

# **50 Years of Education Research Trends**

A Synthetic History from 1970 to 2020

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# Executive Summary



## How Have Trends in Education Research Evolved over the Past 50 Years?

History is who we are and why we are the way we are.

David McCullough, American Historian

Education as a professional field and academic discipline has historically evolved and responded to social, economic, and technological changes. This book provides the first comprehensive analysis of research trends in education spanning from 1970 to 2020. In this undertaking, we have divided our treatment into four major subdisciplines of education research:

- [teaching and teacher education](#),
- [educational technology](#),
- [educational psychology](#), and
- [higher education](#).

## Teaching and Teacher Education >

The past 50 years have seen major changes both in teaching and teacher education. Beginning in 1970, education research dove into understanding what makes a quality teacher, how a teacher's training affects student performance, and what measures are effective in evaluating teachers. Continuing into the 1980s, teacher education reform and teacher efficacy dominated education research. Teaching English as a Second Language (ESL) also emerged as a prominent theme in the 1980s, and this theme would influence later research on cultural and social awareness in classrooms. As social awareness increased, education research in the 1990s saw an increase in both female and international authors, as well as articles published focusing on students' race, ethnicity, home, and community. Continual improvement in teacher education has been a major theme in education research over the past 50 years, and researchers in the 1990s discussed strategies to help improve teacher education. Along with improving teacher education, research also focused on socioeconomic and language learning factors that impacted student success. In the 2000s, new research centered on the creation of a teacher's professional identity as researchers continued to redefine quality in teacher education. Research in the 2010s predominantly focused on teacher education, with an emphasis on moving away from industrial models of education toward developing quality programs in universities that would better prepare future teachers and avoid teacher attrition. Technology was also heavily introduced into teacher education research in the 2010s as students and teachers navigated technology both in and out of the classroom. In

current research from 2020, technology, online learning, and race were the most common themes, reflecting concerns that arose from a global pandemic and an increased awareness of racism, along with efforts to promote anti-racism in classrooms and communities. As a whole, the past 50 years of education research in teaching and teacher education have shown a significant shift from standard-based achievement in education to a focus on education that acknowledges barriers to student achievement and trains teachers to work with students to overcome those barriers.

## **Educational Technology** >

Research on educational technology from 1970 to 2020 experienced a shift from being centered on theories about the effectiveness of technology adaptation to understanding how emerging technologies could be adapted for classroom use. Research in the 1970s and 1980s focused on whether or not emerging technology—like television and other visual media—could enhance cognitive behavior. Strong debates ensued as researchers began to study the intersection of technology, education, and psychology; researchers became more accepting of multiple learning theories, and technology in the classroom began to transition from a theory to an applied learning model. The 1990s brought drastic advancements in technology, including the internet and personal devices, and the research done in this decade laid the groundwork for much of the widespread application of technology in education in the 21st century. Starting in the 2000s, the next 20 years of research branched into multiple new applications for educational technology. A combination of rapidly increasing technological progress and greater access to technology allowed learning models like e-learning, blended learning, gamification, and mobile learning to emerge. Increased access to technology through the 2010s meant a shift in the focus of education research from technology related to student achievement to a focus on technology that fosters positive student interaction and relationships. Research over the past 50 years narrowed from a broad discussion of theoretical applications of technology to emphases on more context-aware and specific technology applications.

## **Educational Psychology** >

Themes in educational psychology research have been consistent from 1970–2020. Many of the articles published throughout these decades dove into the intersection of schema, knowledge, motivation, and self-efficacy. Beginning in the 1970s, research in educational psychology sought to understand which factors influenced student achievement and how learning can be more effective. This decade initiated the next 50 years of research on student motivation. The 1980s brought research on self-concept in learners, along with self-efficacy and self-regulation. Much of the research surrounding this decade and the following decades strove to understand which extrinsic and intrinsic factors influenced students to achieve learning goals. Researchers in the 1990s continued to study these common themes from previous decades, with an emphasis on how much control learners have over their learning, as well as the introduction of the idea of cognitive load. During this decade, researchers discussed theories and practices that could reduce the cognitive load on students, while also increasing cognitive development. Another emerging theme in this decade was the focus on counseling relationships, specifically teacher–student relationships. Measuring student motivation and cognitive load were significant aspects of research done in the 2000s. New theories and ways of understanding, like Problem-Based Learning (PBL), were proposed for classroom use. Another theme from this decade was the need for continued research on student emotions and improving research constructs. Moving into the 2010s, research focused on student learning outcomes and improving statistical processes in research and instructional technology. Cognitive load and motivation remained themes in this decade as well. Research in the 2010s considered the influence of new technologies, theories, and teaching and learning methods on student success and failure, while also trying to understand which traditional methods were no longer effective for students’ academic achievement. In 2020, research branched into specific discussions of common themes from the previous decades. Self-efficacy was studied with the intersection of effort and self-regulation. Cognitive load was also studied, now with an emphasis on how distractions added to that load. Research on motivation studied theories about what influences students’ goals and self-evaluations. The topics of student learning and which factors influence successful learning, like peer interaction, technology, and

journaling, were also researched in 2020. While much of the research in educational psychology from 1970–2020 overlapped, the articles built on one another with each passing decade, creating a deeper understanding of the intrinsic and extrinsic factors that influence students.

## **Higher Education** >

Over the past five decades, higher education has shifted its focus from teacher-centered research to student-centered research. This has encouraged more thorough student engagement and more comprehensive learning. In the 1970s, learning environments, study processes, student ratings, and freshman attrition were all heavily studied. Researchers sought to understand the factors that kept university students from staying and succeeding in universities. The articles from this decade began the discussion on student-centered learning and initiated the shift in focus from teacher-centered research. This shifting trend continued throughout the following decades, with the main foci in the 1980s being teacher effectiveness, attrition (especially in nontraditional students), and students' self-assessments. With the shift to student-centered approaches also came a shift from behaviorist to cognitivist methods. Research in the 1990s studied the integration of student-centered instructional design approaches, as well as ethnicity and power structures in higher education. Articles centered on the latter topic addressed many of the concerns minority students face in higher education. Themes in the 2000s were heavily influenced by social, political, and economic factors, with the main topics being student success (specifically, post-graduation), the internationalization of education, and survey response bias. Concerns about the economy continued to significantly influence research in the 2010s as well, with studies emphasizing graduate employability and consumerist education. Student experience was another significant theme in the 2010s, along with the introduction of feminism into education research. Gender equality and its effect on female faculty first became a significant source of study during this decade. Finally, research from 2020 studied partnerships in education, student employability, teaching and learning practices, and online learning. As research became more student-centered during the past 50 years, different theories and perspectives emerged in higher education research. Increased focus on student experience also meant the emergence of research on issues students face, like financial responsibility and racial discrimination. Trends in higher education research have experienced a definitive shift over the past 50 years in response to social, political, and economic factors.

## **Implications**

As we have explored education research in (1) teaching and teacher education, (2) educational technology, (3) educational psychology and counseling, and (4) higher education, we have seen substantial shifts in education that have prepared educators and students to meet current social and educational challenges. Advancements in technological and pedagogical approaches in education have prepared teachers and students for online learning in the digital age. Similarly, a better understanding of student engagement, motivation, and teacher involvement has focused on providing more inclusive and accessible educational experiences for all students.





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# Methodology



## How Did We Conduct Our Analyses of Historical Trends in Education Research?

*The methodology employed for this book involved collecting titles, abstracts, and citation counts from the Scopus API of all articles in the top 20 journals (as identified by Google Scholar) from the four targeted subdisciplines of education research (Teaching and Teacher Education, Educational Technology, Educational Psychology and Counseling, and Higher Education) from 1970 to 2020. Based on citation counts for each article, we identified the top 20 articles for each decade in each subdiscipline and conducted qualitative coding and synthesis of the articles into a coherent narrative for each decade. We also conducted keyword analyses for all articles to identify most common words in titles and abstracts for each decade to assist the narrative.*

Education has changed drastically over the past century as laws, cultures, technologies, societies, and people have evolved in unpredictable ways. Less than a century ago, there were still states in the U.S. that did not have mandatory education laws and public schooling opportunities for children. Less than 70 years ago, *Brown v. Board of Education* declared that racial segregation in schools in the U.S. was unconstitutional, leading to the gradual dismantling of Jim Crow laws and policies into the 1960s and 1970s. In 1957, Sputnik was launched, and in 1961, Yuri Gagarin became the first human to leave Earth's atmosphere, leading to a lengthy and expensive space race between world powers and a surge of investment into STEM fields at all education levels. The first personal computer was created by IBM in 1981, and the invention of the WorldWideWeb by Tim Berners-Lee shortly followed in 1983. In 1989, the Berlin Wall fell, paving the way for the dismantling of the Soviet Union and a democratic resurgence of knowledge and idea-sharing between people from culturally divergent and historically antagonistic countries across the world. In the 1990s, the internet became commonplace in households across the U.S. and many other developed countries. Wi-Fi was created in 1991, and the first smartphone was released by IBM in 1994. The first Apple iPhone was released in 2007, allowing laypeople to have more computer processing power in a single pocket than was available to all of NASA while landing men on the moon less than 40 years earlier. Throughout these shifting decades of technology-enabled globalization, most countries' populations became increasingly heterogeneous and divergent with increased diversity of represented races, ethnicities, languages, and various other identity constructs.

Education and education research have evolved alongside these social and technological changes, with needs evolving, paradigms splintering, methodologies adjusting, learners changing, and institutions adapting to ever-fluctuating contexts and demands. In conjunction with increasing population sizes, growing numbers of scholars, and increased research and communication efficiencies, this has also led to an increase in the amount of education research being produced, with more research articles published each year than in previous years. Taken together, this means that the past 50 years in particular have given rise to a heretofore unprecedented explosion of education research that is both qualitatively and quantitatively different than anything the world has ever seen. In part to deal with this, the education

field proper has further fragmented into a variety of subdisciplines, representing discrete social sciences and professional communities, such as teacher education or educational technology, allowing it to better grapple with continually refined educational problems with increasing sophistication, accuracy, and emphasis.

