditation (Indiana Department of Education (IDOE), n.d.). Upon an EPP's

completion of a state review report, trained reviewers are selected and assigned within appropriate content areas to make recommendations for further action and/or approval on the EPPs ability to meet standards for licensure/certificate program approval (IDOE, n.d.). The IDOE (n.d.) has the authority to review instructional content area programs, initial licensure/post-baccalaureate programs, alternative route to special education licensure programs, school administration programs, and school services programs. State reviews are conducted every three years through an ongoing process of data collection and annual reporting requirements (IDOE, n.d.). Title II, HEA 1388, and CAEP Annual reports are reviewed annually by the IDOE for accountability purposes and displayed on EPP websites for transparency in licensure scores, enrollment, admissions practices, and other measures critical to quality teacher education programs (University of Saint Francis, 2023). EPPs are required by statute to provide accurate licensure score data in collaboration with testing companies that report scores to the state and institutions.

Specialized Professional Association Reviews

Specialty programs reviews can be utilized in replacing the state review process (IDOE, n.d.). The IDOE states the goal of the specialized professional association (SPA) review process is to align specialty licensure area data with national standards developed by SPAs to receive national recognition at the program level. Specialty programs, such a special education programs, gifted and talented programs, math or social studies specific programs, or school services programs (counselors and psychologists) can utilize this option or may be required by national or state accreditation to obtain SPA approval (CAEP, 2020). Licensure exam testing data, including pass rates, and internal assessment measures are reviewed by the SPA to verify candidates have a strong foundation of content and pedagogical knowledge in relation to the

specialty area (CAEP, 2020). There are currently 16 active SPA options for programs to align their EPP curriculum and corresponding assessments to the required standards for each association (CAEP, 2020). Standards and submission forms for each SPA are available for EPP review and alignment on the corresponding website.

Modalities of Instruction

The modality of instruction in post-baccalaureate educator preparation programs can play a significant role in preparing aspiring teachers for program completion and successful passage of licensure exams. Various instructional modalities, such as face-to-face, online, and hybrid (blended), provide future teachers with options on how to gain the necessary knowledge and experience to successfully complete traditional or alternative programs and ultimately become a licensed teacher in Indiana.

On-Ground (Face-to-Face) Instruction

On-ground instruction has been the traditional modality for educator preparation programs, offering the benefits of direct interaction between instructors and students, as well as opportunities for collaborative learning (Allen & Seaman, 2013). In 1999, John Hattie reported a synthesis of over 500 meta-analyses, involving 450,000 effect sizes from 180,000 studies, representing approximately 20 to 30 million students, on various influences on student achievement. His analysis included more than 100 factors influencing educational achievement and covered various aspects of those typically. In a research analysis, Hattie found face-to-face instruction allows for real-time interaction between instructors and students, enabling immediate feedback and clarification of concepts (Hattie & Timperley, 2007). Hattie's study also suggests that difficult items are more likely to involve greater degrees of processing about the task, and

delayed feedback provides the opportunity to do this, whereas easy items do not require this processing and so delay is both unnecessary and undesirable. On-ground instruction provides an option for immediate feedback whereas online instruction, which tends to be asynchronous in nature, therefore delaying feedback at the instructor's discretion. Furthermore, Borich (2016) found direct interaction can contribute to a deeper understanding of course material, as students can ask questions and receive personalized guidance from their instructors. Borich compiled years of research and observations of effective teaching practices in actual classrooms that includes the challenges educators face when instituting online instruction and asynchronous learning. His work reinforces that face-to-face instruction facilitates social learning and collaboration among students, as they engage in group activities, discussions, and problem-solving tasks.

In a study by Ginns and Ellis (2007), the authors analyzed responses from 127 students from years three- and four of a five-year undergraduate degree from a metropolitan university in Australia. Sixty-one students came from the third-year course, and sixty-six students were from the fourth year course. Students who consented to take part in the study filled out two paper-based questionnaires, the 32-item e-Learning Experience Questionnaire, and the 20-item Study Process Questionnaire. The data revealed the majority of students disagreed that the teaching in an e-Learning context was supportive of learning and respondents did not tend to find other students' on-line submissions overly helpful in clarifying and extending their own ideas, and that other students' postings did not appear to be especially intrinsically motivating. The research showed students preferred face-to-face learning and rated that mode of instruction as the highest for overall satisfaction of quality of education.

One of the most common ways to measure the effectiveness of traditional face-to-face learning is through student achievement, typically assessed through standardized tests, course grades, and other objective measures (Hattie, 2009). By comparing student outcomes in different learning environments, researchers can determine the relative effectiveness of various instructional approaches. Another approach to measuring the effectiveness of traditional face-to-face learning is to assess student engagement. This can include measures of behavioral, emotional, and cognitive engagement, such as attendance, participation, motivation, and critical thinking skills (Fredricks, Blumenfeld, & Paris, 2004). The authors, drawing conclusions from their respective institutions (Connecticut College, University of Michigan, and Claremont McKenna College respectively), describe behavioral, emotional, and cognitive engagement and recommend studying engagement as a multifaceted construct. The Fredericks, et al. (2004) research reviewed measures, precursors, and outcomes of student engagement and despite its advantages, face-to-face instruction may not be feasible for all aspiring teachers, particularly those who are working professionals or have other commitments that prevent them from attending in-person classes. The quality of face-to-face instruction can vary significantly between different educator preparation programs, depending on factors such as faculty expertise, available resources, and program design (Cochran-Smith & Zeichner, 2005). This variability can lead to inconsistencies in the preparation of pre-service teachers and may impact their readiness for licensure exams and classroom teaching.

Online Instruction

The advent of increasing technology and the internet has transformed the face of higher education institutions by offering new and innovative ways to deliver instruction. Online learning, which refers to the use of electronic technologies to facilitate learning and teaching

remotely, has become an increasingly popular mode of instruction in higher education (Allen & Seaman, 2017). In 2002, Allen and Seaman (2013, 2017) started a series of publications from a new research partnership of the Babson Survey Research Group, e-Literate, and WCET. Their studies take a detailed look at the trends and patterns of distance education enrollments among U.S. degree-granting higher education institutions. During the ten years they tracked data from 2,820 colleges and universities that offer online programs. The studies showed an increase in online learning from 9.6% in 2002 to 32% in 2011 while the perception of online learning from faculty accepting the value and legitimacy of online education increased barely six percentage points over the decade researched. The authors have explored many aspects of online learning from enrollment trends to faculty perceptions of online learning to the views of chief academic officers in relation to learning outcomes. While there is considerable diversity among course delivery methods used by individual instructors, they have defined online learning as a course where most or all of the content (at least 80%) is delivered online and typically have no face-to-face meetings.

Online instruction often incorporates self-paced learning, enabling students to focus on areas where they need the most improvement and progress at their own pace (Dede et al., 2005). Dede et al. (2005) reviewed in detail forty research studies that met criteria for high quality empirical research, including a mixture of qualitative and quantitative approaches, that examined design and effectiveness of professional development, online communication, and online methods. The literature found studies were beginning to recognize online learning is an up-and-coming area of interest and the outcomes need to be examined. For example, Harlan and Doubler (2004) completed a comparative study of an online course called TryScience, for which they compared aspects of the online course with a face-to-face course with the same objectives and

content. They combined video observations and field notes from trained observers to document the experience of the teacher learners in the face-to-face classroom, while the archive of online postings was used to record the experience of teacher-learners online. Participants' contributions to both environments were analyzed according to the researchers' own matrix, most of which described various levels of reflection, inquiry, and content knowledge evidence. Pre-and post-questionnaires were used in similar ways for both groups of participants. They found that participants online were more reflective of their practice and felt they had benefited more from the course than the face-to-face group. Hodges et al. (2020) examined the effects of "Emergency Remote Teaching" as a result of the COVID-19 pandemic and created a CIPP (context, inputs, process, and products) model to measure outcomes of online teaching. They found the online instruction individualized approach can lead to more efficient learning experiences and better alignment with students' unique learning needs (Hodges et al., 2020).

In his Handbook of Distance Education, Cavanagh, (2013) found online instruction offers flexibility and accessibility, allowing aspiring teachers to complete their preparation programs at their own pace and from any location. He utilized research on educational theory, organizational structures, pedagogies, and policy issues, as well as online educational practices to compile an extensive handbook for practitioners in higher education. He found online instruction can be more cost-effective than traditional face-to-face instruction, as it eliminates expenses related to physical facilities and transportation (Cavanagh, 2013). Furthermore, Means, et al. (2010) reviewed literature from 1996 through July 2008 and identified more than a thousand empirical studies of online learning. They focused on studies that (a) contrasted an online to a face-to-face condition, (b) measured student learning outcomes, (c) used a rigorous research design, and (d) provided adequate information to calculate an effect size. They identified 51 independent effects

that were subjected to a meta-analysis that revealed, on average, students in online learning conditions performed better than those receiving face-to-face instruction. The difference between student outcomes for online and face-to-face was larger in those studies contrasting conditions that blended elements of online and face-to-face instruction with conditions taught entirely face-to-face. Their research indicated that well-designed online courses can lead to similar or even superior learning outcomes compared to face-to-face instruction, including licensure exam scores (Means et al., 2010).

Jaggars (2014) collected data from two Virginia community colleges and conducted interviews of online faculty, support and administrative staff, and 47 students taking at least one online course. The study, funded by the Bill & Melinda Gates Foundation, found student satisfaction and perceptions of learning are important indicators of effectiveness. Students perceived advantages of flexibility, at-home convenience, and reduced travel time while several students said they preferred online courses because these courses allowed them to use their time more efficiently. These students felt that in-class time was often wasted, sometimes due to the instructor's choices and sometimes due to other students and distractions. Survey data, course evaluations, and qualitative interviews can be used to assess students' overall satisfaction with their online learning experiences and their perceptions of learning gains (Jaggars, 2014).

Although online learning offers the potential for increased flexibility and accessibility, it also presents several challenges. Students may struggle with self-regulation, time management, and feelings of isolation (Kebritchi et al., 2017). Kebritchi et al. (2017) analyzed 107 articles between 1990 and 2015 relating to issues with learners, issues with content, and issues with instructors. They recommended providing professional developments for online instructors, trainings for students, and adequate support for technical issues and multimedia integration to

further enhance the quality of online education.to counteract the common issues associated with online learning. Another common concern of online learning is the social impact of isolation and relational concerns. Social interaction and collaboration have historically been a fundamental aspect of the learning process. Students benefit from engaging with their peers, exchanging ideas, and building upon collective knowledge (Vygotsky, 1978). Furthermore, in-person interaction fosters a sense of belonging and community, promotes positive relationships, and enhances social-emotional development (Johnson, Johnson, & Holubec, 2013). The lack of in-person interaction in the classroom can contribute to a sense of isolation among students. Reduced in-person interaction also diminishes opportunities for collaborative learning. Collaborative activities, such as group work, rely on effective communication, shared decision-making, and cooperative problem-solving (Johnson et al., 2013).

Additionally, maintaining high-quality instruction in online educator preparation programs can be challenging, as there is often a lack of standardized quality measures and accreditation requirements for online programs (Crawford-Ferre & Wiest, 2012). Ensuring quality in course design, faculty expertise, and student support services is crucial for effective online instruction (Hodges et al., 2020). Educators can also implement strategies and interventions to promote social connection and collaborative learning. This may include fostering online communities, incorporating synchronous discussions, and utilizing technology tools that facilitate collaboration (Garrison, Anderson, & Archer, 2001). Providing structured opportunities for peer interaction, such as virtual group projects or breakout sessions, can also enhance collaborative learning experiences (Cheng & Chau, 2016).

Hybrid (Blended) Instruction

Hybrid or blended learning combines elements of both online and face-to-face instruction, providing students with the benefits of both instructional modalities. This approach has been heralded as a potential solution to the challenges associated with online learning, as it allows for increased flexibility and access to resources while maintaining the social interaction and support found in face-to-face instruction (Garrison & Kanuka, 2004). Their position paper found blended learning environments can also be assessed using measures of student engagement and satisfaction. Research has indicated that blended learning can lead to higher levels of student engagement and satisfaction compared to traditional or online learning environments (Garrison & Kanuka, 2004). They claim research suggests that blended learning can lead to improved learning outcomes and higher licensure exam scores compared to traditional face-to-face instruction.

Hybrid instruction can help accommodate various learning preferences and provide greater accessibility for students who may have difficulty attending traditional face-to-face classes (Bonk & Graham, 2006). From their study referenced previously, blended learning combines the strengths of both face-to-face and online instruction, providing students with the benefits of in-person interaction and the flexibility of online learning (Means et al., 2010). To measure the effectiveness of blended learning, which combines face-to-face and online components, researchers often compare student achievement in blended courses to that in traditional and online courses.