One problem that this explosion has posed for modern education researchers, practitioners, and policymakers, however, is that in such a wide sea of fragmented research, it is often difficult to get a handle on what we know, where we are as a field, and where we are going. As thousands of new studies are conducted annually, how can any single person manage to understand what we are collectively learning, and how can we translate this into improved practice and an enlightened vision for future research?

This book attempts to tackle this complex problem by providing a bibliometric-driven synthetic history of the past 50 years of education research across a variety of education-related subdisciplines. In compiling a 50-year synthesis for each subdiscipline, our aim is to help the reader to recognize the dominant trends and topics within the subdiscipline across time, the current state of the subdiscipline, and how these takeaways relate to education proper. By identifying the most impactful research articles and topics within subdisciplines and synthesizing them in a cohesive manner, we attempt to show how research in education subdisciplines has evolved across the past five decades and what trends emerge within and between subdisciplines to help us better understand the current state and trajectory of education research.

Synthesizing research across an entire discipline or even a subdiscipline for any amount of time is a daunting task, but doing so across 50 years would be altogether impossible if we did not employ some strict parameters to allow us to focus our efforts on what would be expected to be most beneficial. For instance, each subdiscipline represented in this book might consist of hundreds of professional venues publishing tens of thousands of publications each year. These venues might include either aged or new peer-reviewed research journals, predatory (pay-to-publish) journals, white papers, trade magazines, conference proceedings, or professional blogs. Additionally, even within a particular venue, publications might differ with even the most prestigious research journals often publishing research articles alongside potentially less-interesting publications, such as errata, book reviews, or editorials.

To assist in identifying publications that should attract our attention, bibliometric researchers have long utilized impact indicators to help readers determine the relative importance of both venues and publications to a scholarly community. In the case of venues, metrics such as impact factor (Finardi, 2013; Garfield, 2003), h-indices (Bornmann & Daniel, 2007), and other citation indices are often used as rankings of quality, ostensibly equating a venue's "impact" on its professional field with numbers of times publications within the venue are cited by other publications in specific ways (e.g., ignoring self-citations). Though metrics like these are not perfect representations of a venue's value and have been widely critiqued for their rapidity (Seglen, 1997) or ability to be distorted (Alberts, 2013) or gamed (Huang, 2016; PLoS Medicine Editors, 2006), such factors have been shown to correlate with some other expected measures of venue quality, such as professionals' perceptions of a journal's value (Saha et al., 2003), level of research evidence (Amiri et al., 2013), and likelihood of future scientific achievement (Hirsch, 2007). They are also able to be measured with relative ease and are widely used, making them more workable to more sophisticated alternatives.

Central to this notion of impact is the assumption that the number of times a particular publication is cited has meaning, and the research articles, for instance, that are having the most impact are also the ones being cited most often. Though citation indices are by no means a perfect measure of impact or value, they may nonetheless play an important role in more holistic interpretations of venue and article quality that deserves our attention (West & Rich, 2012). Thus, though citation counts certainly do not tell us the whole story of a publication's impact, they seem to tell us something and at least give us something worthwhile to work with for moving forward.

To balance this tension between measurability and holistic understanding, this book represents a combination of bibliometric study and literature analysis, where we use bibliometrics to identify venues and articles for analysis but then rely upon both qualitative and machine analyses of articles to draw conclusions. To scope our analyses via bibliometrics, we focused on venues that were identified by Google Scholar to be the most impactful in each subdiscipline, as calculated by h5-indices (Google Scholar, n.d.). The h5-index "is the h-index for articles published in the

last 5 complete years ... [and is] the largest number  $h$  such that  $h$  articles ... have at least  $h$  citations each." In other words, if the journal *Educational Technology Research and Development* has an  $h$ -index of 41, this means that in the past 5 years, the journal has published 41 articles that have been cited at least 41 times. Such a metric helps to deal with outlier articles (e.g., one that has thousands of citations) or outlier years and allows us to identify journals that have been fairly stable in the citation counts of their articles over time.

For each subdiscipline, we utilized the Elsevier Scopus API to return all article titles, citation counts, and other information for the top 20 venues provided by Google Scholar for the years 1970 to 2020 inclusive. For a complete list of included journals, please refer to the [Journal List](#) in the appendix. We stored relevant data in a relational database for further query and analysis, resulting in roughly 20,000–30,000 articles per subdiscipline for the 50-year span. This large historical perspective introduced additional challenges for using metrics like citation counts because the lifespan of an article significantly impacted its citation count (e.g., an article published in 2010 had 10 years to garner citations, while an article published in 2019 only had two years). To account for these lifespan differences, we converted citation counts to a citations per year count by dividing the raw citation count by the elapsed time (in days, but normalized to years) since the article was published.

Since the goal of this book is to understand research trends, articles labeled by Scopus as being of other types (e.g., book reviews, errata) were removed. We then organized articles based on year, decade, and citations per year counts to identify (a) the most cited articles per decade and (b) the most cited articles per year. Researchers then reviewed the top 20 most cited articles per decade plus any most cited articles per year that were not included. Researchers compared, contrasted, and synthesized each article's questions, methods, and results with other top articles from the same decade, allowing for a series of snapshots to be created for the 1970s, 1980s, 1990s, 2000s, and 2010s. Articles for the year 2020 were treated as a separate decade and were also synthesized for the purpose of showing current trajectories in research.

To assist in the creation of these decade-framed snapshots, a bag-of-words approach to natural language processing was used to identify dominant keywords and bigrams in article titles for each decade represented. Keywords were single words represented in titles, such as "school," "teacher," or "intervention." Bigrams were double word pairs represented in titles, such as "higher education," "elementary school," or "policy perspective." Stopwords, such as "a," "an," "the," etc., were removed, and words were truncated to their roots using an asterisk to signify truncation (e.g., "school," "schools," and "schooling" were all truncated to "school\*").

For each subdiscipline, we will now proceed by providing some background on the subdiscipline and previous attempts at long-term synthesis, sharing snapshots of each of the five decades and the year 2020, and synthesizing results in terms of (a) most important issues, topics, and trends, (b) missing links, topics, and trends, and (c) discussion and implications. We will then conclude the book by providing some additional synthesis of our findings across all subdisciplines to shed light on the history and state of education proper as a macrodiscipline.

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# Teaching and Teacher Education



## A History of Research Trends from 1970 to 2020

Hillari Bollard, Meagan Nielsen, Layne West, Devin Young, Julie Irvine, & Royce Kimmons

Second Language Acquisition

Teacher Education

Teaching

Efficacy

Educational Reform

Teacher Practice

Teacher Learning

Teacher Beliefs

Attrition

*By undertaking a comprehensive analysis of the top cited research articles in teaching and teacher education over the past 50 years, this chapter identifies trends and issues in this field leading up to and including the year 2020. Data sources included articles from thirteen professional journals on teaching and teacher education. We identified the 20 top cited articles of each decade from 1970 to 2020, resulting in 120 articles comprised of empirical studies, theoretical works, literature reviews, and conceptual papers. Then, we analyzed each article individually for content and compared the articles to identify key themes throughout the decades. Results show that broad changes took place in the field of teaching and teacher education over the past 50 years. We observed the following trends: (a) increased focus on teacher education improvement and reform, including a move from focusing on teacher practice within teacher education programs toward a focus on teacher beliefs, efficacy, and attrition; (b) increased awareness of sociocultural factors within teaching and teacher education; and (c) increased acknowledgment of the unique needs of ESL students, which was reflected by changes in the field of ESL teaching. The implications of this analysis are that as teaching and teacher education evolves, and as researchers and practitioners seek for ways to further improve the field, teaching and teacher education will continue to move toward more student-centered, culturally-aware approaches.*

In this chapter, we analyze top cited research in teaching and teacher education from 1970 to 2020 in order to identify prominent themes, ideas, and methodologies. This analysis will discuss these themes, the contexts in which they were considered, and the methodologies used in the research from these articles to identify similarities and differences, overlap of content, and emerging trends. In doing so, we hope to understand the trends and issues in teaching and teacher education and to identify ways to use what has been learned over the past 50 years to enhance the future of teaching and teacher education.

Many studies, research projects, and special editions of journals or magazines have synthesized teaching and teacher education research. These efforts to synthesize previous research can be classified into two approaches, namely topic-specific summaries and journal-specific syntheses. For example, in a topic-specific summary, Hallinger and Kulophas (2020) summarized research on leadership and professional learning in K–12 schools by conducting a bibliometric

analysis. Ro (2019) focused specifically on novice teachers' professional learning in varied test-based accountability contexts by reviewing all relevant articles published in one specific journal. Although these and other examples cited below are comprehensive in their analysis of one specific topic or topics within one specific publication, to date, there has not been an analysis conducted with the intent to synthesize the literature across topics and journals surrounding teaching and teacher education within the past 50 years. Nor has there been any such review presented in which an overview of the themes or a narrative of the areas of interest in this dynamic field have been provided.

We conducted a brief meta-analysis of literature that aimed to review comparable research in teaching and teacher education. This endeavor revealed that most synthesis articles to date have focused on either a particular issue or limited time period. For example, Küçükaydin (2019) conducted a meta-synthesis that specifically addressed themes and codes of pedagogical content knowledge studies in science education. Zuga (1994) reviewed and synthesized literature published from 1987 to 1993 on K–12 teacher education in technology education. Many articles focused on a range of specific issues, including the role of international experiential learning in the multidimensional development of pre- and in-service language teachers (Çiftçi & Karaman, 2019), the impact professional learning communities have on teaching practices and student learning (Vescio et al., 2008), and the impact of language instruction (Long, 1983). While these examples provide information about specific topics, readers are not able to contextualize the relevant significance of these topics in the greater landscape of issues relating to teaching and teacher education.

In another approach to summarizing the literature, researchers conducted several syntheses encompassing articles from within one specific journal. For example, Livingston and Flores (2017) analyzed research and provided a summary of the major themes published only in the *European Journal of Teacher Education* since its first publication in 1978. In another review, Cottle et al. (2012) examined the *Journal of Technology and Teacher Education* to summarize trends and topics published during the time period from 2001 to 2010. And lastly, Rock et al. (2016) provided a summary of studies published in two journals: *Teacher Education and Special Education* and the *Journal of Teacher Education* from 1996 to 2014. Reviews of this type can provide insight into the publishing priorities of specific major journals in the field of education and may reflect the changing interests of researchers and practitioners. Yet this approach may fail to capture significant trends that were not in line with the publishing priorities of these specific journals, resulting in biases favoring the limited scope and aim of the target journal. In contrast, our research synthesized and analyzed articles from multiple journals and was not limited to specific themes or topics.