Studies have shown that blended learning can lead to improved learning outcomes compared to both traditional and online learning (Bernard et al., 2014). In their meta-analysis of a sub-collection of comparative studies of blended learning and classroom instruction from a

larger systematic review of technology integration, they examined the empirical studies that yielded the outcomes, work through the methodology that enables evidence-based decision-making, and explored how this line of research can improve pedagogy and student achievement. Their results indicate that, in terms of achievement outcomes, blended learning conditions exceed classroom conditions by about one-third of a standard deviation and that the kind of computer support used (i.e., cognitive support vs. content/presentational support) and the presence of one or more interaction treatments (e.g., student–student/–teacher/–content interaction) serve to enhance student achievement.

By providing a more diverse range of instructional methods, hybrid instruction can better address the unique learning needs of individual students, potentially resulting in improved content knowledge, pedagogical skills, and licensure exam scores (López-Pérez et al., 2011). In their study at the University of Granada, they studied four first year undergraduate courses and analyzed pass rates and questionnaires in three academic years (2008-2010). Of the 985 respondent students, the study found the implementation of blended learning had a positive effect on reducing dropout rates, raising exam scores, and increasing pass rates in the subject. Moreover, it showed the joint effect of the blended learning activities had a positive influence on the relationship between blended learning activities and class attendance which could indicate that greater student commitment and perseverance is being achieved through hybrid learning.

Students and faculty may need time to adjust to the unique demands and expectations of hybrid instruction, particularly if they are more accustomed to traditional face-to-face or online learning environments (Graham, 2006). Also, access to technology and internet connectivity may be a barrier for some students, as it is for online learning as well. Additionally, instructors must be adept at using technology and managing both online and in-person learning environments

(Bonk & Graham, 2006). To optimize the effectiveness of hybrid instruction in educator preparation programs, it is essential to identify best practices for course design, implementation, and evaluation. This includes determining the appropriate balance between online and face-to-face components, as well as identifying strategies for effectively integrating technology and promoting student engagement (Garrison & Vaughan, 2008).

Comparisons in Modality of Instruction

Despite the growing prevalence of online and hybrid instruction in post-baccalaureate educator preparation programs, there is limited research specifically focused on the effectiveness of these instructional modalities in learning outcomes. Kennedy and Archambault (2012) found that online teacher preparation programs were generally as effective as traditional programs in terms of candidate performance, but also highlighted the need for additional research in this area. Archambault et al. (2016) conducted a study examining the efficacy of online and face-to-face teacher preparation programs and found no significant differences in candidate performance on state licensure exams.

Comparing the effectiveness of different learning modalities can be challenging due to variations in instructional design, course content, and assessment methods across studies (Zhao et al., 2019). Ensuring comparability in research requires careful consideration of these factors. The effectiveness of different learning modalities can also be influenced by contextual factors, such as student demographics, institutional support, and instructor quality (Halverson et al., 2012). Educator Preparation Programs should carefully consider which instructional modality best meets the needs of their students and aligns with their program goals. This may involve evaluating the resources available, the characteristics of their student population, and the desired learning outcomes for the program (Means et al., 2010). Regardless of the modality of

instruction, it is crucial for post-baccalaureate educator preparation programs to ensure high-quality instruction that effectively prepares aspiring teachers for licensure exams and their future careers. This may involve incorporating evidence-based instructional practices, providing ongoing professional development for faculty, and engaging in continuous program evaluation and improvement (Cavanagh, 2013).

In recent years, particularly since the COVID-19 pandemic, there has been much discuss among EPPs on the effectiveness of particular modalities in preparing pre-service teachers for the profession. For instance, Darling-Hammond et al. (2002) found that of 2,956 beginning teachers in New York City, teachers from traditional preparation programs showed significantly higher instructional knowledge of curriculum and teaching strategies, sense of efficacy, and confidence in teaching than those from alternative programs or those without preparation. The authors, from Stanford University, and their research is cited extensively in the research on the effectiveness of the methods of delivery of teacher preparation programs to students. In a similar study, Zientek (2007) found that, comparing 415 traditionally prepared to 782 non-traditionally prepared novice teachers in Texas, traditionally-prepared teachers showed a higher sense of self-efficacy and preparedness in communication, planning, and instructional strategies. Using data from the national Schools and Staffing Survey (SASS), Ronfeldt, Schwartz, and Jacob (2014) found that almost half of teachers from alternative preparation programs did not complete practice teaching (i.e., pre-service student teaching), compared to only 8% of teachers from traditional programs. In addition, Ronfeldt et al. found that almost 70% of teachers from traditional programs completed the highest level of practice teaching, compared to less than 30% of teachers from alternative preparation. These differences were particularly consequential for teacher outcomes as Ronfeldt et al. also observed that teachers who had completed more practice

teaching and coursework on pedagogy felt more prepared for teaching and indicated a higher likelihood to stay in teaching. Finally, a study by Arias et al. (2018) contrasted the efficacy of online delivery relative to face-to face delivery using an enrollment protocol that largely eliminated self-selection bias. The study utilized a random assignment of the registrants of the same course offered online and face-to-face. The same professor taught both sections with the same course objectives and exams. The face-to-face class performed statistically, significantly better than the online class in terms of the exam average and improvement in post-test instructor questions.

Harrell and Harris (2006) conducted a two-year longitudinal study exploring the effectiveness of online teacher educator programs that aimed to investigate the outcomes and experiences of participants in the program. The authors conducted a qualitative study and collected data through interviews, surveys, and program artifacts. Research indicated success of the online program in (a) effecting statistically significant increases in the number of diverse candidates entering teaching, including career changer and minority candidates; (b) significantly increasing the number of candidates prepared by University of North Texas (UNT) in the critical shortage areas of science and mathematics; (c) achieving candidate performance at least equal to that of traditional program candidates on teacher quality indicators including GRE, state certification tests, and portfolio ratings; and (d) assuring candidate satisfaction with the online program.

Chiero & Beare (2010), the Regional Director at CalState TEACH California State University Fresno and the dean at the Kremen School of Education and Human Development at California State University in Fresno, conducted a study comparing an online supported teacher preparation program with more traditional campus-based program in a large state university

system. The study analyzed data from 2003 through 2009 annual systemwide evaluations of teacher preparation programs. Participants were elementary credentialed program graduates who had completed one year of professional teaching and their employment supervisors over a seven-year period. Interestingly, 50% of online students were already in teaching positions in comparison to 25% of on-ground students. Ratings were consistently higher for the online program than for a selected campus-based program and for the system as a whole. The results of this study suggest that a well-designed online teacher preparation program can be as effective or more effective as a campus-based programs.

Duhaney (2012) from State University of New York at New Paltz, found advantages of blended learning for both students and teachers. He suggests teacher preparation programs must adjust to upcoming generations that have been immersed from an early age in technology and will most likely prefer this type of learning. He proposes that online learning provides flexibility for students and professors, as well as encouraging teacher preparation programs to utilize technology on field experiences and observations. He found pre-service teachers prefer using technology due to the enhanced interaction, increased student engagement, and opportunities for continuous improvement, which benefits both the teacher preparation program and the student. His study found teachers and students are no longer comfortable with learning in a passive setting that is still largely text-based and heavily dependent on the lecture format typical of traditional classrooms in higher education settings.

A study conducted by Halasa et al. (2020) revealed that students achieved higher grades in a blended learning group. Students in the study were split into an experimental blended learning with a flipped classroom design group and a control group using the traditional, teacher-centered learning method. Data were collected during spring 2018 (13.3 weeks) and student's

grades for the registered course and their grade point average (GPA) were recorded. Findings showed statistically significant increases in student grades in the experimental group utilizing hybrid learning. Predictability calculations also showed better achievement of learning outcomes in a blended learning environment.

Some research has shown modality of instruction has a minimal effect on teacher and student performance. Kane et al. (2008) examined the relationship between teacher certification status and student achievement using data from nearly 19,000 teachers and 624,000 fourth through eighth-grade students in New York City. Kane et al. found little difference in the effects of traditionally certified, uncertified, and alternatively certified teachers on students' math and reading value-added achievement scores in both elementary and middle schools. Additionally, the six years of panel data on students and teachers found the initial certification status of a teacher has small impacts on student test performance. However, among those with the same experience and certification status, there are large and persistent differences in teacher effectiveness. Such evidence suggests that classroom performance during the first two years is a more reliable indicator of a teacher's future effectiveness.

Educator Licensing Exams

Licensing exams serve as a standardized and objective measure of teacher preparation program effectiveness and provide a way to ensure that new teachers meet certain standards of competence before entering the profession (Darling-Hammond et al., 2005). By passing the required licensing exams, teacher candidates demonstrate their readiness to teach and their potential to positively impact student learning outcomes (Nettles et al., 1996). Additionally, policymakers aim to ensure that new teachers have a minimum level of competence in pedagogical knowledge before entering the profession through exam scoring methods (Darling-

Hammond et al., 2005). This is intended to maintain high standards for teacher quality and ultimately improve student learning outcomes (Ingersoll, 2007). Additionally, licensure exams are an essential component of the teacher licensure process and, within some EPPs, is the gateway to program completion. Furthermore, exam scores influence curriculum development, as programs strive to align their content with the exam requirements (Darling-Hammond, 2017). Licensure exams may also serve as a quality assurance mechanism, ensuring that individuals who enter the teaching profession possess the necessary knowledge and skills to be effective in the classroom. Moreover, the outcomes of these exams contribute to the accountability and public trust associated with the teaching profession (Popham, 2006).

Pedagogy Exams

The purpose of the exam is the assessment of pedagogical knowledge, which includes understanding teaching methodologies, learning theories, and classroom management strategies. Pedagogy licensing exams are designed to assess the knowledge, skills, and dispositions of prospective teachers related to teaching principles, practices, and their ability to apply this knowledge in real-world settings (American Association of Colleges for Teacher Education, 2017). The formulation of pedagogy licensure exams involves a thorough and systematic development process. Multiple stakeholders, including educators, subject matter experts, and policymakers, contribute to the creation of exam frameworks and content (Liu & Hilliard, 2021). The process often includes conducting job analyses, establishing test blueprints, and item writing and review procedures (Popham, 2006). Collaboration between testing agencies and relevant educational institutions is crucial to ensure the alignment of licensure exams with professional standards (Stiggins, 1991). Pedagogy licensure exams typically encompass a range of content areas that are central to effective teaching, such as instructional strategies, classroom

management, assessment techniques, and professional ethics (Darling-Hammond, 2017). The exams may consist of multiple-choice questions, constructed-response items, and performance-based tasks (Liu & Hilliard, 2021). It is important to strike a balance between breadth and depth of content coverage to provide a comprehensive assessment of candidates' pedagogical knowledge and skills (Popham, 2006).

Ensuring the validity and reliability of licensure exams is critical for maintaining their credibility and fairness. Validity refers to the extent to which an exam measures the intended knowledge and skills of candidates (Messick, 1989). Licensure exams should demonstrate evidence of content validity, criterion-related validity, and construct validity (American Educational Research Association et al., 2014). Reliability, on the other hand, refers to the consistency and stability of exam results over time and across different administrations (Popham, 2006). Rigorous psychometric analyses, including item analysis and equating procedures, contribute to establishing the reliability of licensure exams (Liu & Hilliard, 2021).

Predicting Effectiveness

Several studies have utilized pedagogy licensing exam scores as a measure of effectiveness in post-baccalaureate educator preparation programs. For instance, Nettles et al. (1996) found that teacher candidates who passed the licensing exams demonstrated higher levels of teaching effectiveness in their first year of teaching and demonstrated higher levels of pedagogical knowledge than those who did not. Toma and Cross (2016) examined the relationship between teacher candidates' performance on licensing exams and their later teaching effectiveness, finding a positive correlation between the two. Toma and Cross (2016) found a positive correlation between teacher candidates' performance on licensure exams and their knowledge of pedagogy.