Our research adds to the findings from other research in making connections with the contexts of political, social, and educational changes (Crook, 2012). Our unique methodology has given us insight into teaching and teacher education themes from 1970–2020. The articles we analyzed used different methodologies, including empirical, theoretical, conceptual, and literature reviews. This diverse collection of articles added to our synthesis of themes that emerged in teaching and teacher education. Because our methodology was unlike any other used previously, the results contained herein provide a unique review of the evolution of teaching and teacher education over the last 50 years.

## **1970s: Student Teaching and Teacher Education, Student Achievement, and Teacher Effectiveness and Evaluation**

The top 20 most cited articles from the 1970s in teaching and teacher education represented many topics and themes. This analysis will discuss the most common themes of student teaching and teacher education, student achievement, and teacher effectiveness and evaluation. We will also consider trends from the decade and common types of research used.

### **Research Methods**

Among the 1970s top 20 most cited research articles, there were three main types of research: empirical studies, literature reviews, and theoretical papers. Of the 20 articles, about 50% were empirical research, 25% were literature reviews, and the remaining 25% were theoretical papers. Even though theoretical papers were the least represented, two

of the top five most cited articles were theoretical papers, including the most cited article, which focused on why and how to ask questions in the classroom that have a specific known answer (Mehan, 1979).

## Themes

The dataset was drawn from many prominent journals. Most of the top cited articles were published in one of three journals. The most popular journal, which published almost half of these articles, was the *Journal of Teacher Education*. The rest of the articles were split between the *Journal of Educational Research* and *Theory Into Practice*, with one article published in the *English Language Teaching Journal*.

The top 20 articles from the 1970s covered many topics, including student teaching and teacher education, teaching strategies, various forms of student achievement, teacher effectiveness and evaluation, people who influence teachers, and student-faculty relationships. The three most popular topics were student teaching and teacher education (five articles), teacher effectiveness and evaluation (five articles), and student achievement (three articles).

Even though these were some of the most common topics, the top three articles of the decade each covered unique topics not touched on in other articles. The most cited article focused on asking known questions in the classroom (Mehan, 1979), the second focused on morals and how or if they should be taught in the classroom (Kohlberg & Hersh, 1977), and the third focused on the adoption of new innovations (Hall et al., 1975).

## Student Teaching and Teacher Education

Twenty-five percent of the most cited articles from the 1970s focused on student teaching and teacher education. Of those articles, each took a slightly different perspective of an aspect of student teaching or teacher education. Doyle's (1979) article focused on discovering what factors impact student teachers as they start teaching in the classroom. He asserted that understanding the classroom environment first was essential for student teachers to develop the skills needed to meet the demands of the class. Once student teachers understood the complexities within their classrooms, they could use Doyle's five strategies to successfully adapt to their students' needs—chunking, differentiation, overlap, timing, and rapid judgement (p. 54). Doyle's research was influential because it identified key skills teachers learn over the course of their careers and discussed how student teachers can implement those skills when they are introduced into a classroom.

Two other articles on influences in student teaching were published in the 1970s. Hoy and Reese (1977) studied how student teachers changed in their orientations and outlooks over the course of student teaching, finding that student teachers were heavily influenced by the bureaucratic organization of the schools they taught in. In contrast, Karmos and Jacko (1977) researched the effect that significant others have on student teachers. Their findings suggested the significant others in student teachers' lives had a considerable influence in the following areas: personal support, role development, and professional skills. Both studies provided insight into the external factors that impact student teachers' self-concept.

Another article from the 1970s that focused on teacher education was Shavelson's (1973) article on decision-making, teaching skills, and teacher education. Shavelson studied how licensed teachers make decisions, including those in preservice teacher education, and he proposed decision-making was the skill all other teacher skills were based on. He also suggested decision-making be included as a component in teacher education (p. 149). Shavelson's work, along with many of the other articles from the 1970s, sought to understand the aspects that influence student teachers and teacher education. These researchers laid the groundwork for improving teacher education in later decades.

## Student Achievement

Student achievement was also a common topic in the research. Good (1979) wrote an article that considered what impact teacher effectiveness had on student achievement. He found that teachers needed to have a minimum level of ability and teaching skill to be effective in the classroom, but all teachers did have an impact on student achievement. Teachers who had good classroom management skills had a higher positive effect on student achievement, and teachers who used direct instruction also had a positive impact on student achievement. Good's research showed the

influence teachers have on student achievement. His conclusions supported other findings from the 1970s that identified gaps in teacher education and advocated for improvements to teachers' training.

Other articles from the 1970s focused on students' behavior in relation to their academic achievement. These studies researched math achievement between boys and girls (Hilton & Berglund, 1974) and note-taking by college students (Locke, 1977). Hilton and Berglund concluded that student interest in a subject was related to achievement, while Locke reported lecture engagement was related to achievement. Both articles emphasized students' individual responsibilities, rather than teachers' responsibilities, for their education. This research supported other studies from the decade that sought to understand the factors involved in students' academic success.

## Teacher Effectiveness and Evaluation

As mentioned above, one article by Good focused on the impact of teacher effectiveness on student achievement. But there was also an article by Good and Grouws (1977) that discussed different skills teachers should have that can increase their effectiveness. The researchers studied fourth-grade math teachers to examine teacher effectiveness measured by student behavior and test scores. This study identified six findings strongly associated with teacher effectiveness: (a) student-initiated behavior, (b) whole class instruction, (c) clear instructions coupled with timely feedback, (d) a relaxed yet task-focused learning environment, (e) high expectations for student performance, and (f) an absence of major behavioral disorders in the class. Good and Grouws's research highlighted changes teachers could make in their classrooms to benefit students.

In contrast, Berliner (1976) focused on the problems with teacher evaluation practices during the 1970s. He discussed flaws with the ways teachers were being evaluated, and he proposed six main issues with teacher evaluation methods. Those issues were broken up into problems with the dependent variables and independent variables. Dependent variable issues included problems with standardized testing, tests for special teaching units, and multivariate outcomes. Independent variable issues included the appropriateness of teacher behavior (changes when observers are there), the unit analysis, and the stability of teacher behavior. Berliner suggested steps researchers could take to solve the problems undergirding teacher evaluation and effectiveness, as well as what needed to happen in education research to redefine the relationship between teacher behavior and student achievement.

## Discussion

This analysis shows that the 1970s witnessed an emphasis on student teaching and teacher education research. Researchers studied what made effective student teachers (Doyle, 1979), how licensed teachers were teaching and planning (Shavelson, 1973; Yinger, 1979) and how to incorporate that research into preservice teacher education programs. There was equal focus on student achievement and teacher effectiveness.

## 1980s: ESL, Changes in Teacher Education, Teacher Efficacy, and Teaching Methodology

An analysis of the most frequently cited articles on teaching and teacher education written in the 1980s yields a range of topics, ideas, and methodologies. Out of the 20 articles, 11 researched English as a second language (ESL) teaching methods and theory. The theme of teacher education comprised five articles and centered mainly on change and reform within the university setting. Three articles were concerned with teacher efficacy, and one article dealt with a specific teaching methodology called "wait time," although teaching methodology was also a secondary topic found in the ESL articles.

## Research Methods

Methods used for research during this time period fell into three categories: (a) empirical studies, which included quantitative, qualitative, and mixed method studies; (b) literature reviews in which a review of previously completed studies was analyzed for content and implications; and (c) theoretical analyses, or papers which discussed a topic and

the theory supporting or refuting it. Of the 20 studies, 11 were empirical, five were literature reviews, and four were theoretical. The emphasis on empirical studies, particularly within the theme of ESL, suggests a strong push to understand which practices best met the needs of English language learners (ELLs) at the time. It also shows that a change was occurring in the ESL environment during the 1980s. These empirical studies utilized a variety of quantitative and qualitative methods. Some studies consisted of large groups of ELLs, and some consisted of small sample sizes. Procedures included questionnaires, surveys, interviews, observations, recordings, and studies of ELL writing samples. This emphasis on ESL empirical studies carries over into the literature review studies, three of which consisted of analyses of empirical studies devoted to second language acquisition. The four theoretical studies, on the other hand, focused primarily on teacher education.

## Themes

### English as a Second Language

Interestingly, the topic of English as a second language, second language acquisition, or second language (L2) teaching strategies comprised over 50% of the top cited articles from the 1980s and over 20% of the total number of articles analyzed for this chapter. This could be due to what the United States Census Bureau terms the "Second Great Wave" of immigration (Greico, 2014). According to census data, the number of foreign-born residents of the United States quadrupled after 1970, and the number continued to climb for the next four decades. Educators in the 1980s responded to students' need for ESL instruction by utilizing a variety of methods in the classroom, and educational researchers worked to identify the best methods for this instruction. It is clear that the ability to effectively teach second language learners was foremost in the minds of education researchers. The following is a discussion of each of the topics within the theme of ESL.

A variety of ESL teaching methods were discussed including language instruction, group work, and student-teacher interaction. Long (1983) reviewed 12 studies to determine whether or not classroom instruction, as opposed to simple exposure to the language as spoken by native speakers, was actually helpful or harmful in second language acquisition. He concluded that second language instruction does make a difference, noting that six of the 12 studies showed that instruction did make a difference. Five studies provided either ambiguous or null findings, and Long argued those results could have reflected the efficacy of instruction. The final study was disregarded by the researcher because all subjects received the same amount of instruction. Long and Porter (1985) tackled the idea of group work in second language acquisition by analyzing the pedagogical and psycholinguistic evidence of the value of group work as methodology. Their focus was on comprehensible input and output that occurs with both nonnative/nonnative and native/nonnative conversation. This study focused on "interlanguage talk" or communication between two or more nonnative speakers in the second language. Results indicated that when class structure was carefully planned, group activity was a preferable alternative to teacher-led discussion. Methods of student-teacher interaction were further explored by Pica et al. (1987) as they compared the comprehension of native speakers when given a task by a teacher. They found that comprehension was highest when the direction was repeated and rephrased but was not significantly impacted when the linguistic complexity was reduced. These studies indicated that educators in the 1980s were highly interested in determining effective teaching methodology for second language acquisition.

The nature of the composition process and the impact of educator feedback on student writing was of interest to educational researchers in the 1980s. Zamel (1985) and Robb et al. (1986) analyzed the impact of error correction on ELLs. Robb et al. found that ESL teachers focused predominantly on mechanical errors in writing, whereas teachers of other subjects focused on content and argumentation. Zamel's findings were similar, noting that ESL teachers focused on "language-specific" or "sentence level" errors. Both studies explained that ESL composition teachers rarely viewed ESL students' writing as a "work in progress," instead giving feedback as if the draft was the final composition, "thus reinforcing an extremely constricted notion of composing" (Zamel, p. 79). This built upon Zamel's previous research on the composing processes of ESL students in which she found that ESL writers clarify ideas and correct language-related errors after their ideas have been delineated (1983). She questioned methodology in ESL writing instruction that was overly concerned with correctness. This work provided a closer look into how previously accepted methodologies surrounding second language instruction were being questioned.

In addition to methodology, the age at which a student first began studying a second language and the length of time they engaged in the study were also of importance to education researchers in the 1980s. Some questions in this vein included the following: "How long does it take to master a language?", "Is it easier for young children to acquire a second language?", and "How long does it take to master the language at a level of proficiency to positively impact academic achievement?" (Collier, 1987, 1989). Collier's findings indicated that contrary to popular thought, the youngest students were not at an advantage when compared to their older peers. Her results in a study of over 1,500 students indicated that limited English proficient (LEP) students who began L2 study between the ages of 8–11 were the fastest achievers, requiring two to five years to achieve the 50th percentile on national tests (Collier, 1989). Younger students (5–7 years) were one to three years behind this performance, and older students (12–15 years) were the most disadvantaged. Taken in concert with other studies regarding teaching methods, the understanding of how a student's age and length of study impacted success at acquiring a second language gave significant insight in how best to help ELL students be successful in acquiring a second language and performing in other academic areas.

In contrast to previous research in the decade, one highly cited theoretical article from the time argued that the positivist and progressive orthodoxies of linguistics should be challenged (Pennycook, 1989). This research asserted that the primary focus on methods maintained inequities in the education realm. This is a noteworthy digression from the abundance of discussion on ESL teaching methodology. This article was published at the end of the decade and was a precursor for more interest in this topic in the 1990s.

## Changes in Teacher Education

During the 1980s, seeds of doubt regarding traditional training methods for teachers were beginning to sprout. Two articles focused on theory and literature advocating reforms. Zeichner (1983) argued that there was a lack of open debate over the goals and purposes of teacher education and that the models of teacher education utilized during that time were narrow in scope and closely tied to dominant paradigms. He advocated for discussing desirable teacher education practices and proposed a range of alternative paradigms from which to approach teacher education. This furthered the research started at the beginning of the decade when Zeichner and Tabachnik (1981) posed questions surrounding why progressive ideologies presented to teacher education students at the university level were then "washed out" by the time student teachers and new teachers began to practice at the school level. By analyzing three views on the influence of the university on teacher attitudes, the conclusion the authors made was that new teachers were not only influenced by the school setting but also by the years of teaching examples they received prior to entering a university-level teacher education program. They concluded that it could not be assumed that the role of a university was a liberalizing one. The implications were that teacher education reformers needed to focus more on the university setting rather than on the school setting.

In 1989, the idea of reflective teaching was emerging as an important aspect of teacher education reform. Calderhead (1989) urged further examination on teacher cognitions, knowledge, and learning context in order to understand the role that reflective teaching had on teacher education. During this time, ideas encompassed within reflective teaching such as growth through critical inquiry, self-directed evaluation, and self-analysis were being compared with widely used teacher education content such as behavioral skills and teacher craft. Calderhead's work was a call to action to develop an improved understanding of the nature of reflection and its potential in teacher education.

In addition to Calderhead's findings, a study analyzing the results of questionnaires given to 113 university education majors regarding their own preconceptions of teaching and what makes a "good teacher" gave a broad understanding of how those approaching teaching as a profession viewed themselves and teaching in general (Weinstein, 1989). Findings from this study indicated that education students had a strong form of "optimism bias" in which they viewed themselves as very competent compared to peers and other educators. Their answers indicated that they did not highly value content knowledge, academic performance, or IQ as a standard of good teaching but instead leaned favorably toward social and affective variables such as caring and concern for children, ability to relate to students, patience, and enthusiasm. The responses of teacher education students were compared to those of in-service teachers, with nearly opposing results. This study would have had direct implications on the movement to reform teacher education in favor of more reflective teaching and more culturally aware teaching that would later grow in the 1990s.

Although mentoring is not specific only to teacher education, the idea of mentoring did appear toward the end of the decade. Anderson and Shannon (1988) discussed mentoring as a way to guide new teachers. Their research indicated that before effective mentoring programs could be implemented, basic functions of mentoring must be defined. Their research focused on five main areas: teach, sponsor, encourage, counsel, and befriend. A thorough analysis of theory behind mentoring and the disposition of mentors was also provided. The inclusion of mentoring as a methodology in teacher education supports the idea that new ideas on how to improve teacher education were being explored.

## Teacher Efficacy

Three articles discussed teacher efficacy, or the concept of a teacher's belief in their own ability to be successful in the classroom. These articles focused on the idea that teacher efficacy had an impact on whether or not a new innovation could be successfully implemented in a school. Stein and Wang (1988) analyzed the relationship between teacher success in implementing an innovative program and teachers' perceptions of self-efficacy and the teacher-perceived value of the program. They found that teachers' self-efficacy contributed to the motivation of teachers to implement a new program. Guskey (1988) also found a strong relationship between teachers who exhibited a high level of personal efficacy and the likelihood of implementation of new instructional strategies. Both of these studies addressed implications on school change and innovation in teaching. These studies would most likely have influenced those who sought to change teacher education programs or in-service practice.

Teacher content knowledge and its impact on a teacher's self-efficacy was another topic of interest. Smith and Neale (1989) analyzed the views and behaviors of 10 teachers during a four-week summer school training on implementing a new science curriculum which utilized a conceptual change approach. Recognizing that the approach was new, the authors (also the designers of the curriculum) wanted to ensure that it would be successfully taught. This study provided a good example of how teacher efficacy affected new curriculum implementation. Throughout the four-week summer school training, teachers were provided opportunities to understand the new program and the content. After the training was completed, teachers expressed their confidence in their ability to implement the program. This was in contrast to the start of the training when 90% of the teachers expressed that they did not have confidence in their content knowledge and therefore did not believe they could successfully implement the program. Although self-efficacy was not a direct measure of the study, this study did indicate that self-efficacy had a direct impact on whether or not teachers successfully implemented innovative programs.

## Teaching Methodology

Researchers approached teaching methodology in a variety of ways throughout the decade. Because there was such a focus on ESL, many of the articles on teaching methodology were found within the ESL articles and dealt primarily with the best ways to help ELLs become proficient in English. However, one frequently cited article dealt with wait time, or the amount of time a teacher would wait after posing questions to students or the amount of time a teacher would allow between student responses without interjecting (Rowe, 1986). This literature review documented research on the impact of wait time on student engagement and response in the classroom. The author concluded that when wait time was increased, a variety of positive student behaviors were observed.

## Discussion

The 1980s were a precursor to a variety of changes in teaching and teacher education that occurred during the 1990s. Education researchers were intent on finding the best way to help English language learners succeed academically, but there was not yet a focus on how to do this and maintain a respect for a student's primary language, culture, and ethnicity. Teacher education researchers were looking for ways to reform teacher education. Ideas in teacher efficacy, reflective teaching, and mentoring were also being explored.

# 1990s: Language Learning, Home and Culture, and Education Improvement

In a review of the 20 top cited articles related to teaching and teacher education from the 1990s, a variety of research methodologies were represented, and a few clear and distinct themes were present. In many ways, the themes coincided with those from the 1980s. For example, in the 1980s, the majority of articles focused on ESL teaching and theories. That trend continued in the 1990s, where seven of the 20 articles focused on language learning. Likewise, there seems to have been a continuous effort during the 1980s and 1990s to examine teacher education where many suggestions for improvement emerged. In both the 1980s and 1990s, there was an increase in female and international authors compared to the 1970s. Two very noticeable thematic departures from previous decades that were specifically noted in the 1990s included a focus on race and ethnicity and home and community as determinants of teaching and teacher education.

## Research Methods

In the 1990s, various research methodologies were used in the top cited articles that can be categorized into four types: empirical studies, literature reviews, theoretical or reflective papers, and conceptual pieces. The majority of the articles were empirical (11 of 20) and used quantitative, qualitative, and mixed methods, with most being qualitative. Eight articles were either conceptual (synthesizing knowledge from previous research and giving way for new research to fill the knowledge gaps) or theoretical (offering suggestions or solutions to educational dilemmas or challenges). Only one of the articles was a literature review.

## Themes

We identified three prominent themes from the top cited articles in the 1990s: language learning, the impact of socioeconomic status (SES) on student learning, and general strategies to improve teacher education.

### Language Learning

In the top cited articles of the 1990s, language learning was one of the major themes in over one third of the articles. There were different points of focus in each article. For example, Peirce (1995) collected data from immigrant women to use in conjunction with knowledge of social theory to argue that current conceptions of the individual in second language acquisition (SLA) needed to be reconceptualized. Freeman and Johnson (1998) explored the idea that historical and theoretical traditions had defined TESOL and examined the need to reconceptualize the knowledge base of teacher education. Another article discussed common attitudes toward language and explored the need to have a positive image of second language users (Cook, 1999). Finally, another examined the influence of social order on English language teaching (ELT) practitioners' decisions in the classroom and how those decisions shaped attitudes, assumptions, and beliefs in learners and language planning and policy (Ricento & Hornberger, 1996).

In several language learning articles, there seemed to be a link between culture and language learning. Green and Oxford (1995) called for further research about the specific patterns of language learning strategies found in Puerto Rico that could be generalized to other geographical and cultural settings. Silva (1993) discussed a need to develop theories and practices that adequately address the multilingual and multicultural perspective of L2 writers (Silva, 1993). In addition, Rampton (1990) analyzed the complications of sociolinguistic situations and examined the links between people and language and the need to use more culturally appropriate terms.