Despite these findings, there are challenges associated with using licensure exam scores as a measure of pedagogical knowledge. For example, the exams often focus on a limited range of knowledge and skills and may not fully capture the breadth and depth of pre-service teachers' pedagogical understanding (Cochran-Smith et al., 2013). Additionally, exam scores may be influenced by factors unrelated to pedagogical knowledge, such as test-taking strategies and anxiety (Popham, 2009). Darling-Hammond et al. (2005) found that teacher candidates with stronger academic backgrounds were more likely to pass licensing exams. Additionally, research has shown that demographic factors such as age, gender, and ethnicity can also impact exam performance (Goldhaber et al., 2015). Program characteristics, such as curriculum design, faculty qualifications, and support systems, have also been linked to exam performance. Ingersoll et al. (2014) found that the quality of educator preparation programs, as measured by factors such as accreditation status and selectivity, was positively associated with candidate performance on licensing exams. Moreover, Boyd et al. (2009) reported that programs that provided extensive field experiences and close collaboration between coursework and fieldwork were more likely to produce candidates with higher exam scores. Finally, some studies suggest that a combination of strong pedagogical and content knowledge is necessary for effective teaching (Darling-Hammond, 2010), while others argue that pedagogical knowledge may be more important than content knowledge, particularly for teaching diverse learners (Cochran-Smith et al., 2018). Conversely, studies have found that strong content knowledge is essential for effective teaching, particularly in subjects like mathematics and science (Hill et al., 2005). However, some research suggests that the relationship between content exam scores and teacher effectiveness may vary by subject area and grade level, with content knowledge being more crucial than pedagogical knowledge for teaching advanced subjects at higher grade levels (Floden & Meniketti, 2005).

Another factor that can impact exam performance is the level of candidate engagement and motivation in the learning process. Zhao et al. (2019) found that student engagement and motivation played a crucial role in determining success in online learning environments and licensure passage success. The authors suggested that fostering a sense of belonging and providing opportunities for meaningful interaction can contribute to increased engagement and better learning outcomes. Coursework in education, psychology, and related fields can contribute to a better understanding of pedagogical principles and practices, potentially leading to higher exam scores (Floden & Meniketti, 2005). Historically, research on this subject often focuses on a limited range of teacher preparation programs and may not be generalizable to all contexts (Darling-Hammond et al., 2005).

The relationship between pedagogy licensing exam scores and classroom effectiveness after graduation has been a topic of interest for researchers, policymakers, and educators. Additionally, classroom effectiveness is a complex and multifaceted construct, and measuring it accurately is a challenge in itself (Stronge et al., 2011). Research suggests that teacher quality is a significant factor in student achievement, and effective educator preparation programs can contribute to producing highly qualified teachers (Darling-Hammond et al., 2005). Factors such as school resources, class size, and socioeconomic conditions can also play a role in determining student outcomes, making it difficult to isolate the impact of EPPs pedagogical and knowledge instruction and curriculum (Darling-Hammond et al., 2005). Additionally, teacher characteristics, such as prior academic achievement and demographic factors, have also been found to influence exam scores and classroom effectiveness (Goldhaber et al., 2015). Buddin and Zamarro (2008) found teacher licensure test scores are unrelated to teacher success in the classroom while student achievement is unaffected by whether classroom teachers have advanced degrees.

In Indiana, Praxis pedagogy licensure exams are categorized by four grade bands: P-3, K-6, 5-9, 5-12, and P-12. The desired grade band licensure and EPP program completion via observed field experiences determines the pedagogy exam attempted by candidates or graduates. Elementary-level pedagogy licensing exams typically assess pre-service teachers' knowledge of teaching methods, child development, classroom management, and some subject matter across various content areas (math, science, language arts, health, and social studies). These exams often emphasize the importance of understanding early literacy and numeracy development, as well as strategies for differentiating instruction to meet the diverse needs of young learners (Darling-Hammond et al., 2017). High school-level pedagogy licensing exams are typically subject-specific, assessing pre-service teachers' content knowledge and pedagogical skills within their chosen discipline. These exams may also address the importance of preparing students for college and career readiness, including the development of critical thinking, problem-solving, and communication skills (Darling-Hammond et al., 2017). However, some studies have suggested that pre-service teachers preparing for elementary-level exams may face unique challenges, given the breadth of content knowledge required across multiple subject areas (Flippo, 2001). Additionally, research has shown that pre-service teachers' content knowledge is a significant predictor of their performance on pedagogy licensing exams (Gitomer et al., 2016), suggesting that subject-specific exams for middle and high school levels may yield different performance outcomes compared to more general elementary-level exams.

Research on pedagogy licensing exams has identified several issues when utilizing licensure exams to measure competency, content, and pedagogical knowledge. Critics argue that licensure exams may not adequately assess the full range of knowledge and skills required for effective teaching, particularly in relation to culturally responsive pedagogy and the needs of

diverse learners (Cochran-Smith et al., 2018). Concerns have been raised about potential biases in exam content, which may disadvantage certain groups of candidates, particularly those from underrepresented backgrounds (Banks et al., 2016). Some studies suggest that pre-service teachers may focus excessively on test preparation at the expense of more meaningful learning experiences, potentially undermining the development of pedagogical expertise (Sato, 2014). Research on the effectiveness of Praxis exams has been mixed. Some studies have found that passing scores on the exams are a reliable predictor of teacher effectiveness in the classroom (e.g., Ladd & Sorenson, 2017; Wyant, 2015). Other studies, however, have raised concerns about the validity and fairness of the exams, particularly for candidates from underrepresented groups (e.g., Warren, Ballinger, & Otaiba, 2019). A major concern is that the exams may be biased against individuals from diverse backgrounds, as they may not reflect the cultural knowledge and experiences of all test-takers (Santiago & Grinberg, 2019). Additionally, some researchers have questioned whether the exams accurately assess the skills necessary for effective teaching, such as the ability to build positive relationships with students (Madera, 2018).

Research has shown that pre-service teachers' academic background, such as grade point average (GPA) and performance on standardized tests, is positively correlated with their licensure exam scores (Nelson & Michael, 2016). Moreover, subject-specific coursework completed during undergraduate studies has been found to influence content exam scores (Floden & Meniketti, 2005). Some research has indicated that factors such as age, gender, and socioeconomic background may influence exam performance (Goldhaber & Hansen, 2010). For instance, some studies have found that women tend to score higher on pedagogy exams, while men tend to score higher on content exams (Xu & Brown, 2016). Additionally, candidates from underrepresented racial and ethnic backgrounds may face greater challenges in achieving high

licensure exam scores due to factors such as test bias and limited access to high-quality preparation resources (Banks et al., 2016).

CHAPTER THREE

Methodology

The efficacy of online learning, sometimes referred to as distance learning, has become a debated and controversial topic of discussion among higher education institutions and much research has been conducted in recent decades. As evidenced in Chapter Two, the consensus is mixed on the effectiveness of online learning and long-term sustainability of varying modes of instruction in the changing landscape of education as a system. Although many factors and variables contribute to student success, teacher preparation programs have concrete measures in addition to grades and learning outcomes, such as licensing exams, to measure program impact and the effectiveness of varying forms of instructional modality. One could argue licensure exams scores are not truly indicative of teacher preparation program success, but it is a measure that can serve as one of many indicators for researchers to analyze when discussing on-ground, online, and hybrid teacher preparation program effectiveness. In the world of teacher preparation programs, teacher licensing exams are intended to help ensure only qualified individuals enter the field of education, thereby enhancing the overall quality of teaching by establishing benchmarks for competence. The primary role of pedagogy licensing exams is ensuring that individuals entering the teaching profession are well-equipped to provide high-quality education and contribute to positive learning outcomes of P-12 students.

Research Question

Education Preparation Programs (EPPs) in Indiana have access to review average pedagogy and content licensure exam scores of all EPPs across the state each year in September. This data is relayed through a matrix provided to EPPs by the Indiana Department of Education. Institutions that have ten or more candidates attributed to an attempt at a particular licensure

exam have data reported by test provider and are included in the matrix. Aggregated licensing exam scores are a common metric used to measure program effectiveness and used for programmatic improvement purposes and to address potential gaps in curriculum that contribute to deficiencies evident in scores. According to the Indiana Department of Education (2023), there are currently no on-ground universities able to offer an online baccalaureate program to obtain an Indiana teaching license. For this reason, post-baccalaureate (e.g. Transition to Teaching and Masters level programs) licensure exams were examined in this study, rather than baccalaureate program licensure exams. The study at hand is attempting to answer the following research questions:

- Main Question: What is the relationship between instructional modality and pedagogy licensing exam scores in post-baccalaureate educator preparation programs over a four-year cycle?
    - Sub-Question: How does the relationship between modality of instruction and exam scores compare across grade bands and years in pedagogy licensing exams?

This chapter lays out the methodology for an examination of the relationship between modality of instruction among EPPs and resulting licensure exam scores of institutional completers overall and by grade band over a four-year period.

Conceptual Framework

This study focuses on the independent variables of on-ground, online, or hybrid teacher preparation instruction and examines the relationship of the modality of delivery of curriculum as evidenced in pedagogy licensing exam scores. In the field of education, research is essential to improving teaching methodologies, student outcomes, and educational policies. Quantitative analysis provides a systematic and data-driven approach to decision-making and problem-solving

through drawing valid conclusions from sets of numerical data. Additionally, quantitative analysis helps in making objective decisions by relying on data rather than subjective opinions. As Edward Tufte (2018), a prominent statistician, mentions in his book "The Visual Display of Quantitative Information," that data graphics can reveal patterns and relationships that might not be apparent through qualitative analysis alone.

The independent variable, modality of instruction, consists of one of three options in which higher education institutions deliver content in post-baccalaureate teacher preparation programs in Indiana. The independent variable was identified as on-ground, online, or hybrid instruction. It is important to note, online teacher preparation programs are permitted to deliver course content online synchronously or asynchronously, but the Indiana Department of Education (2023) requires a student teaching component to be monitored by the institution for accountability purposes. Institutions classified as online providers deliver all coursework and content through an online platform. On-ground teacher preparation programs require at least 80% of coursework be delivered via face-to-face instruction (Indiana Department of Education, 2023). Hybrid programs have a mixture of both online and on-ground coursework.

The dependent variable, licensure scores, represents the average pedagogy licensing exam score of institutional completers in an academic year over a four-year cycle and disaggregated by year. The four-year cycle includes data reported in the following academic years which run September 1st through August 31st annually: 2017-2018, 2018-2019, 2019-2020, and 2020-2021. Passage of one pedagogy licensure exam is a component and requirement to obtain an initial teaching license in Indiana (Indiana Department of Education, 2023). The significance of pedagogy licensing exams is vital in ensuring teacher competence and maintaining high standards in the teaching profession (Johnson, 2018). Pedagogy licensing

exams are designed to assess the pedagogical knowledge, skills, and abilities of individuals aspiring to become teachers. The exams evaluate if candidates have a solid understanding of educational theory, teaching methods, and other essential aspects of effective instruction relating to pedagogy.

Data Sources

This study investigates public data compiled by the Indiana Department of Education through the annual HEA 1388 State Report. This report collects data from all Indiana Educator Preparation Programs in conjunction with the licensing exam provider and Title II Report from the previous year. House Enrolled Act No. 1388 (HEA 1388) was enacted during the 2014 session of the Indiana General Assembly and was incorporated within IC 20-28-3-1 and IC 20-28-11.5-9. This act requires the Indiana Department of Education (IDOE) to collect and report data and information from teacher preparation programs, principals, and teachers. The standards established under subsection (e) of the legislation are required to include benchmarks for performance, including test score data for each teacher preparation entity on content area licensure tests and test score data for each teacher preparation entity on pedagogy licensure tests. The collected data is required to be included within a non-ranking matrix to be posted on the state website and displayed on all EPP websites for transparency purposes. The data from the matrix is used by institutions for evaluation and improvement, as well as to provide data to the IDOE for EPP accountability purposes. This data is also used by institutional accreditors, including CAEP and SPAs, as a measure of the effectiveness of pre-service teacher preparation.

The HEA 1388 report relays institutional data, such as completer licensing exam scores for the current year and three prior years, as well as surveys completed by teachers and principals across the state. Each year, EPPs complete a Title II Report in which previous years' EPP

enrollment data is matched with testing data from a provider, previously Pearson VUE Assessments, and since September 2012 the Educational Testing Service (ETS) via Praxis exams. Thes data matching process provides licensure exam pass rate data for each exam for every EPP in Indiana if an n>10 is present. During the years examined in this study, the licensing exam service provider was Pearson VUE Assessments. Starting on September 1, 2021, the licensing exam provider transitioned to ETS Praxis. For consistency purposes, this study only examined years in which the same testing company administered the exams. The years examined in this study were the academic years of 2017-2018, 2018-2019, 2019-2020, and 2020-2021. These years are "reported" as the following year. For example, the 2020-2021 HEA 1388 report is reporting scores and data for the 2019-2020 academic year.

In Indiana, there are four pedagogy licensure exam grade bands: P-3 (Early Childhood), K-6 (Elementary Generalist), 5-12 (Secondary), and P-12 (All Grade). The Early Childhood P-3 pedagogy exam reported minimal data (one institutional score that met the required parameters for the study) in the time frame examined and was therefore excluded from the research. The K-6 Pearson pedagogy exam had five domains tested: Student Development and Diversity, Learning Processes and Environments, Instruction and Assessment, and the Professional Environment. The 5-12 Pearson pedagogy exam had five domains as well: Student Development and Diversity, Learning Processes and Environments, Instruction and Assessment, and the Professional Environment. Finally, the P-12 Pearson pedagogy exam had five domains that were evaluated: Student Development and Diversity, Learning Processes and Environments, Instruction and Assessment, Reading Instruction, and the Professional Environment.