### Home and Culture

A second theme that emerged was the impact and influence of socioeconomic factors such as race, culture, and family structure on teaching and teacher education. In a study of Mexican communities in Arizona, the primary purpose was to draw upon the knowledge and skills found in local households. Moll et al. (1992) suggested that some students' households that are usually viewed as poor actually contain ample cultural and cognitive resources with potential utility

for classroom instruction. By capitalizing on household and other community resources, educators could organize classroom instruction that far exceeds the quality of instruction these children commonly encounter in schools.

In another article, Caldas and Bankston (1997) explored how the socioeconomic status of a student's peer environment at school influenced achievement, regardless of individual social status. Later in the decade, Desimone (1999) found how the effects of parental involvement in childrens' learning vary across racial, ethnic, and economic backgrounds to help bridge the gap in educational disparities. Ladson-Billings (1995) discussed the need to understand better the practice of successful teachers of African American and other minority students.

## Education Improvement

A third theme focused on general strategies to improve or reconceptualize different teaching and teacher education components. For example, it was suggested that teachers continue to value professional teacher preparation while training on the reflective process and gaining practical knowledge and insight (Van Manen, 1995). Also, classroom instruction could be organized more effectively by taking advantage of household and community resources in innovative ways (Moll, 1992). Calderhead and Robison (1991) found that a student teacher's previous knowledge impacted their teacher education experience by influencing what they learned and what they extracted from their courses and training. They suggested that continual research in this area could improve students' training and education by enlarging their current understanding with more profitable and constructive training for student teachers. Other strategies to improve teaching and teacher education focused on recognizing the emotional labor required in teaching, including emotions associated with educational reform, because teaching cannot be reduced to technical competence or clinical standards (Hargreaves 1998). These strategies for education improvement laid the groundwork for continuing research in following decades.

## Outlier

There was one study from the 1990s on bullying. Although it is not easily categorized into one of the major themes of the 1990s, it is important to recognize this article given how an emphasis in research on bullying increased in subsequent years. The study results found that bullying occurred twice every hour in each classroom. In addition, boys and girls were bullied at the same rate. It also suggested that bullying could be related to classroom activity and individual characteristics of children involved in the bullying (Atlas & Pepler, 1998). This topic, while unique among the other top cited articles of the decade, is useful in understanding the various influences in education research during the 1990s.

## Discussion

Research in the 1990s shifted toward students' experiences in the classroom. The main themes of language learning, home and culture, and teacher education improvement had a strong emphasis on improving instruction and education for learners. These themes continued into the 2000s, including an increased focus on teacher improvement.

## **2000s: High-Quality Teacher Education, Professional Identity, and Teacher Change**

The top cited articles from the 2000s continued to emphasize major themes in the field of teacher education research. The research themes from this decade focused on identifying challenges teachers face and providing solutions to those challenges. These articles emphasized research that aimed to improve teachers' education and professional experiences, which was a trend that extended into the following decades.

## Research Methods

During the 2000s, a shift occurred in research methods used in the top cited articles. The previous three decades were heavily influenced by empirical studies, as the majority of the top cited articles in each decade fell within this methodology. However, the majority of the articles during the 2000s were theoretical studies: 12 were theoretical, 3

were empirical, 3 were literature reviews, and 2 were conceptual. The following themes show much of what was discussed in the theoretical studies.

## Themes

Three main themes emerged from the 20 top cited articles in this decade. The most prominent theme was high-quality teacher education. The articles in this category emphasized maintaining quality in teacher education. The second theme was professional identity, which focused mostly on novice teachers and how their professional identity was created. And the third major theme was teacher change, which sought to create models that tracked teacher improvement over time. Each of these themes is described in more detail below.

### High-Quality Teacher Education

Seven of the 20 articles had topics related to maintaining high-quality teacher education. Darling-Hammond addressed the issue directly with her article about constructing 21st-century teacher education (2006). In the introduction to the article, she stated that much of what made a teacher successful was invisible to the common observer, leading the common observer (or policymaker) to think that teaching was easy. She warned of the dangers of this type of thinking, stating that watering down teacher education to get more teachers in the profession will ultimately have a negative impact on student outcomes. Darling-Hammond pointed to incentives from the U.S. Department of Education that amplified the problem by encouraging faster, easier ways to credential teachers. These incentives ignored the complexities of teaching and produced weak programs that underprepared teachers, especially for urban school environments.

Other articles in this category attempted to define a good teacher through different lenses and then suggested models to help identify training that would create good teachers (e.g., Korthagen, 2004; Loewenberg Ball & Forzani, 2009; Grossman et al., 2009). Loewenberg Ball and Forzani (2009) echoed the words of Darling-Hammond when they stated that teaching is not natural and that it is intricate work. They stated that teaching is not improvisational but instead a series of skills that could be identified and practiced.

One last note in this category is that the first two studies in the decade had a subtheme of preparing teachers for culturally aware teaching (Gay, 2002; Sleeter, 2001), but the next five studies were more general in discussing teaching as a whole. This will be explored further in the discussion portion of this decade.

### Professional Identity

Another theme that emerged between 2004 and 2007 was the theme of professional identity. Beijaard et al.'s (2004) study was the first of the top cited articles to address this theme. Their article was a literature review of studies from 1988–2000 that explored professional identity. The authors analyzed 22 studies and categorized them into three areas: (a) studies in which the focus was on the formation of the teachers' professional identity, (b) studies in which the focus was on the identification of characteristics of teachers' professional identity, and (c) studies in which stories depicted the teachers' professional identity. The final part of this study identified areas that can be improved in further studies of teachers' professional identity. Some of these areas include clarifying terms such as "identity" and "self," ensuring the focus is on professional identity and not on personal identity, and clarifying what counts as professional.

The other studies in this category researched novice teachers and the development of their professional identities. Flores and Day (2006) discussed how identities are built and rebuilt over the first two years of a teacher's career. Fourteen brand new teachers were chosen for the qualitative study to find what was shaping their professional identity. The results of the study showed three main influences on the construction, deconstruction, and reconstruction of their professional identities: prior influences, initial teacher training and teaching practice, and contexts of teaching.

A third study in this category tried to identify sources of self-efficacy beliefs from both novice and experienced teachers (Tschannen-Moran & Hoy, 2007). The researchers studied survey data and found that experienced teachers drew upon experiences of success for their self-efficacy beliefs, while novice teachers drew upon availability of resources and support from other teachers.

## Teacher Change

The final category for the 2000s was teacher change. Guskey's (2002) article provided support for a method of professional development that was first suggested in 1986. The method was based on the order in which teachers adopted three main components: professional practices, beliefs, and understanding of teachers. Guskey explained that professional development was often based around getting teachers to try a new method before they actually "bought in" to the new method. However, getting teachers to believe in the effectiveness of a new method before they tried it in their classrooms was more effective. Another article on teacher change was published by Korthagen (2004). He proposed six levels of change that should be considered in education. The six levels were environment, behavior, competencies, beliefs, identity, and mission. He suggested that if teachers were aware of these levels and sought to fulfill them for themselves, then they would also help their students do the same.

## Discussion

The major takeaway from this decade is that many of the most cited articles of the 2000s dealt with maintaining the integrity of the teaching profession. While most articles did not cite specific reasons for focusing on the integrity of the teaching profession, Darling-Hammond (2006) pointed to the U.S. Department of Education's No Child Left Behind and Highly Qualified Teachers initiatives as reasons of the topic:

However, in recent years, under pressure from opponents of teacher education and with incentives for faster, cheaper alternatives (see, e.g., U.S. Department of Education, 2002), teacher education as an enterprise has probably launched more new weak programs that underprepare teachers, especially for urban schools, than it has further developed the stronger models that demonstrate what intense preparation can accomplish. As a result, beginning teacher attrition has continued to increase (p. 302).

Many in the profession felt the need to defend themselves and to raise awareness of the complexities of teaching. There was concern that if the quality of teaching decreased, achievement gaps would increase between urban schools and other areas. This seemed to be the most significant area of concern for teaching and teacher education in the 2000s.

## 2010s: Transition in Teacher Education, Digital Literacy, and Teacher Identity

Articles from the early 2010s continued to build upon the theme of teacher identity from the 2000s. Three articles published in 2010 and 2011 discussed the topic of teacher identity and beliefs. New topics such as the effectiveness of teacher education, digital literacy among teachers and students, and educational technology also emerged during this decade.

## Research Methods

The 20 most cited articles in the 2010s utilized a variety of research methods. This decade saw a split between empirical research (nine articles) and theoretical work (four articles), as well as a split between literature reviews (four articles) and conceptual works (three articles). The majority of the empirical studies utilized qualitative research methods with surveys as the main driver for data collection. Notably, four studies focused on a specific project and international context, surveying a large sample of Norwegian teachers to collect data. While the majority of the empirical studies were qualitative, three of the empirical studies utilized quantitative methods.

## Themes

The emergent themes observed in these articles fell into three main categories. Reconceptualizing teacher education was the most prominent theme in the 2010s, comprising eight of 20 articles. Within this theme a range of topics were discussed, including the structure of teacher education, international teacher education, and what the focus of teacher

education should be. The theme of digital literacy or technology integration was another theme that was common, with educational researchers working to understand how the prevalence of technology use impacted student learning, as well as how teachers practiced in the classroom. Teacher identity was a third theme that was well-researched, with the focus being on teacher diversity and teacher beliefs. Woven among these themes were some common topics such as content knowledge, professional development, and teacher burnout.

## Reforming Teacher Education

As in other decades previously explored, the subject of improving teacher education was prevalent. Education researchers felt a need to find ways to improve teacher education by analyzing current methods and by reviewing teacher education techniques being used around the world. Comparisons were made between university teacher education programs in the United States and those in other nations. One notable study compared teacher education practice in the United States to those in Finland, Singapore, Australia, and Canada (Darling-Hammond, 2017). This study showed that high-achieving nations are doing more than the United States to recruit and train top-performing teachers. These nations' programs promoted a high level of teacher preparation and professionalism, including requiring advanced university degrees, compensating with high levels of pay, and fostering esteem for teachers among the general population. The author showed that the teacher education efforts in these nations resulted in higher student achievement and greater equality in education. Darling-Hammond contrasted these techniques with those in the United States in which incentives for quick licensure were being used to recruit new teachers, which had a detrimental effect on the quality of education in U.S. schools. She also previously discussed the practice of alternative certification programs in an article emphasizing the importance of quality teacher education to the United States' educational future (2010). This analysis sought to identify how to effectively use practice as a learning tool for new teachers.