The secondary data used in this study has been anonymized by removing all references to Educator Preparation Program (EPP) names and further identifiers, such as institutional

enrollment or location. Institutions were chosen for analysis based on the requirements below and identified by an assigned number during statistical analysis. The independent variable of EPP modality of instruction was used to disaggregate the data for the analysis portion of the study.

Participants

In this study, 18 EPPs' pedagogy licensing exam scoring data was analyzed. To be included in the study, EPPs must have reported more than ten students attempting the exam in the academic year reported and have at least one year of results in the four-year timeframe. Although the number of EPPs ranged from 42 to 38 during the reporting timeframe, only those reporting scores over the four-year span were included. In total over this longitudinal study, 1,865 test taker exam results were utilized for the statistical data analysis. Three on-ground, six online, and nine hybrid institutions were included in the study and their corresponding pedagogy licensure exam scores analyzed. The passing score for all examinees during this entire time frame was 220 points, which provided a consistent data analysis base score across all grade bands and years. As discussed, the HEA 1388 Report, inclusive of average licensure exam scores over an academic year, is provided by the IDOE to every EPP in Indiana yearly. This data, specific to the students enrolled in or completer of an institution, and licensure score exam data is aggregated to report average scores for each exam. Individual scores of test takers are not reported; only average scores of each exam for each EPP and the state average.

In Indiana, to obtain an initial teaching license, all licensure applicants must obtain a passing score in one pedagogy exam and at least one content exam. For purposes of this study, pedagogy exams were chosen to analyze due to the requirement that every pre-service teacher must pass at least one to become a licensed teacher in Indiana. There were over 30 content exams

offered during the timeframe in which this study analyzed scores and the reported data was insufficient to analyze under the umbrella of modality.

Post-baccalaureate programs in Indiana were chosen for the study due to the varying modalities inclusive in the data. In comparison, baccalaureate programs are required to be classified as on-ground. The post-baccalaureate programs in Indiana include master's degrees, transition to teaching programs, and varying certificate programs. Data was extracted from four years of HEA 1388 Reports and Title II Reports provided publicly by the IDOE for all EPPs in Indiana. The data was initially organized by year and exam. EPPs were then excluded if data was not sufficient across multiple years and grade band scores.

Validity and Reliability

Pearson follows an industry-accepted process to develop assessments that are valid, reliable, fair, and administered in a standardized way (Pearson Education, 2019). The multifaceted, systematic process begins by assembling the standards identified in state educator licensure regulations and other policy materials, such as curriculum frameworks, student learning standards, and professional learning and content standards. Assessment objectives describing the knowledge and skills a teacher candidate must demonstrate for each content standard are developed and then reviewed by educators and teacher educators. An assessment design is set and assessment items are drafted to correspond to the assessment's objectives. The final task is establishing the scoring criteria, which are aligned to the objectives and items, to evaluate the performance of teacher candidates. Knowledgeable educators, who represent the diversity of the teaching population in a state review the materials and job analysis studies as well as document and link the tasks teachers perform with the assessment content to strengthen validity evidence. Teachers and higher education professionals also conduct assessment framework and item

reviews (for both content and bias prevention) and review the state-specific standards for passing, as well as national standards. A panel of educators recommend passing scores for the assessment, which are then reviewed and decided by the state agency responsible for licensure. Standard setting activities to set the passing score solidify the final link in the chain of validity evidence that has involved educators from the beginning of the development process. The state-established passing score demonstrates the level of performance of individuals who meet the minimum competency required for entry-level teaching in the state's P–12 schools.

Licensure is designed to protect citizens from mental, physical, or economic harm that could be caused by practitioners who may not be sufficiently competent to enter the profession (Schmitt, 1995). A licensure test is often included in the larger licensure process— which typically includes educational and experiential requirements—because it represents a standardized, uniform opportunity to determine if a test taker has acquired and can demonstrate adequate command of a domain of knowledge and/or skills that the profession has defined as being important or necessary to be considered qualified to enter the profession (American Psychological Association, 2014). Proper assessment use is a joint responsibility of the test developer, and of states, agencies, associations, and institutions of higher education as the test users.

During the four-year cycle of pedagogy licensing exam scores reviewed, Pearson VUE was the assessment service providing teacher licensure exams to the State of Indiana. The alignment of Pearson VUE (2023) licensure exams with state standards and requirements involved several key steps:

1. Collaboration with State Education Agencies (SEAs): Pearson worked closely with state education agencies to understand the specific licensure requirements, standards, and competencies established by each state.
2. Analysis of State Standards: Pearson conducted a thorough analysis of the state-specific academic standards and teacher competencies outlined by the Indiana Department of Education.
3. Development of Exam Content: Pearson developed licensure exam content based on the identified state standards. Subject matter experts and educators contributed to the creation of test questions that assess candidates' knowledge, skills, and abilities in accordance with the state's educational requirements.
4. Test Validation and Alignment Studies: Pearson conducted validation studies to ensure that the licensure exams are fair, reliable, and valid measures of teacher readiness.
5. Regular Updates and Revisions: Pearson regularly reviewed and updated licensure exams to reflect changes in state standards, educational policies, and best practices in teaching.

Praxis ETS, the licensure exam provider in Indiana since September 2021, was also responsible for developing valid and fair assessments in accordance with technical guidelines established by the American Educational Research Association, the American Psychological Association, and the National Council on Educational Measurement in Education (Standards for Educational and Psychological Testing, 2014). The same requirements mandated by the Indiana Department of Education to meet state standards and needs of pre-service teachers in Indiana for Pearson were also required for Praxis ETS exams.

Praxis (2023) states: Different standard-setting approaches are used for different test structures. ETS implements a modified Angoff method for selected-response (SR) items and a

Benchmark method for constructed-response (CR) items. A state-specific study was employed by convening panels of licensed practicing educators and college faculty from user states to conduct standard-setting studies and to confirm that the knowledge and/or skills represented in the test content specifications are important for entry-level practice. Praxis also recommends passing scores to consider when incorporating exams to a state.

At the time of data collection, Praxis scores had not yet been reported to EPPs and were therefore excluded from the study. Additionally, issues could arise by comparing two different licensing exam providers due to the scoring systems utilized by Pearson and Praxis. Fortunately, Pearson provided a concrete passing score within consistent ranges across all exams (passing score of 220 points) to further justify the decision to exclude Praxis exam scores and delay the data collection period by one year. Praxis instituted varying passing scores for each pedagogy exam which could potentially skew data and make comparisons unreliable between the years.

Limitations

The limitations of this study include the smaller number of on-ground institutions (three) that reported scores. In Indiana, the trend is online education for post-baccalaureate programs, specifically transition to teaching and certificate programs to meet the demands of school districts facing teacher shortages (Indiana Department of Education, 2023). Gaps in data due to $n<10$ for attending students of on-ground schools, which tend to be smaller institutions in general, may not be truly indicative of quality of instruction of the on-ground modality. Also, due to a lack of data, the study did not have the ability to analyze the P-12 licensure exam scores for on-ground institutions. Additionally, the last year examined was the 2020-2021 academic year of completers (2022 HEA 1388 and 2022 Title II Reports) was inclusive of the onset of the

COVID-19 pandemic. Finally, potential bias in pedagogy licensing exam tests is a continual concern and a topic for future research on gender and race disparities in testing design.

Almost all baccalaureate teacher preparation programs are categorized as on-ground, therefore, this study analyzed post-baccalaureate programs only. It is important to note, there are online baccalaureate education programs located outside of Indiana, such as the University of Phoenix and Western Governors University, that offer online teacher education programs to students located in Indiana (Teaching Degree, 2023). Unfortunately, EPPs in Indiana do not have access to or the ability to review licensure exams scores of these outlier universities as reported in the HEA 1388 and Title II Reports and, therefore, could not be analyzed in this study.

Finally, although demographic data (e.g. gender, race, completion GPA) is reported through the HEA1388 and Title II Reports, the data in this study is not disaggregated by baccalaureate or post-baccalaureate program within the EPP so the data could not be analyzed for this study.

Analysis

By facilitating longitudinal analysis of teacher performance on institutional completer licensure exams scores by examining changes in licensing exam scores over time, studies such as this can be analyzed for trends and provide potential avenues for EPP to implement new practices. Research can explore how initial exam scores correlate with later teaching effectiveness, providing insights into the long-term impact of licensing exams on teacher quality (Koedel & Parsons, 2016). The longitudinal perspective, evident in this study, is useful in providing data to improve teacher preparation program efficacy by providing valuable data on modality effectiveness evidenced in scores over a four-year cycle. Quantitative analyses allow for the assessment of the predictive validity of licensing exam scores. Although disputed, some

research has demonstrated that teacher licensing exam scores are positively correlated with student achievement outcomes (Goldhaber & Brewer, 2000). This finding underscores the importance of using quantitative methods to examine the relationship between teacher qualifications, as measured by licensing exams, and teacher success evidenced in K-12 student growth data.

From a policy perspective, quantitative research methods are instrumental in evaluating the effectiveness of licensing exam policies. Jacob (2007) used quantitative methods to examine the impact of alternative routes to teacher certification on student achievement. This type of research informs policymakers about the consequences of altering licensing requirements, helping them make informed decisions on exam vendors and departments of educations' decisions on licensing. Finally, quantitative analysis is crucial for ensuring that licensing exams are standardized and fair. Through the application of statistical methods, researchers can assess the reliability and validity of exam questions and scoring procedures (American Educational Research Association, American Psychological Association, & National Council on Measurement in Education, 2014). This helps guarantee exams accurately measure teacher competency without bias.

At its heart, quantitative analysis provides the foundation for evidence-based decision-making in higher education. It allows researchers to analyze data and identify patterns, trends, and correlations. For example, a study by Hattie and Timperley (2007) on feedback in education used quantitative analysis to demonstrate the impact of feedback on student learning outcomes. This evidence helps educators refine their teaching methods and enhance the learning experience of higher education students and future K-12 stakeholders.

The researcher obtained all Title II and House Enrolled Act 1388 Report data for all 18 EPPs in Indiana during the four-year cycle from the Indiana Department of Indiana publicly accessed website. The reports had large amounts of data that required aggregation and further disaggregation to analyze effectively and efficiently. If an Educator Preparation Program (EPP) did not have enrollment (either new or closed) during the four-year cycle, they were excluded from the study. A spreadsheet with columns for each school, referred to as the "Data Spreadsheet", was created to structure the testing data visually and categorize the modality of each EPP as on-ground, online, or hybrid. Each EPP was contacted via email to determine the modality of instruction of the Transition to Teaching and/or Master's Degree programs at the institution. If the researcher did not receive confirmation via email after two emails, the EPP was contacted via telephone to obtain the information. The modality of instruction of each EPP was then cross-referenced the modality of instruction listed for the institution on the Indiana Department of Education website (IDOE, 2023).

Once all modalities were obtained for the EPPs, the pedagogy licensing exam scores were aggregated for each EPP, year, and exam and placed in the Data Sheet. As previously noted, if an institution had less than ten scores reported, the report was not inclusive of the scores and the data was not available to the researcher. EPPs were only included in the analysis of data if they could provide at least one cycle of data for one of the four pedagogy exams. Once the data was analyzed, the P-3 pedagogy exam was determined to have insufficient scores to include in the study. Once average scores were obtained for each EPP and the state score average obtained, the data was cross-referenced with the HEA 1388 Reports provided to every EPP from the Indiana Department of Education. Both Title II and HEA 1388 Reports are required by state statute and

national accreditation be posted publicly by the Indiana Department of Education and on the EPP website on a yearly basis.

The Data Sheet was color coded to reflect the modality on instruction for each EPP and the average scores of each exam for the four cycles and three pedagogy exams was placed in the corresponding column for each school, year, and exam (K-6, 5-12, P-12). The state average was then added for reference for each year and exam. Large amounts of data sets were aggregated into the final Data Set, which is reflected in the total number of test-takers examined (n=1,865 test takers). The results of the completed Data Sheet revealed data viability of three on-ground EPPs, six online EPPs, and nine hybrid EPPs to proceed with further analysis. The final 18 schools were chosen based on data availability and consistently having scores reported over the four-year cycle. From the data available, a Code Book and Data Set were created to effectively run statistical analyses.

This study employed JASP, an intuitive interface, open-source project supported by the University of Amsterdam, as the statistical package to run analyses. JASP offers standard analysis procedures in both a classic frequentist analysis and Bayesian analysis form.
All three modalities were the independent variable (online, on-ground, and hybrid EPPs) and ANOVA statistical tests were performed analyze the variances present in the data. The researcher ran ANOVA tests comparing: the aggregate of four-year exam scores by modality of instruction for all three exams aggregated, the aggregate of four-year exam scores by modality of instruction for all three exams scores disaggregated, the three exams independently and disaggregated by year and modality, the scores disaggregated by year with all exams scores aggregated by modality, the three exams disaggregated by modality and disaggregated by year, and each year by modality and all exam scores disaggregated. The analysis of data included

using frequencies and descriptive statistics. Descriptive analyses were utilized to statistically describe, aggregate, and present the associations present between the variables. Bivariate correlations analyzed the variables to determine if correlations are significant. Frequency distribution tables were utilized to identify patterns in the data and analyze the data using measures of variance.

Conclusion

The research conducted on this subject identified potential advantages of varying types of instructional modalities reflected in pedagogy teacher licensure exam scores. Instructional modality has been shifting to meet the needs of students in the new educational landscape present across the country and globe. Pre-service teachers are required to present their knowledge on effective pedagogical practices by passage of licensure exam scores, which can categorically reflect the quality of education received from educator preparations programs. This data can be used to identify potential gaps in pedagogical curriculum by analyzing exam scores over multiple years for trends relating to the modality of instruction provided by the EPP.

CHAPTER FOUR

Data Analysis and Findings

This chapter presents the results of the study. This study examines to what extent the relationship between instructional modality and pedagogy licensing exam scores in post-baccalaureate educator preparation programs is present. The study also examines to what extent the relationship between modality of instruction and exam scores compare across grade bands in pedagogy licensing exams over a four-year cycle. This chapter includes descriptive analyses and analyses of variance that show the relationships among the variables explored in the study. JASP was used to calculate statistical, quantitative data obtained by the researcher through data analysis of licensure exam score data aggregated and disaggregated by the researcher. First developed at the University of Amsterdam, JASP is a software platform for teaching and conducting statistics. Analysis of variance (ANOVA) tests were employed to examine data for the study. One-way ANOVAs were used to gather data relating to the study. The researcher determined if each of the factors had a significant effect on the dependent variable independently of the other factor. This helped in understanding the individual contributions of each factor.

In total, there was data available from 18 Educator Preparation Programs (EPP) in Indiana with post-baccalaureate programs and utilized for the analysis of this study. There are four academic year cycles of data reported inclusive of 2017-2018, 2018-2019, 2019-2020, and 2020-2021 licensure exam scores. Three pedagogy licensure exam scores were examined: Elementary Education K-6, Secondary Education 5-12, and All Grade Education P-12. The total number of exam test takers was calculated at 1,865 unique exam scores across the four-year cycle of data. As previously noted, All Grade P-12 exam scores could not be analyzed for on-ground EPPs due to lack of data ($n<10$) and therefore was excluded from the analyses. The

researcher found the Early Childhood P-3 licensure exam only yielded one unique score for an on-ground modality over the four-year cycle and it was not plausible to examine in relationship to the study parameters. EPP institutional names and exam taker names have been excluded from the written dissertation to maintain anonymity.

Data Coding for Analysis

For clarification in analyzing data presented by the researcher in this study, the following coding was used to anonymize data and for ease of statistical analysis. Each Education Preparation Program (EPP) was randomly assigned an institutional number ranging from 1-18, while the State of Indiana was assigned as number 19 for analysis. The institutions were then identified by their modality of instruction by being coded as on-ground instruction (assigned the number 1), online instruction only (assigned the number 2), or hybrid instruction (assigned the 3) which employs both modalities of online and on-ground instruction. The State of Indiana average exam scores were assigned the number 4 for comparisons to each modality. The State of Indiana averages included all exam takers for the academic year reported regardless of number of exam takers and modality. Anonymity was essential to this analysis to report un-biased data and results. See Table 1 for a breakdown of the number of institutions examined identified by instructional modality and the corresponding overall percentage of institutions based on modality. A further description of the methodology utilized in the study is examined in Chapter Three of this study.

To further examine the diversity of the funding of institutions with post-baccalaureate degree programs included in the study, the researcher also disaggregated the type of institution based on funding type. The institutions were identified as either public, non-religious private,

Table 1.

Number of Institutions Based on Instructional Modality

Modality	EPP Code(s)	Total Number of Modality	Percent
1 (On-ground)	4,8,6	3	16.66
2 (Online)	1,3,10,13,14,18	6	33.33
3 (Hybrid)	2,5,6,7,9,11,12,15,17	9	50.00
4 (State of Indiana)	19	N/A	N/A

Table 2.

Number of Institutions Based on Funding

Funding Type	Number of Institutions	Percent
Public	6	33.33
Private Non-Religious	3	16.66
Private Religious	9	50.00

and religious private institutions. After classifying the institutions based on the corresponding institutional website, it was determined there were six public universities, three non-religious private universities, and seven religious private universities in the study. Table 2 reports the type of institution and the corresponding percentage of institutions for each funding type. Please note, the modality of instruction is not correlated to the funding type even though the percentages are identical to Table 1.

Modality and Exam Score Comparisons

The first data analysis to guide the study reviewed the average licensure scores of all three pedagogy exams over the full four-year cycle by each modality. The average licensure exam score for the above-mentioned independent variables (years and exams) were examined and reported as follows. Please note, passing scores for all the Pearson exams for all four years analyzed was a score of 220 or above. The Pearson exam scores ranged from 200-290 during the years examined. The average licensure exam score for all independent variables revealed the highest average score was hybrid programs with 258.514 points. The second highest modality was online institutions with an average score of 251.321 points. Finally, the lowest scoring modality was on-ground with an average score of 250.938. An ANOVA revealed ($F(3, 136)=10.024$; $p<.001$). The *post-hoc* test shows a statistically significant difference between online and hybrid modalities. See Table 3.

Modality Comparisons by Year

The next comparisons involved reviewing modality of instruction by each academic year cycle (2017-2018, 2018-2019, 2019-2020, and 2020-2021).

Table 3.

Post Hoc Comparisons of All Year Average Scores by Modality

Modality	Mean Difference	SE	t	p tukey
On-ground & Online	-0.035	1.707	-0.021	1.000
On-ground & Hybrid	-5.940	1.679	-3.538	0.003
Online & Hybrid	-5.905	1.158	-5.100	<.001

Year 2017-2018

The data found the average licensure exams score for the year 2017-2018 for all exams was 261.055 for hybrid programs, 253.500 for on-ground programs, and 249.083 for online programs. The data revealed hybrid programs scored the highest, followed by on-ground programs, with online programs scoring the lowest. An ANOVA revealed (F(3, 136)=1.233; p=.300). The *post-hoc* test shows a statistically significant difference between online and hybrid modalities. See Table 4.

Year 2018-2019

The data found the average licensure exams score for the year 2018-2019 for all exams was 256.889 for hybrid programs, 253.722 for online programs, and 252.75 for on-ground programs. The data showed hybrid programs obtaining the highest score, with online programs scoring the second highest, followed by on-ground programs reporting the lowest average score. During this year, on-ground programs had the lowest average score. An ANOVA revealed (F(3, 136)=37.76; p=.993). The *post-hoc* test shows no statistically significant differences between the three modalities. See Table 5.

Year 2019-2020

The data found the average licensure exams score for the year 2019-2020 for all exams was 260.222 for hybrid programs, 249.111 for online programs, and 252.00 for on-ground programs. The data showed hybrid programs obtaining the highest score, with on-ground programs scoring the second highest. During this year, online programs had the lowest average score. An ANOVA revealed (F(3, 136)=37.932; p=.673). The *post-hoc* test shows a statistically significant difference between online and hybrid modalities. See Table 6.

Table 4.

Post Hoc Comparisons of 2017-2018 Average Scores by Modality

Modality	Mean Difference	SE	t	p tukey
On-ground & Online	0.842	2.560	0.329	0.998
On-ground & Hybrid	-6.692	2.578	-2.596	0.051
Online & Hybrid	-7.534	1.614	-4.669	<.001

Table 5.

Post Hoc Comparisons of 2018-2019 Average Scores by Modality

Modality	Mean Difference	SE	t	p tukey
On-ground & Online	-0.590	2.366	-0.249	0.995
On-ground & Hybrid	-6.172	2.313	-2.669	0.042
Online & Hybrid	-5.583	1.818	-3.070	0.014

Table 6.

Post Hoc Comparisons of 2019-2020 Average Scores by Modality

Modality	Mean Difference	SE	t	p tukey
On-ground & Online	0.560	2.676	0.209	0.998
On-ground & Hybrid	-6.690	2.552	-2.622	0.051
Online & Hybrid	-7.250	1.710	-4.239	<.001

Year 2020-2021

The data found the average licensure exams score for the year 2020-2021 for all exams was 255.889 for hybrid programs, 253.367 for online programs, and 245.500 for on-ground programs. The data showed hybrid programs obtaining the highest score, with online programs scoring the second highest. During this year, on-ground programs had the lowest average score. An ANOVA revealed ($F(3, 136)=37.204$; $p=.389$). The *post-hoc* test shows no statistically significant differences between the three modalities. See Table 7.

Full Cycle Analysis

When examining the average scores over the four years, hybrid programs consistently scored the highest, followed by online and on-ground programs splitting the years evenly. In 2018-2019 and 2020-2021, online programs were the second highest scoring modality. In 2017-2018 and 2019-2020, on-ground programs scored higher than online programs. See Table 8. The average modality scores over the four years indicated hybrid programs obtained the highest average score of 258.514. Coming in second place were online programs with a score of 251.321. Finally, on-ground programs scored the lowest with an average score of 250.938. See. Table 9.

When analyzing the average scores by year of each modality, trends were attained and noted. First, on-ground program scores were in a consistent decline over the four-year cycle. The 2020-2021 year was significantly lower for on-ground programs and the researcher can possibly attribute this to the COVID-19 pandemic and institutions on-ground institutions modifying modality of instruction which may contribute to lower scores by exposing students to a new mode of instruction via a virtual campus.

Table 7.

Post Hoc Comparisons of 2020-2021 Average Scores by Modality

Modality	Mean Difference	SE	t	p tukey
On-ground & Online	-3.117	2.519	-1.238	0.604
On-ground & Hybrid	-8.165	2.498	-3.269	0.007
Online & Hybrid	-5.048	1.429	-3.533	0.003

Table 8.

Modality Rankings by Year All Exams

Year	Highest	Middle	Lowest
2017-2018	Hybrid	On-ground	Online
2018-2019	Hybrid	Online	On-ground
2019-2020	Hybrid	On-ground	Online
2020-2021	Hybrid	Online	On-ground

Table 9.

Average Modality Scores Over All Years

Modality	Four-Year Average Score	Ranking
Hybrid	258.514	Highest
Online	251.321	Middle
On-ground	250.938	Lowest

Hybrid programs reported the lowest score during the 2020-2021 year and indicated a decline in average scores with the exception of the 2019-2020 academic year. The overall decline in average scores was 5.166 points over the four-year cycle from 2017-2018 to 2020-2021. The online modality programs showed the highest scores in 2018-2019 and fluctuating over the four years cycle. The lowest reported year of average scores was the 2019-2020 academic year while 2020-2021 was the second highest scoring year. The online modality institutions showed an increase of average scores from 2017-2021 of 4.28 points which was not consistent with the decline is average scores during the four-year cycle that on-ground and hybrid institutions reported. This non-decline in average scores could be attributed to the COVID-19 pandemic not affecting the modality of instruction since these schools were not required to adapt instruction and students were acclimated previously to the online modality of instruction whereas hybrid and on-ground institutions were not. Similar to hybrid programs, on-ground institutions reported an 8.00 point decline in scores from 2017-2021. To be noted, on-ground institutions did not have scores for the P-12 All-Grade exam for the four-year cycle due to an $n<10$ for the exam. Overall, the difference between on-ground and online program total average score over the four-year cycle was .383 points with online schools reporting the higher average. It is important to report all modalities of instruction obtained passing scores every year with the passing score being a 220 for all four years which was notable. The State of Indiana only declined by one point overall from 2017-2021 showing an increase in 2018-2019 with the lowest average score during the 2020-2021 academic year which, once again, could be contributed to the COVID-19 pandemic. The state scores fluctuated over the four-year cycle with no trends evident. See Table 10 for further detail.