Structure and content within teacher education was also a priority for teacher education researchers in the 2010s. The idea of rethinking how campus courses and field experiences worked to train teachers was discussed by Zeichner (2010). He advocated for creating a "third space" to bridge the gap between the university and real-world practice. Zeichner (2012) also warned that the focus on practice-based teacher education may result in disregarding important aspects of teaching such as the historical, cultural, political, social, and economic contexts in which teachers practice. Again, much of this concern came from the movement toward a competency-based and fast-paced teacher licensure route.

The idea of change or redirection within teacher education programs was considered during the 2010s. Kleickmann et al. (2013) analyzed structural differences within teacher education and the subsequent impact on math teachers' content knowledge (CK) and pedagogical content knowledge (PCK). Their study noted differences in the CK and the PCK between European teachers who taught students who were placed in an academic track school (a school where students planned to attend university after secondary school) in comparison with those who taught at a non-academic track school (a school where students did not plan to attend university, but instead they prepared to study trade or skilled labor jobs in postsecondary school). It was observed that teachers' general CK and PCK was directly impacted by their placement. Those practicing in an academic-based school exhibited greater acquired CK and PCK. In addition, a review researched the findings of 110 studies regarding professional development in teacher education, and it was concluded that teacher education had moved away from a traditional in-service training model (Avalos, 2011). Some researchers asserted that by centering teacher education around core practices, the important work of justice and equity in education was being pushed to the periphery. McDonald et al. (2013) criticized the core practice movement and called for (a) recognition that core practices undermined the purpose of public schools; (b) a re-emphasis on the social, cultural, political dimensions of teacher practice; and (c) a re-centering of the educational system on justice with a willingness to recognize historical oppressions and a consideration of how core practices might misalign with equity. Similar research was published in 2019, showing that the movement against core practices and toward a critical theory-based teacher education system had built momentum during the decade (Philip et al., 2019). However, the wide variety of topics found within the theme of teacher education in the 2010s shows that teacher education is complex.

## Digital Literacy

An important theme discussed in educational research in the 2010s was digital literacy. While the use of technology in the classroom was not new to the decade, education researchers were trying to determine the best ways to integrate technology in the classroom, to provide training on using technology in teacher education programs, and to instruct digitally literate students. Kirschner and De Bruyckere (2017) argued against the belief that students in the 2010s were "digital natives" with inherent digital capabilities. Their work refuted the idea that these students were multitaskers who were able to complete competing tasks digitally without any detrimental academic impact. Their research showed that digital multitasking actually reduced focus and that students of the 2010s, while more digitally literate than previous generations of students, did not inherently know how to use technology to improve their own academic experience. Educational researchers recognized that students needed digitally competent teachers and that in many ways teacher education programs were not meeting these demands. Instefjord and Munthe (2017) found a gap in the amount of training preservice teachers received and what was actually needed in the classroom. Their empirical study analyzed the results of a survey completed by 654 preservice teachers, 387 teacher educators, and 340 teacher mentors throughout Norway. They found that there was a correlation between teachers' professional digital competence and the digital competence of their teacher educators and mentors. Preservice teachers and teacher educators ranked themselves in a similar fashion in terms of digital competence (medium proficiency), and mentor teachers ranked themselves as having a high amount of digital competency. The authors advocated for greater digital proficiency among teacher educators in order to increase digital proficiency among preservice and new teachers. Similar findings were reported by Gudmundsdottir and Hatlevik (2017) who determined that newly qualified teachers reported poor quality and contribution of information and communication technology in their teacher education experiences.

While the use of digital technology in the classroom was widespread and educational researchers were interested in the impact of teacher education programs on teachers' digital literacy, teachers were also utilizing technology to share knowledge and inform their practice (Macià & García, 2016). In their study, Macià and García sought to answer how teachers were utilizing online communities and networks as a source of professional development. Their literature review of research published after 2009 sought to answer questions such as "What are the main characteristics of the studied learning structures?", "Which theoretical frameworks and research methodologies [had] been used to study online professional development communities/networks for teachers?", "How [was] participation fostered in teachers' communities and networks?", and "What repercussions did participation in online networks and communities have on teachers' professional development?" (Macià & García, 2016, p. 293). Their results found that the full impact of online communities on teacher professional development was unclear and that because the phenomenon of teachers participating in online networks in order to seek professional development was relatively new, more research was needed.

The impact of teacher beliefs on technology integration was also important to educational researchers in the 2010s. Kim et al. (2013) completed a four-year study to examine the relation of teachers' beliefs to their technology integration practices. The goal of this study was to improve the use of technology in poorly performing schools in the southwestern United States by providing new technologies, professional development workshops, and pedagogical assistance. The results of their study showed that teacher beliefs about effective ways of teaching and their technology use were directly correlated. From these examples, we see that the use of technology in classrooms was an important aspect of teaching and learning in the 2010s. Highly cited research articles showed that educational researchers around the world wanted to improve digital literacy among teachers and understand how teacher education and development programs could be used to help educators.

## Teacher Identity

In addition to analyzing structure, content, and focus of teacher education, educational researchers also worked to understand how teacher identity, beliefs, and burnout were affecting education. Six of the 20 articles analyzed for this decade dealt with this theme. The overarching target of the research in these areas seemed to be the idea that fostering teacher identity, allowing for teacher agency in the classroom, and studying the impact of teachers' beliefs could help to improve the experience of teachers and aid in avoiding burnout or emotional exhaustion among teachers. Akkerman

and Meijer (2011) began the decade with a review of literature analyzing the concept of teacher identity. They determined that teacher identity went beyond a set of "assets" (i.e., accumulated knowledge, skills, and pedagogical competencies). Teacher identity, instead, should be viewed through a dialogical lens in which the teacher as an agent helps to determine their own professional development needs and trajectories.

In 2010 and 2011, Skaalvik and Skaalvik focused attention on the idea that teacher job satisfaction and self-efficacy were predictors of burnout and subsequent teacher attrition. Their 2010 study showed that collective teacher efficacy was most strongly related to supervisory support (Skaalvik & Skaalvik, 2010), while their 2011 empirical analysis of the relationship among a variety of school context variables, teacher job satisfaction, emotional exhaustion, and feelings of belonging showed that a lack of belonging as well as emotional exhaustion had a direct impact on whether or not teachers were motivated to remain in or leave the profession (Skaalvik & Skaalvik, 2011).

The idea of teacher agency was also explored during this decade. It was recognized that teacher beliefs impacted a teacher's choices in the classroom and thereby had a direct impact on student learning. Worldwide, there was tension within educational institutions between those who would encourage teacher agency and those who sought to minimize it (Biesta et al., 2015). In a 2015 survey of teachers who were involved in a curriculum change project in Scotland in which teachers were positioned as agents of change, it was found that teacher beliefs regarding teacher responsibility and the purpose of education had a direct impact on teacher agency (Beista et al., 2015). Authors of that study recognized that a deficit of discussion regarding the purpose of education existed and that more robust conversation in this regard was necessary.

## Discussion

One clear takeaway from the articles in this decade is that they built upon work done in previous decades. The 2000s discussed a need for high-quality teacher education and the 2010s built upon that with many articles discussing effectiveness of teacher education. Further, the new focus on technology in the 2010s created an additional facet of high quality teaching and teacher education. By digging into what types of teacher education are effective, the articles in the 2010s added detail to what makes teacher education high quality.

## 2020 and Beyond: Technology, Online Learning, and Race

The 20 most cited articles from the year 2020 in teaching and teacher education represented many topics and themes. In this analysis, we will discuss the themes of technology in education, online learning (in the context of COVID-19), and race. We will also consider common types of research used as well as trends and possible future research.

## Research Methods

The 20 most cited articles from 2020 mostly fell into one of three types of research: empirical studies (10), literature reviews (7), and theoretical papers (2). The top three most cited papers fell into each of these categories with the most cited being an empirical study, second-most cited a theoretical paper, and the third-most cited a literature review.

## Themes

There was a wide spread of where these articles were published compared to previous decades. The 20 articles were published across nine different journals. Two or more articles were published across seven different journals with the plurality of articles (four) coming from the Journal of Teacher Education.

There were many different topics that were published in 2020. The three most popular topics were technology (three), online learning and COVID-19 (two), and race (two). The remaining articles dove deeply into one specific topic, subtopic, or idea, preventing their thematic classification.

## Technology

Of the three studies that discussed technology, each focused on a different aspect of technology. Casillas Martín et al. (2020) focused on early childhood education preservice teachers and studied their feelings about information and communication technologies (ICT). Overall, the preservice teachers had very positive views of ICT. They had moderate confidence in their abilities to use ICT, and they felt their knowledge about ICT (how to effectively use it in the classroom, what types of technology are out there, etc.) was minimal.

Walkoe and Elby (2020) also focused on preservice teachers, but they studied how preservice teachers used technology to enhance their teaching skills. They had preservice teachers use a video tagging program to notice and reflect on things happening in the classroom. The article found that preservice teachers could both notice the same moment but have different interpretations for what was happening at that moment.

Instead of focusing on preservice teachers, Maas and Hughes (2020) reviewed the current research about virtual, augmented, and mixed reality technologies in K–12 education. Of the 29 studies that were considered, most focused on augmented reality, with only three studying mixed reality and one studying virtual reality. Within those studies, many topical themes emerged, including collaboration and communication, critical thinking, attitude, engagement, learning, motivation, and performance or achievement.

## Online Learning

Online learning became an important theme in 2020. With the worldwide COVID-19 pandemic disrupting traditional schooling for most of the world at the end of the 2019–2020 school year, some of the articles in 2020 focused on the effects of completely transitioning to online learning. A few journals even ran entire special issues on this topic.

The most cited article from 2020 was by König et al., and it focused on early career teachers in Germany and how they were handling the shift to online learning due to the pandemic. The study focused on the first few months of the pandemic, and during those months, early career teachers in this study generally maintained regular contact with students and parents, introduced new content to their students, assigned tasks, and provided feedback. Skills in online teaching and online assessment were not used as much nor did teachers have as much confidence in being able to use those skills.

Carrillo and Flores (2020) did a literature review of different studies focusing on online learning. They came up with three themes that were present throughout their literature review. Their research reaffirmed the need for the presence of the three elements of the CoI Framework—teacher presence, social presence, and cognitive presence (Garrison, 2009)—in online learning in order for it to be successful. Carrillo and Flores (2020) also discussed the "blurred line" between the need for social and cognitive presence. However, teacher presence had strong connections to both the social and cognitive presence in online learning and teaching. Because of that finding, the authors stated there needs to be more research on the "social and collaborative components of learning" (p. 478) in online pedagogy. These findings provided insight into online learning in education research. The research in 2020 on remote learning showed how the field of education research responded and found solutions to challenges that arose in teaching and teacher education.

## Race

There were two articles that focused on race from 2020. The first was by Shah and Coles (2020). In this article the authors discussed the term racial noticing, which is bringing awareness to racism and acknowledging possible or potential racism around us. This study called for preservice teachers to be educated in anti-racism before they begin teaching in the classroom.

The other article by Baker-Bell (2020) discussed anti-racist Black language pedagogy. The author gave a history of Black language in the classroom, discussed the linguistic inequalities in English Language Arts (ELA) classrooms, and interrogated the notion of "academic language." The author also provided an ethnographic approach in understanding how an all-girls ELA class of ninth graders in Detroit who identify as Black or African American reflected on anti-black

linguistic racism. The theme of race in teaching and teacher education indicates a need for further research and continued improvement on how race impacts students and their learning.

## Discussion

The theme of technology carried over from the 2010s into 2020. Considering the opportunity for increased digital literacy in classrooms due to the COVID-19 pandemic, technology may be more relevant to teacher education than ever before. As the 2020 decade continues, we anticipate there will continue to be a large push for more online learning, technology, and digital literacy research. Additionally, we anticipate that there will be more research on how education was handled during the COVID-19 pandemic. Race has emerged as a prominent topic of discussion and research during this decade, and we expect it will continue to influence teaching and teacher education research throughout the rest of the 2020s.

## Synthesis of 50 Years

### Common Themes

Many themes emerge as we look back over the last 50 years of research in teaching and teacher education. We will be focusing on the five main themes of the decades: teacher identity and teacher beliefs, teaching methods, teacher education reform, English as a second language (ESL), and cultural awareness.

### Teacher Identity and Teacher Beliefs

Over the last 50 years, every decade has included some research in the 20 most cited articles about teacher identity or teacher beliefs. These articles focused on how the teachers viewed themselves in or out of the classroom, what beliefs teachers came into the profession with, how those beliefs changed as they taught, and who influenced teachers' identities or beliefs.

### Teaching Methods

The study of different teaching methods was also prevalent in each decade of the last 50 years. The methods themselves have changed from 1970 to 2020, but the idea that new methods and more effective methods exist has continued to progress over time.

### Teacher Education Reform

Another theme we found throughout all of the decades was the idea of teacher education reform. Each decade had articles that called for reforming teacher education to improve it for both teachers and future students. Again, like teaching methods, the actual calls for reform look different throughout the decades, but the idea of change and improvement is there across the last 50 years.

### English as a Second Language

ESL is the only subject-specific theme that emerged in our research, but it wasn't initially a prevalent theme. Only one article in the top cited research during the 1970s focused on ESL teaching. In contrast, in the 1980s, 11 of the top 20 cited articles focused on second language acquisition. This focus continued throughout the 1990s, and then this theme was not seen among the top cited research again until the year 2020. These trends show that helping learners acquire skills in ESL was important to educational researchers, even though the emphasis on ESL research varied across the decades.

### Cultural Awareness

Cultural awareness research started to pop up in the 1990s where researchers were focusing on various cultures and how those cultures impacted or could impact classroom learning. This theme of cultural awareness continued through the 2000s, 2010s, and most recently, in 2020.

# Important Issues, Topics and Trends

## Race and Culture

The awareness of race and culture in teaching and teacher education research evolved from 1970 to 2020. In the 1970s, little research focused specifically on race and culture. Instead, some articles targeted students for whom English was not their first language. They explored how culture impacted English as a second language (ESL) students or second language (L2) users. In the 1970s, they used terms like native and non-native speakers (Reid, 1987). Rampton (1990) examined the issues with those terms and suggested replacing them with more appropriate terms. As ESL research continued to progress, Silva (1993) proposed a need to develop theories and practices that appropriately addressed the multilingual and multicultural perspectives of L2 users. At the end of the 1990s, there was a movement to correct how others perceived the L2 users and how L2 users perceived themselves. Cook (1999) found that having a positive image of L2 users can help them recognize they are successful multicompetent speakers, not failed native speakers.

As the research progressed through the decades, there was a stronger emphasis on teaching and teacher education research directly related to race, culture, and socioeconomic status. Mol et al. (1992) used the phrase “funds of knowledge” to describe something more encompassing than the phrase “culture.” Funds of knowledge is the knowledge that pertains to the social, economic, and productive activities of people in a local region. Moving forward, practitioners, communities, and families can work together and combine resources to magnify the funds of knowledge that can bring educational change. In the 2000s, Gay (2002) discussed the importance of culturally responsive teachers and their impact on the academic success of ethnically diverse students. Almost two decades later, Shah and Cole (2020) called for more teacher education about race and racism. As a result, we see that culture, race, racism, and anti-racism have been more centrally discussed in classroom settings. After recent events in the United States, such as the killing of George Floyd and the expansion of the Black Lives Matter movement in 2020, we expect to see more studies about race, racism, and anti-racism moving forward.

## Author Diversity

There was as much variety in the authors as there was in the research in teaching and teacher education research. There were three main trends: (a) an increase in articles authored by multiple authors, (b) an increase in female authors, and (c) an increase in the number of international articles. In the 1970s and 1980s, less than half of the articles had multiple authors. Progressing through the decades, the number of multi-authored articles increased. In the 1990s, more than half of the articles had multiple authors. In the 2010s and 2020, more than 15 of the 20 top cited articles had multiple authors. Starting in the late 1980s and early 1990s, there was an increase in female authors. In the 1970s, there were only four female authors. In the 1980s and 1990s, there were more than 10 female authors. By the 2000s, more than half of the articles had at least one female author. This trend continued in the 2010s and 2020. The third major trend in authors was the increase in international authors through the decades. In 1970 there was one international research article. The number of international articles increased drastically through the decades. By 2010 there were at least six international articles, and in 2020 over half of the articles were international articles.

## Influence of Teacher Attrition

According to data from Carver-Thomas and Darling-Hammond (2017), teacher attrition increased dramatically from the early 1990s into the mid 2000s. We believe that this increase in teacher attrition contributed to much of the most cited research throughout the 2000s and 2010s. In particular, we saw much of the top cited research had trends in (a) improving the quality of teacher education and (b) teacher identity, which could both relate back to the issue of teacher attrition.

The trend of quality of teacher education was first apparent in the 2000s. Darling-Hammond (2006) addressed the issue as she warned of the dangers of watering-down teacher education. Grossman et al. (2009) and Loewenberg Ball and Forzani (2009) added their work on how to improve professional development to better prepare teachers for the complexity of the teaching profession. Avalos (2011) reviewed 111 publications from Teaching and Teacher Education from 2000–2010 and found effectiveness of professional development to be a major theme in the studies. Darling-

Hammond (2017) continued her focus later in the 2010s by comparing U.S. teacher education with teacher education programs in other countries.

The trend of teacher identity also appeared around the same time. Beijaard et al. (2004) seem to have sparked a string of influential work on professional identity by reviewing much of the work already done on teachers' professional identity and proposing ways to better guide research on the topic. Flores and Day (2006) published a qualitative study to better understand what shapes and reshapes new teachers' identities, and Tschannen-Moran and Hoy (2007) added their qualitative research that focused on the source of teachers' self-efficacy beliefs. This trend continued into the 2010s with work from Skaalvik and Skaalvik (2010) that examined relationships between teacher self-efficacy beliefs and teacher burnout, with Hong (2010) and Akkerman and Meijer (2011) also publishing influential research on teacher identity in the early 2010s.

## Evolution in ESL Teaching

ESL teaching is the only subject-specific theme that emerged from our analysis of teaching and teacher education research. A study of the top cited articles discussing teaching English as a second language (ESL) and related topics from 1970 to 2020 revealed a range of issues and trends. The approach to ESL and second language acquisition evolved through the decades.

Research on ESL teaching comprised 18% of the top cited articles over the past 50 years. This research was a primary focus during the 1980s and 1990s. During the 1980s, this theme comprised 11 of the top 20 cited articles. The trend continued into the 1990s to a lesser extent, with seven of the 20 articles. Only one article focused on ESL during the 1970s and none in the 2010s. While the topic was not mentioned during the 2000s, cultural awareness and diversity were prominent during this decade. The theme of ESL resurfaced during the year 2020 with three highly cited international articles.

Over the course of the five decades analyzed in this synthesis, the methods used in second language (L2) instruction evolved from an emphasis on the most efficient way to instruct children and young adults in English as a second language to a more learner-oriented approach which emphasized learner choice. During the 1980s, educational research focused on learning strategies and styles as well as practice-based methodologies such as group work, native speaker and non-native speaker (NS and NNS) interaction, and the effectiveness of direct instruction versus exposure acquisition. The focus on learning strategies and styles resulted from the view that knowing the process, rather than just the product of learning, was needed to move from "head-scratching" to designing programs that met the varying needs of students (Block, 1986). Early in the decade, researchers analyzed the effectiveness of direct instruction, whereby a student acquires a second language by interaction with a teacher in a structured setting, as opposed to exposure to the second language in use or a combination of the two (Long, 1983). Long's research analysis concluded that direct instruction benefited ESL students, and subsequent researchers worked through the decade to understand the best methods to include in the ESL classroom. Those methods included group work, interaction, and interlanguage talk. Long and Porter (1985) provided evidence that group work and interlanguage talk, or conversation between non-native speakers, were highly beneficial to second language acquisition. This research encouraged a move away from what Long referred to as "lock-step" teaching and a pedagogical emphasis to a more psycholinguistic approach in which NS/NNS interaction was valued in the ESL classroom.