Modality Comparisons by Pedagogy Exam Scores

The second data analysis to guide the study reviewed the average licensure scores of each of the three pedagogy exams over the four-year cycle by each modality. Recall, three pedagogy licensure exam scores were examined were Elementary Education K-6, Secondary Education 5-12, and All Grade Education P-12. The average licensure exam score for the above-mentioned independent variable (licensure exam grade band) controlling for modality was examined and reported below. The average scores were aggregated over the four-year cycle to allow for some years being sparse in data for specific exams. The number of test takers for each exam over the four-year cycle is reported in Table 11.

Exam One (K-6 Elementary) Comparisons

All graduates of Educator Preparation Programs (EPP) in Indiana that wish to license and teach in grades K-6 as an elementary generalist, must successfully pass the K-6 Elementary Generalist Pedagogy exam. Additionally, special education (both mild and intense intervention), health, physical education, music, and visual arts graduates may also attempt this exam to have the ability to teach in this grade band. Graduates who complete an elementary program at an EPP in Indiana may also, once licensed, to add on content areas to their existing elementary generalist license to allow them the ability teach in junior high and high school settings by only taking the content exams. These teachers are not required to take the 5-12 Secondary Pedagogy exam even though they will be teaching in the 5-12 grade bands. Therefore, a small number of graduates pass this exam with no intention of teaching in an elementary setting but only to establish an initial teaching license to later add on content areas to teach in secondary settings. The reported data for the K-6 pedagogy exam in this study revealed similar data as examination by year in section one of this study. Analysis of average licensure exam scores reported the highest average

Table 10.

Modality Average Score by Year

Year	On-ground	Online	Hybrid	Indiana
2017-2018	253.500	249.083	261.055	254.666
2018-2019	252.750	253.722	256.889	257.333
2019-2020	252.000	249.111	260.222	257.000
2020-2021	245.500	253.367	255.889	253.667

Table 11.

Number of Test Takers for Each Exam

Exam	Number of Institutions Reporting	Total Number of Test Takers
K-6 Elementary	12	684
5-12 Secondary	17	924
P-12 All-Grade	5	257

score were hybrid programs with 258.514 points. The second highest modality was online institutions with a average score of 251.321 points. Finally, the lowest scoring modality was on-ground with a average score of 250.938. The average score for all State of Indiana test takers was 253.500 for the K-6 Elementary exam.

The researcher had the ability to disaggregate average scores for the K-6 Elementary Generalist exam by modality and year for comparative purposes. Table 12 reports the average scores for each modality for each year in the four-year cycle. With the exception of online programs, the lowest year for the remaining two modalities and the State of Indiana scored the lowest in the 2020-2021 academic year. Both on-ground and hybrid programs showed a consistent decline over the four-year cycle whereas online programs scores fluctuated.
Table 12.

An ANOVA revealed ($F(3, 136)=35.72$; $p=.691$). The *post-hoc* test shows a statistically significant difference between online and hybrid modalities. See Table 13.

Exam Two (5-12 Secondary)

All graduates of Educator Preparation Programs in Indiana that wish to license and teach in grades 5-12 in a middle school or high school, must successfully pass the 5-12 Secondary Pedagogy exam. This exam is recommended to those who wish to teach in middle or high school core content areas. Evidenced in the grade bands, there is an overlap of two grades, grades five and six, between the K-6 Elementary Generalist exam and the 5-12 Secondary exam. In addition to teachers who wish to license and teach content in secondary settings, graduates who plan to teach special education (both mild and intense intervention), health, physical education, music, and visual arts graduates may also attempt this exam to have the ability to teach in this grade band. As previously discussed, all licensed teachers must pass at least one pedagogy exam and at

Table 12.

K-6 Elementary Exam Scores by Modality and Year

Modality	2017-2018	2018-2019	2019-2020	2020-2021
On-ground	253.000	250.000	245.000	243.000
Online	248.500	253.666	251.666	249.500
Hybrid	257.666	254.666	259.666	255.000
Indiana	254.000	253.000	256.000	252.000

Table 13.

Post Hoc Comparisons of K-6 Elementary Exam by Modality

Modality	Mean Difference	SE	t	p tukey
On-ground & Online	-0.645	1.740	-0.370	0.983
On-ground & Hybrid	-6.603	1.742	-3.618	0.002
Online & Hybrid	-5.658	1.208	-4.684	<.001

Table 14.

5-12 Secondary Exam Scores by Modality and Year

Modality	2017-2018	2018-2019	2019-2020	2020-2021
On-ground	254.000	255.500	259.000	248.000
Online	256.750	260.500	249.666	253.600
Hybrid	266.000	255.500	259.000	257.666
Indiana	260.000	261.000	258.000	256.000

least one content area exam (e.g., math, biology, history). The reported data for the 5-12 Secondary pedagogy exam in this study revealed similar data as examination by year in section one of this study. Analysis of average licensure exam scores reported the highest average score were hybrid programs with 259.542 points. The second highest modality was online institutions with an average score of 255.129 points. Finally, the lowest scoring modality was on-ground with an average score of 254.125. The average score for all State of Indiana test takers was 258.750 for the 5-12 Secondary exam.

The researcher had the ability to disaggregate average scores for the 5-12 Secondary exam by modality and year for comparative purposes. Table 14 reports the average scores for each modality for each year in the four-year cycle. An ANOVA revealed ($F(3, 136)=36.024$; $p=.789$). The *post-hoc* test shows a statistically significant difference between online and hybrid modalities. See Table 15.

Exam Three (P-12 All-Grade) Comparisons

All graduates of Educator Preparation Programs in Indiana that wish to teach in grades P-12 must successfully pass the P-12 All-Grade pedagogy exam. The most common type of graduate to attempt this exam are those planning to teach special education (mild and intense intervention), music, visual arts, physical education, health, school counseling, and school psychology due to these subject areas spanning the full P-12 grade bands. Although not an exclusive list, these content areas comprise of the majority of test takers attempting this exam. Once again, it is important to emphasize that on-ground institutions were not included in this study due to the low number of test takers and the data is not available to the researcher. The reported data for the P-12 All-Grade pedagogy exam analysis of average licensure exam scores reported the highest average score were hybrid programs with 259.25 points. Online programs

Table 15.

Post Hoc Comparisons of 5-12 Secondary Exam by Modality

Modality	Mean Difference	SE	t	p tukey
On-ground & Online	-0.302	1.691	-0.179	0.998
On-ground & Hybrid	-6.014	1.659	-3.625	0.002
Online & Hybrid	-5.711	1.165	-4.903	<.001

were lower with an average score of 251.321. The average score for all State of Indiana test takers was 254.75 points for the P-12 All-Grade exam.

The researcher had the ability to disaggregate average scores for the P-12 All-Grade exam for the four years of data for comparative purposes for only online and hybrid modalities. Table 16 reports the average scores for each modality for each year in the four-year cycle.

Exam Comparisons by Modality

On-ground Institutions. The data revealed the average score for on-ground modalities was 247.750 for Exam One (K-6 Elementary) while the average score was 254.125 for Exam Two (5-12 Secondary). On-ground institutions did not have data for Exam Three (P-12 All Grade) therefore a three-exam comparison could not be performed. The average score for the four years reported for the two exams combined was 250.938 points. See Table 17.

***Online Institutions*.** The data revealed the average score for online modalities was 250.833 for Exam One (K-6 Elementary) while the average score was 255.129 for Exam Two (5-12 Secondary). The average score for the P-12 All Grade exam was 248.000. The average score for the four years reported for all three exams combined was 251.321 points. See Table 18.

***Hybrid Institutions*.** The data revealed the average score for hybrid modalities was 256.750 for Exam One (K-6 Elementary) while the average score was 259.542 for Exam Two (5-12 Secondary). The average score for the P-12 All Grade exam was 259.250. The average score for the four years reported for all three exams combined was 258.514 points. See Table 19.

Table 16.

P-12 All-Grade Exam Scores by Modality and Year

Modality	2017-2018	2018-2019	2019-2020	2020-2021
Online	242.000	247.000	246.000	257.000
Hybrid	259.500	260.500	262.000	255.000
Indiana	250.000	258.000	258.000	253.000

Table 17.

On-ground Modality Scores by Exam All Years

Exam	Average Score	Ranking
K-6 Elementary	247.750	Lowest
5-12 Secondary	254.125	Highest
P-12 All-Grade	No Data	N/A
All Exams	250.938	N/A

Table 18.

Online Modality Scores by Exam All Years

Exam	Average Score	Ranking
K-6 Elementary	250.833	Lowest
5-12 Secondary	255.129	Highest
P-12 All-Grade	248.000	Middle
All Exams	251.321	N/A

Table 19.

Hybrid Modality Scores by Exam All Years

Exam	Average Score	Ranking
K-6 Elementary	256.750	Lowest
5-12 Secondary	259.542	Highest
P-12 All-Gade	259.250	Middle
All Exams	258.514	N/A

Analysis of Modality by Exam

All three modalities were consistent in that the K-6 Elementary exam was the lowest scoring exam. Both online and hybrid modalities data showed the 5-12 Secondary exam was the highest scoring exam. Additionally, both online and hybrid modalities data revealed the middle ranking exam was the P-12 All-Grade exam. On-ground institutions did not have the ability to report P-12 All-Grade data so by definition the 5-12 Secondary exam was the highest scoring exam and, as mentioned, revealed the K-6 Elementary exam as the lowest scoring exam. Upon reviewing the total average scores for all three exams, the data was consistent with section one in reporting hybrid institutions scored the highest, followed by online modalities, then on-ground modalities. The average score of all State of Indiana test takers was 255.666. See Table 20.

When reviewing the data from the K-6 Elementary exam, the only modality that scored higher than the state average were hybrid institutions. Secondary 5-12 data revealed the same trend for the hybrid modality scoring higher than the state average, but on-ground and online institutions did not. For the P-12 All-Grade exam, the hybrid modality average was also higher than the state average while online institutions were lower than the state average. Finally, the average scores of all three exams for each modality revealed hybrid modality scores were highest, followed by the online modality, with on-ground institutions scoring the lowest as consistent with section one of this study. Consistent with exams aggregated, the only modality that scored higher than the state for the average scores of all exams were hybrid modalities. See Table 21.

Table 20.

All Exam Average Scores by Modality All Years

Modality	Average Score (All Exams)	Ranking
On-ground	250.938	Lowest
Online	251.321	Middle
Hybrid	258.514	Highest
State of Indiana	255.666	N/A

Table 21.

Modality Average Score by Exam All Years

Year	On-Ground	Online	Hybrid	Indiana
K-6 Elementary	247.500	250.833	256.750	253.500
5-12 Secondary	254.125	255.129	259.542	258.750
P-12 All-Grade	N/A	248.000	259.500	254.750
All Exams	250.938	251.321	258.514	255.666

CHAPTER FIVE

Discussion of Findings

Introduction

This study investigated if the modality of instruction employed by Educator Preparation Programs (EPPs) in Indiana had a correlation to pedagogical licensing exam scores for students of the corresponding post-baccalaureate program of institutions examined. On-ground, online, and hybrid teacher preparation programs are attempting to recruit pre-service teachers to attend their institutions to support K-12 districts in the teacher shortage crisis facing the United States, so this data is of particular interest to EPPs and K-12 disctricts According to the U.S. Department of Education, all 50 states reported shortages in more than one area for the 2022–23 school year (Darling-Hammond, DiNapoli Jr & Kini, 2023). One of the most common tensions in higher education institutions (HEIs) is related to deciding which teaching methods and learning environments should be used to ensure quality and expand coverage (Green, 1994; Brookes & Becket, 2007; Lee & Im, 2014). To further examine this quandary, the research questions for this study examine what the relationship is between instructional modality and pedagogy licensing exam scores in post-baccalaureate educator preparation programs. And second, how does the relationship between modality of instruction and exam scores compare across grade bands and years in pedagogy licensing exams.

Summary of Research

In the changing environment of higher education, it is imperative learning environments and modalities are examined for effectiveness and efficacy of licensed graduates upon completion of a program. From teacher turnover and burnout to lack of enrollment of pre-service teachers in preparation programs, the teacher shortage is increasing in intensity and is marked by

controversial issues at its heart. It has been widely held that teacher staffing problems and shortages are primarily due to an insufficient supply of new teachers in the face of two large-scale demographic trends—increasing student enrollments and increasing teacher retirements due to an aging of the teaching force—and that these staffing problems have resulted in lower school performance (Ingersoll & Tran, 2023). The research in this study included examining 18 post-baccalaureate Educator Preparation Programs in Indiana to determine if significant differences in average pedagogy licensing exam scores were observed based on modality of instruction utilized by the institution. Having a significant number of institutions in the study, a total of 1,865 test takers over a four-year time frame, along with the ability to disaggregate data based on grade band of the pedagogy exam (K-6 Elementary, 5-12 Secondary, and P-12 All-Grade) and year, provided rich data for analysis and observation of trends across modalities, years, and exams.

Each of the existing modalities (on-ground, online, and hybrid) have their defenders, many times arguments for or against a given modality are based in research but some institutions may have circumstances in which to promote a particular modality. Self-preservation of higher education institutions, particularly smaller, private universities, can drive research efforts to report only on demographics that relay the intended results to promote initiatives or a specific modality of instruction.

Interpretation of Findings and Discussion

The interpretation of findings and discussion section is organized to answer the two research questions found in this study. Each research question will be explored to provide interpretations of the data and correlating results. Implications are drawn and explained within this section and trends are discussed.

In review, all teacher preparation program graduates that wish to obtain a teaching license must pass at least one pedagogy licensure exam to measure pedagogical content and knowledge. The licensure exams are intended to measure the level of pedagogical preparation provided the Educator Preparation Program (EPP) to ensure a level of competency to enter the classroom as a teacher. According to Žogla (2018), pedagogical instruction can be defined as:

> A university discipline in the field of education sciences and a deliberate process of intentional teaching and learning is a process for living (Dewey, 1963); based on specific regularities and theoretical assumptions organized process of education has to mediate the learning and developing persons with their environment. Knowledge of education and educational knowledge are complex phenomena that require integrated and updated understanding of humanities and social sciences, including large components of educational practice with the growing amount of knowledge.

EPPs have the responsibility of preparing their students with the necessary skills and knowledge to enter the workforce upon graduation and promote the passage of necessary licensure exams required to obtain a teaching license. Providing meaningful and purposeful field experiences, along with content and instructional preparation, is integral to establishing an effective teacher with relevant and appropriate pedagogical knowledge. Therefore, examining pedagogy licensing exams scores was essential in examining teacher preparation programmatic success by modality to guide future research and data collection.

Modality and Exam Scores Overall Results

This study examined the pedagogy licensure exam scores of 18 Educator Preparation Programs (EPPS) in Indiana over a four-year period (2017-2018, 2018-2019, 2019-2020, and 2020-2021). For purposes of this study, on-ground EPPs were categorized by no more than 20%

of courses being administered online during the year(s) examined. Online institutions were those EPPs that provided 100% online instruction. Hybrid EPPs were designated as those that provided more than 20% of coursework online.

After analysis, the data revealed the highest aggregated average score for all four years on all three pedagogy exam grade bands was attributed to hybrid institutions. These results suggest the best performing modality of instruction for the years examined was hybrid institutions by an average score of 258.514. For background, blended (or hybrid) learning, as defined by Dziuban et al. (2004), is an instructional method that includes the efficiency and socialization opportunities of the traditional face-to-face classroom with the digitally enhanced learning possibilities of the online mode of delivery. A blended course comprises in-person sessions that are accompanied by online resources and tasks; essentially a combination of both on-ground and online learning. Characteristics of this approach include (a) student centered teaching where each and every student has to be actively involved in the content (b) increased opportunities for interaction between student-faculty, student-student, content-student, and student-additional learning material (c) opportunities to collect formative and summative assessment to improve course offerings (Watson, n.d.).

Hybrid classes and programs have many strengths that may have contributed to the modality reporting the highest average score. The ability for students to self-pace and create a sense of self-accountability by encouraging autonomy is a benefit of this type of modality. Hybrid learning environments also provide accessibility for disabled students who may have difficulties attending classes 100% on-ground. These teacher preparation programs can also accommodate those students that may work during the day and attend classes in the evening. A hybrid model of class schedule appears to be the most common schedule for hybrid programs

(online coursework with some evening classes). For students that are on Emergency Permits and teaching in a P-12 school while attending a teacher preparation program, hybrid institutions are ideal for those who can learn both online but prefer some face-to-face contact with peers and instructors. These students can teach during the day but attend classes in the evening while bringing real life struggles in the classroom to peers and faculty for discussion. It is important to stress, successful pedagogical preparation consists of both content knowledge and experience in field placements in P-12 classrooms, so student teaching and field observations are critical to successful preparation. It may be inferred students benefit from on-ground remediation if there is confusion or questions encountered during the online learning aspect of the learning process. The pedagogical content knowledge relayed via online instruction can be clarified during on-ground coursework may be an unexpected benefit of hybrid instruction.

Meta-analytic findings comparing online modalities to in-person learning suggest that online education is just as effective as in-person education (Sitzmann et al., 2006). Interestingly, and consistent with this study, research indicates use a more precise classification (online only, hybrid, in-person only) find that hybrid modalities are significantly more effective than in-person modalities and that there are no differences in effectiveness between in-person and online only courses (Means et al., 2013). Flexibility of online learning with the social support of on-ground learning can be appealing to many students and may contribute to higher licensure exam scores due to retention of quality and committed students. Hybrid programs also provide students with digital citizenship and would ease the transition to 100% online learning if another pandemic or catastrophe occurs which would require a return to purely online learning. Finally, having an online component to the hybrid modality is preparing pre-service teachers for the technological advances being introduced in P-12 schools and this type of knowledge that is sure to be included

on licensure exams moving forward. As licensure exam providers continue to update assessments, more questions relating to technology and pedagogical preparation using technology will likely become more prevalent. By attending hybrid higher education programs, graduates will be better prepared to the reality of P-12 teaching: on-ground instruction in the classroom but utilizing online tools and technology for learning purposes. Teachers are starting to take on more of a proctor role in some schools that rely heavily on online learning components while residing in a brick-and-mortar school. Teachers must be prepared pedagogically for this type of learning and hybrid teacher preparation programs mimic this model in many ways. Hybrid programs may better prepare students pedagogically by coming the best of both worlds; a mixture of in-person and online modalities of instruction.

The second highest scoring modality over the four-year cycle on all exams was online programs. Online programs revealed an average score of 251.321 points. The difference in average scores between hybrid and online programs overall was 7.193 points. This difference represents a statistically significant relationship between hybrid and online programs. Online instruction was somewhat forced upon many instructors and students as a result of the COVID-19 pandemic. Having to adjust quickly to an unusual situation and, more specifically, the shift from on-ground instruction to online learning formats, placed even higher demands on students' ability to transition to a new mode of learning as well as faculty. Depending on if instruction is presented synchronously or asynchronously, online instruction allows students to choose the most productive and available times to complete tasks required for coursework. Results from a study conducted by Hofer, Nistor, & Scheibenzuber (2021) showed that although there were some positive effects on motivation and attitudes, for students to really profit from online self-directed customization, sufficient self-regulation strategies seem to be essential. If students do

not possess these skills themselves, scaffolds and scripts can help them to navigate, choose, and make use of adequate learning tasks (Lehmann et al., 2014). Artificial intelligence and educational data analytics can automatically accommodate individual characteristics (e.g., Magoulas et al., 2003), and, more general, adaptive learning environments, like cognitive and metacognitive tutoring systems (Ritter et al., 2007) or interactive textbooks are hence promising ways to provide personalized feedback and realize individualized learning in online higher education. Although most of the success in online courses and programs rely on the self-motivation of the student, feedback from faculty and instructors are at the crux of the student experience and therefore online programs can be a detriment or benefit for students that are working or have children in the home where childcare would be an unrealistic expense. The significant difference in scores between hybrid and online programs was somewhat surprising but, as noted, online students may not be prepared for the level of commitment required and struggle to absorb and subsequently account for the required knowledge essential to pedagogy exams.

Lodge et al. (2022) proposed there are five main reasons why online learning is difficult for students:

1. Online learning can be isolating because interaction online is foreign to students and teachers compared with entire lives spent interacting face to face with others.
2. Increased flexibility puts more of an onus on students to judge their own progress and make good choices and not everyone has the capacity to make good judgements about their learning and act wisely on those judgements (a.k.a self-regulated learning).

3. Students don't always know where to get help in online environments because students don't recognize when they need help, and they either don't know where to get help or feel uncomfortable about accessing virtual help.
4. The "screen inferiority effect": there is uncertainty about how much difference there is between acquiring information online as opposed to in physical environments, but there is enough research to suggest that there can be a cost to online learning regarding the effectiveness of the time spent.
5. It's easy to get diverted from study online given all the distractions that are only one click away so students are easily diverted from online study.

Given these concerns, online programs must be cognizant of potential issues and address them decisively and in full transparency with students. One obvious draw back to online coursework is it is difficult to ensure the student registered for the course is the actual individual completing the coursework. Although unethical, it is not uncommon for others to pass off work as their own when it is not. The lower licensure scores could be the result of the test-taker not being the individual that completed the mandatory work required to gain the necessary knowledge to obtain a passing score. Additionally, online programs are only expected to grow exponentially in upcoming years and decades. There are many strengths and weaknesses to consider when discussing teacher preparation and 100% online instruction. Policymakers and Departments of Education must monitor outcomes, such as licensure exam scores, to ensure quality teachers are being placed in the classroom rather than just graduates of universities that provide minimal oversight of student work and field observations. It is imperative online programs require observations by institutionally appointed supervisors and provide feedback of pedagogical

practices. There are unfortunately some teachers that may score high on exams due to valid content preparation on pedagogy but cannot translate the content to skills in the classroom.

On-ground average scores were calculated at 250.938 points. This was the lowest scoring modality over the four-year cycle for all exams. The difference in average scores between on-ground and hybrid modalities was 7.576 points. The difference in average scores between on-ground and online modalities overall was only .383 points. On-ground instruction has been present in higher education for centuries, but trends are leaning towards online and hybrid modalities due to advanced technological advances and the ability of students to navigate online modalities. On-ground instruction requires a time commitment that many post-baccalaureate students are unable to commit to due to work and family obligations. As evidence in this study, only three on-ground EPPs had the ability to report data due to low enrollment. This is a direct reflection on the dwindling number of on-ground post-baccalaureate programs in Indiana and across the country. The decline in on-ground programs has deep implications for EPPs and institutions in general. Lederman (2021) reported the roughly 2,200 colleges and universities that participate in NC-SARA reported a 93 percent increase in the number of students enrolled exclusively online, to 5,825,723 from 3,016,944 in 2019. Additionally, the growth in online enrollments was grew by 367 percent and the rates of growth were two to three times higher than at private nonprofit colleges and many times greater than at for-profit colleges (Lederman, 2021). The outcomes of the increase in online programs can be seen when discussing the social and emotional health of college students, specifically undergraduate students. Attending college plays more than just the role of transmitting knowledge but also plays a role in interacting socially with others. Interacting with peers and faculty members provides students with valuable lessons in communication strategies, conflict resolution, and verbal reasoning skills. The lack of

interaction with live humans could have deep effects and potential consequences moving forward. The pandemic and resulting social isolation had effects on children and adults alike that may not be reversable but only time will tell. Being connected to a device, whether it be a cell phone or laptop, has been a worrisome for decades and the increase in online education is only amplifying the amount of time one may spend in from of a screen with potentially dire health implications, both physically and mentally.

It is important to note again, the passing score for all three pedagogy exams was a score of 220 points so all modalities reported average scores well-above the minimum score required for passage which is encouraging. Ultimately, it appears as if EPPs in Indiana are preparing graduates at the sufficient level of pedagogical knowledge required for licensure. Additionally, the study included Transition to Teaching programs which are primarily comprised of those students wishing to switch careers and, therefore, committed to the process of obtaining a valid teaching license. For those receiving master's degrees, these students are many times completing the degree for employment purposes or to increase their current salary. This provides a motivation that some undergraduate students may not have inherently.

Referring to Table 8. *Modality Rankings by Year,* results were consistent in that hybrid modalities reported the highest average scores for all years examined when disaggregated. Online and on-ground modalities fluctuated evenly over the four-year cycle. Online modalities scored higher than on-ground modalities in in 2018-2019 and 2020-2021. As such, on-ground programs scored higher than online programs during the 2017-2018 and 2020-2021 academic years. Trends are noted in the analysis in Chapter Four regarding the disaggregated year comparisons.

Significance of Study

Although some universities are returning to the pre-pandemic modes of instruction, most are maintaining a higher level of alternative course modalities including both virtual synchronous classes and online asynchronous courses which creates an impetus to design courses that can be delivered in a variety of modalities (Wilson and Alexander, 2021). As evidenced in the Chapter Two literature review, data and research is mixed across the board on if or which modality is most effective when training pre-service teachers for licensure requirements, such as pedagogy licensing exams. A recent study conducted by Hammack, Yeter, Pavlovich, & Boz (2024) reported no significant difference between efficacy gains based on course modality of pre-service teachers enrolled in a methods course offered in four modalities (i.e., face-to-face, hybrid, online, rapid shift online). Teacher preparation programs will need to adjust to changing desires of potential students for mode of instruction bet yet monitor programmatic results to ensure quality teachers are provided to stakeholders in the education community. This study was conducted to gather data to influence potential change of the quality of post-baccalaureate teacher preparation programs by identifying any differences in pedagogy licensing scores based on modality of instruction. The instruction of pre-service teachers and respective licensure of those students is vital to addressing concerns surrounding higher education and teacher preparation across the country. Teacher attrition rates, teacher burnout, declining teacher preparation program enrollment, teacher compensation, and the perception of the profession of teaching plays a role in the future of education. P-12 students and high school graduates face grave difficulties both in school and personally that are contributing to the decline in student standardized scores in comparison to other countries across the globe. Although many times politicized, the future of

the country lies in the hands of the teachers that educate students who will inherit the struggles of educational system currently in place.

The steep increase in technological aptitude in younger generations will further necessitate the need for continued means alternative instruction and making teacher education accessible and affordable to new potential teachers. The growth in large, for-profit, online institutions is evident when examining trends in higher education, but this may not be the response the market is seeking to address the teacher shortage. Struble (2023) found online students are more likely to transfer to another institution, enroll at an institution with the purpose of only taking a few courses for different reasons with no plans of graduating, or take courses at an online institution for convenience with the intent to transfer them into a degree program elsewhere. Additionally, the study identified statistically significant results by instructional modality for students' reports of satisfaction with the institution (i.e., online students were more likely to report high satisfaction), retention year-over-year (i.e., on-campus students were more likely to retain), and graduation rate (on-campus students were more likely to graduate) (Struble, 2023). All modes of instruction, from on-ground to online to hybrid, have their advantages and disadvantages which allows for students to make the choice of which institution to attend and what program or modality best fits their needs.

Limitations

After obtaining and analyzing the data in this study, the first limitation was the inability to examine P-3 Early Childhood Exam scores based on the low number of test-takers in the State of Indiana during the four-year period. An additional limitation was only having the ability to examine post-baccalaureate programs since all baccalaureate undergraduate programs in Indiana utilize on-ground instruction apart from alternative routes (Teacher for Tomorrow and Teach for

America) and the large, for-profit, online programs offered across the country. The alternative route data was not reported by the Indiana Department of Education and could therefore not be aggregated. Also, the P-12 All-Grade Exam did not have sufficient data to analyze for on-ground programs so the only comparison could be obtained was between online and hybrid programs. Due to access, the study only included Indiana Educator Preparation Programs (EPPs) and was limited to that state. Results may vary across states, years, and licensure exam provider.

The Indiana Department of Education does not report scores for exams that had n<10 of test takers so this limited many EPPs being included in the study. Although grateful for the 18 institutions that were able to be analyzed, it would have been useful to have access to all institutional data that had test takers during the academic year. Also, data from more recent post-COVID-19 academic years could not be utilized due to the switch in licensure exam providers (Pearson to Praxis) which occurred in September of 2021 in Indiana. The two exam providers have very different exams based on number of questions and varying cut scores across all exams, including the pedagogy exams analyzed in this study. It was straightforward with Pearson in that the pass score was the same (220) for all pedagogy exams scores. Finally, the inability to disaggregate scores based on demographic data was unfortunate. One of the parameters of the licensure exam data reporting by the Indiana Department of Education is the demographic data is aggregated for the entire institution (both baccalaureate and post-baccalaureate programs), which would not be reflective of the data reported in the study. The demographic data could not be disaggregated to determine trends or significant differences.

Recommendations for Research

Educator Preparation Programs (EPPs) must continue to advocate for future teachers and the profession while remaining student centered when delivering crucial content to pre-service

teachers. The teacher shortage is a multi-faceted issue with many extenuating circumstances that must be examined to confront the crisis swiftly and with the intention of training pre-service teachers to deliver quality content and employ effective pedagogical practice to the students in P-12 classrooms. In accordance with best practices of learner centered instruction, students benefit from flexibility and choice in how, where and when they learn (Cornelius-White & Harbaugh, 2009). Blended learning is shown to be effective for virtual internships (Theelen et al., 2020), for teaching explicit instruction and listening techniques (Yoon & Lee, 2012), and for building community during student teaching (Çobanoğlu, 2018). Defining concrete competencies and considerations for virtual observations will be critical if the trends continue to move toward online instruction and field experiences. Higher education institutions are competing for enrollment so student preferences must be considered, with guard rails for competency and effectiveness, moving forward. Although post-baccalaureate programs were studied in this research, implications for undergraduate programs are apparent in the increase in online enrollment in baccalaureate institutions. Student satisfaction with blended classes has been noted for graduate students (Wong et al., 2021) and for in-service teachers as well (Mouzakis, 2008) which is promising for institutions that provide hybrid methods of instruction. According to this study and much research on the topic of instructional modality, hybrid instruction is an effective means in which to educate pre-service teachers at the post-baccalaureate level and should continue to be utilized in teacher preparation program instruction with concentrated monitoring of teacher efficacy in the classroom after graduation and licensure exam passage rates or aggregated average scoring results.

EPPs should continue to monitor licensure exam results as a measure of effectiveness of pedagogical and content delivery as well as teacher success once in the classroom by examining

growth data of P-12 students to ensure the modality of instruction being utilized in training is successful. Accreditation, state and federal reporting, and internal measures provide means to report and analyze data to inform curricular changes, or changes to the modality of instruction, that may be needed to enhance quality training to pre-service teachers. Additionally, when analyzing modality of instruction effectiveness, it will be imperative to examine demographic data when conducting future research. Gender, race, age, socio-economic status, sexual identity, and underrepresented minority status are all relevant areas in which data can be disaggregated to analyze and study. High school (or previous college) grade point average, athletic status (athlete vs. non-athlete in college), or first-generation status are also variables that should be examined for potential influence in licensure scores and teacher preparation program effectiveness.

Examining if licensure scores correlate to teacher efficacy in the classroom should be researched to determine if licensure exams are a true indication of quality instruction while receiving instruction. Gathering data on student growth, via summative or standardized assessments, could also indicate if modality of instruction played a vital role in teacher quality. Although many times difficult to obtain, classroom student growth data can be attained through data requests to districts, states, the Department of Education, or even to current teachers willing to share confidential/anonymized data. Data on number of field experience hours (observational, practicums, and/or student teaching) prior to graduation or licensure could also be an indicator to measure programmatic success in correlation with licensure scores.

Research should be conducted on both baccalaureate and post-baccalaureate programs to verify results are consistent across levels of instruction (bachelors/transition to teaching/masters programs). There may be inconsistences across programs based on degree status or level of commitment in pursuing additional education past a bachelor's degree. Finally, examining

alternative route teacher preparation programs, such as Teach for America or Teachers of Tomorrow can give insight if these types of programs are as effective in delivering content and field experiences.

Implications for Practice

It has been a long-disputed argument if licensure exams truly measure aptitude in teaching practices, particularly relating to pedagogy. Just as in P-12 schools, vitriol involving standardized exams is common when analyzing predictors of success and performance of teachers. Teacher licensure exams are intended to measure pedagogical knowledge, but we must question if pedagogy practice is better measured via observations, such as student teaching. A pre-service may be a wonderful test taker yet, in the classroom, effective pedagogical practices are extremely lacking. Van Cleef (2022) reported multiple studies have found that scores on licensure tests are weak predictors of success in the classroom and have little effect on student achievement and they cannot consistently predict teaching ability at the individual level: Even when they point in the right direction overall, they produce far too many "false positives" (weak teachers who pass) and "false negatives" (strong teachers who fail). States should have the ability to explore better means of assessing teachers' classroom readiness to increase diversity and decrease potential barriers for individuals desiring to enter the teaching profession.

Importantly, online programs must ensure pre-service teachers are in quality field placements prior to graduation which may present a challenge for large, for-profit programs that do not employ supervisors or observers across the country or world. The researcher is cognizant of the need for content licensure exams, particularly in secondary program content (e.g. math, biology, English). Also, it would be interesting to determine if professional dispositions of pre-service teachers are better indicators of success rather than licensure scores. Persistence,

patience, and empathy are qualities teachers should exhibit in a successful classroom, yet these cannot truly be measured by an exam but only observed. Principals and employers place value on these dispositions and may believe content can be taught if it is lacking but dispositions are inherent. The higher education system is now enrolling and graduating the new generation of students that are familiar with virtual communication, working, and learning due to the pandemic. This study was only inclusive of one year of COVID-19 testing so it is important Departments of Education and EPPs are tracking trends in exam scores. These students are familiar with online education and licensure exam scores may reflect this in online programs scoring higher than other modalities. Additionally, will future generations only want to learn online since that is what they are familiar with. While graduate student enrollment grew across the board in fully online programs, hybrid programs and on-campus programs, the fully online offering saw the largest jump, with a 37 percent increase (Coffey, 2023). This begs the question if ultimately all higher education, and P-12 schools, will be conducted online. If this is the case, institutions and districts must find effective ways to educate students under the somewhat difficult conditions, particularly for pre-service teachers that need mentorship and modeling of effective pedagogical practices.

It is also essential to recognize differences in different set of exams. For example, are licensing teachers in Indiana scoring consistently higher since the switch to Praxis? If so, why is this the case? The hope would be expectations are not being lowered but, once again, how is teacher success measured? There must be homogenized measures among states that relay teacher effectiveness after licensure beyond P-12 student growth observed on standardized tests. As mentioned previously, dispositions and pedagogical practices, not knowledge, should be assessed

in a manner that can be observed to adjust for any concerns present prior to entering the classroom and/or licensure.

Also, pedagogical practices have changed over the decades, and it is possible licensure exams have not kept up with these alterations in practices. Education has unique demands now; social emotional learning, physical safety, and food security are at the forefront currently. Additionally, pedagogical practices vary in different parts of the country based on the community needs and even by race or gender. Licensure exams are not adjusted to the needs of the students that may look very different in schools across the country. For example, Midwest, primarily white, suburban communities may have differing challenges and needs than students in an urban school where the majority of students are underrepresented minorities. Not all schools are the same so why should be believe all licensure exams and pre-service teachers should be the same?

While online programs have many strengths for students, it is also important to consider faculty members not being on campus, social isolation, typically lowered salary, no collegial discussions no happening, and faculty not being available to students face to face. When visually interacting with students, faculty can observe differences in behavior in on-ground programs which is beneficial. Although online instruction allows for faculty to watch mini-lessons virtually, being present in the classroom observing can provide faculty with the opportunity to offer immediate feedback and remediation. Also, hybrid programs should be designed in that face-to-face classes are designed so students can receive clarification and answers to questions as well as participate in discussions and group activities. Allocating time at the beginning of a face-to-face class to discuss and answer questions about the content covered online and providing time at the end to introduce the next online assignment (Hall & Villareal, 2015). All modalities

can benefit from programmatic review to determine where improvements can be made and where strengths are present. Although not currently common, EPPs should be sharing the strengths and weakness with each other to improve education preparation in general. The goal of EPPs are to graduate quality teachers to license to become successful teachers in the field and better the P-12 educational system so we should all work together!

Conclusion

The researcher concluded from this study that modality of instruction has a minimal effect of pedagogy licensing exam scores in post-baccalaureate Educator Preparation Programs (EPPs) in Indiana. Although some outlier results presented in particular years or in specific grade band exams, the hybrid modality of instruction consistently tended to have higher average scores than online and on-ground modalities. Online and on-ground teacher preparation programs were very similar in most years and exams with some results varying. This data and findings align with prior research on the topic by researchers across the country and globe noting significant differences are more specific to demographics rather than modality. Hybrid, online, and on-ground modalities of instruction have strengths and weaknesses associated with them but ultimately students will decide the program modality that best fits their needs.

This study did reveal hybrid programs are most successful in conveying pedagogical knowledge and best pedagogical practices which can inform EPPs on the importance of both on-ground and online instruction. EPPs have the opportunity to adjust instructional models and strategies to best meet student needs by reviewing pedagogy and content licensure exam results yearly to determine potential gaps in curriculum or areas lacking in field experiences. Although online and on-ground modalities fell behind in pedagogy licensure exams scores and these types of assessments should be considered when making programmatic decisions, they should not be

the only measure in which decisions are made to modify program modality. All EPPs should strive to increase licensure exam scores to better prepare pre-service teachers for the current intensity of teaching in P-12 schools and the increasing demands of the profession. Requirements and desired dispositions for teachers in the shifting circumstances of education overall will play into licensure assessments moving forward. Departments of Education in each state are ultimately the gatekeepers for teacher licensure by setting exam passing scores and monitoring EPP effectiveness through mandatory reporting measures. In the end, the market will dictate the enrollment in institutions based on trends in higher education and modality of instruction will continue to be a factor in institutional choice.

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