Late in the 1980s, Pennycook (1989) asserted that the focus on methods in language teaching was erroneous, claiming that this perpetuated inequities in education. This change from English language teaching methods as the primary research focus to a more socially aware field of study continued primarily through the first half of the 1990s. In contrast to the 1980s, none of the top cited articles during the 1990s analyzed ESL from the lens of teaching methodology, content, or practice. Instead, researchers in the 1990s focused attention on a range of topics, which included the implications of gender differences in L2 acquisition (Green & Oxford, 1998), the shift away from the native speaker in ESL classrooms (Cook, 1999), the social identity of language learners (Peirce, 1995), and the social ramifications of ELT (Ricento & Hornberger, 1996). In 1998 Johnson and Freeman urged a reconceptualization of English language teacher education with the intent to place emphasis on the sociocultural context in which ELT professionals work.

Research during the 2010s was not primarily concerned with the theme of ESL, as it did not comprise any of the 20 top cited articles during that decade. However, this theme resurfaced during the year 2020 with three articles, each of which approached L2 instruction from a different perspective. These three articles dealt with language use in the classroom (Brevik & Rindal, 2020), teacher metacognition (Yuan & Zhang, 2020), and student voice (Lee & Butler, 2020). Two of these studies differed notably from the research during the 1980s and 1990s in that these studies were located outside of the United States and focused on students learning English as a second language in a school or university setting in which the students themselves were native speakers. This was in contrast to the earlier research, which was comprised of mainly immigrant students in the United States at either secondary, university, or community levels. The range of topics within the theme of ESL during the past 50 years revealed an evolving approach to ESL teaching and L2 students.

## Data Sources

We synthesized the research of teaching and teacher education from 1970 through 2020 and identified the trends and themes of that period. In doing so, we found that all the top cited articles came from thirteen journals. Our research provides insights into how many articles in each decade came from a particular journal and how they aligned with the themes of the decade. For example, we found that some journals dominated the decade. In the 1980s, 11 out of the 20 top cited articles were published in *TESOL Quarterly*. During the 2010s, 50% of the top cited articles were published in *Teaching and Teacher Education*. In addition, we found that from the 1970s to 2020, the variety of journals increased. For example, in the 1970s, all of the top cited articles came from four journals. In contrast, during the year 2020, the top cited articles were published in nine journals. In every decade, there were at least two articles published in the *Journal of Teacher Education*. Further research is needed to examine publishing trends, such as the number of published journals in each decade and other factors that could have favored one journal above others in search methods and citation frequency.

## Limitations

A limitation of our research is the brief amount of time articles from 2016 to 2020 have had to be cited. Because articles in this range have only had between two and five years to be cited, our research could be skewed toward articles published earlier in the 2010s. For instance, 13 of the top 14 most cited articles from the 2010s came from 2010–2013. Similarly, because 2020 was only one year ago, there has not been much time or opportunity for articles to be cited. As the 2020s continue, the 20 most cited articles may shift and change, and our current analysis may become out of date. The COVID-19 pandemic also may have had an impact on publishing, research, and studies that we may not see until later in this decade.

## Missing Links, Topics, and Trends

### Bullying

The prevention of bullying is a priority in many schools (Drake et al., 2003). However, in the top cited articles in the last 50 years there was only one article that addressed bullying. It is notable that bullying was not included in the top cited research for any of the other decades, considering that bullying often impacts student learning dramatically.

### Teacher Training in Educational Technology and Online Learning

During the 2010s and into 2020, there were a number of articles that discussed the need for preservice teachers to receive more training on using technology in the classroom. Björk and Edvard (2017) found that new teachers indicated their training in using technology in the classroom was not adequate. While there has been research on technology use in the classroom over the past few decades (see the “Educational Technology” chapter of this book), the topic of online learning was missing from the top cited articles in the 2010s. However, we predict that online learning will become more of a focus in top cited articles in the coming years.

### Cultural Awareness within ESL Teaching

The presence of the second language learner’s culture and its direct influence on the acquisition of a second language is notably absent in the 22 articles concerned with ESL cited in this review. A survey of the articles from the 1980s

reveals this void when it comes to analysis of the culture of ESL students. Seven of the 11 articles that studied ESL during the 1980s contained empirical studies, and the authors disclosed the nationalities of the subjects. However, no mention of the influence of the subjects' cultural background or its influence on learning was made during any of the studies. Subjects came from a variety of nations located in Asia, Europe, and South America, but the influence of these various cultural backgrounds was not evident in any of the studies produced during the 1980s. In 1989, Pennycook criticized the ELT profession for imposing Western culture on L2 students. This was echoed by Ricento and Hornberger in 1996 as they advocated for change in the field of language planning policy. Indeed, researchers in the 1990s adjusted their focus to include sociocultural context within ELT. However, the direct impact of a student's native culture on the acquisition of a second language was still missing from the top cited research. One article urged a recognition of the L2 speaker as "between two cultures" and advocated a move away from measuring L2 competence against a rubric that focused on native speaker traits (Cook, 1999, p. 200) but did not discuss the subject of the ELL's native culture. Freeman and Johnson in 1998 suggested redefining the approach to language teacher education by focusing on the sociocultural context of teachers' experiences. Even though these shifts were reflected in the research, a lack of specific research on the sociocultural experiences of ESL students was evident.

## Conclusion

Our analysis of the past 50 years of research in teaching and teacher education reveals sweeping changes. Early decades of research analyzed in this review showed a system of teaching and teacher education concerned with students' achievement as measured by standardized testing and what was considered to be academically sound for the time. This included specific teacher practices, classroom behavioral norms, and rigorous academics. Early research showed little to no attention given to the sociocultural influences on students or teachers. This began to change during the 1990s when a new focus on the impact of both students' and teachers' varied cultural contexts emerged. Throughout the 2000s, 2010s, and the year 2020, research on teaching focused primarily on sociocultural influences in the classroom, with student achievement and teacher practice taking a backseat. In addition, research during the 2000s and 2010s focused on improving the quality of teaching, defining a "good teacher," and comparing the U.S. educational system with international educational systems.

Throughout the 50 years of research that we analyzed, we also noted that broad changes took place in teacher education. During the 1970s, teacher education was focused primarily on teaching strategies and the variety of outside influences that impacted preservice teachers. However, during the 1980s, educational researchers were calling for the need to reform teacher education for the university setting to have a lasting impact on new teachers. Teacher education reform remained a theme from the 1980s through the 2010s. During the 2000s and 2010s, researchers worked to understand how teacher beliefs and efficacy impacted the experience of preservice and in-service teachers. Research during this time explored new ways of helping teachers acquire desired beliefs and attitudes. From 2000 to 2020, a new focus on innovation and technology was exhibited in the research. It is anticipated that this focus will continue throughout the 2020s as educational researchers analyze the effects of the swift implementation of online teaching and learning due to the COVID-19 pandemic.

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# Educational Technology



## A History of Research Trends from 1970 to 2020

Abigail Boekweg, Hannah Call, Dillon Crow, Faith Jennings, Julie Irvine, & Royce Kimmons

Educational Technology

Teaching Strategies

Instructional Strategies

New Media

*Our goal in this chapter is to explore the history of educational technology research by identifying research trends across the past 50 years. We surveyed 20 representative research papers from each decade ranging from 1970 to 2020. We used bibliometric data to select these representative papers and then qualitatively analyzed and manually coded them. We found that while the particular technologies investigated consistently changed, research generally progressed from addressing theoretical difficulties to determining the affordances of instructional technologies and finally to studying pedagogical strategies. We saw this trend on a macro level, occurring over 50 years. These findings imply that educational technology research (a) is iterative, beginning with the adoption of new technologies by practitioners; (b) relies on determining the effectiveness of instructional technologies; and (c) ultimately investigates teaching strategies related to technology.*

Educational technology gradually changed from clay tablets to chalkboards and eventually to Chromebooks. Somewhere in that timeline, the study of educational technology became a formal field of research. Of the 13 journals used in this study, the earliest volume was published in 1953 (though for the 13 journals, the mean first publication year was 1986). This indicates that the field of educational technology research as we know it is less than a century old. Our goal in this chapter is to sketch much of the history of this field by exploring 50 years of educational technology research, from 1970 to 2020.

We have identified the prominent research themes of each decade and discussed how the field has progressed over a 50 year period. To capture a snapshot of each decade, we examined the 20 most cited articles from each ten-year period in order to discover what research made a significant impact through citation counts in each decade. The articles were sourced from 13 educational technology journals. We used bibliometrics to identify these journals and select articles from each. After identifying the 20 articles for each decade, we manually coded and compared the articles in order to understand research trends. Once each decade was individually coded to reveal the prominent themes, all of our findings were then synthesized to show the overarching patterns and trends in educational technology research over a 50-year period.

Details about our methodology can be found in the “Methodology” chapter of this book. More information about the 13 journals we pulled articles from can be found in the appendix of this chapter.

# Literature Review

Many bibliometric studies have been done in the field of educational technology. Most of these studies synthesize research over a short period of time and on a narrow subset of educational technology research. However, our study is not unique in its attempt to analyze research trends over a span of 50 years.

One paper that could be compared to ours is by Bond et al. (2019) in which they analyzed 1,777 articles published in the British Journal of Educational Technology (BJET). Bond et al. also considered 50 years of educational technology research, used a combination of computer analysis and human analysis, analyzed research trends, and organized findings by decade. The study was limited in the following three ways: (a) it considered only articles published in BJET, (b) it did not consider the impact factor of individual articles, and (c) its content analysis favored some decades (especially recent decades) more than others (see Table 1).

**Table 1**

*Publications per Decade in BJET*

Decade	Number of Publications
1970s	202
1980s	184
1990s	177
2000s	502
2010s	712

In light of these limitations, our study is needed because (a) it considers a much wider range of journals, (b) it considers only highly cited articles, and (c) it gives equal weight to each decade. Our study produces a holistic picture of how educational technology research has progressed from decade to decade.

In another study similar to ours, Chen et al. (2020) gave a bibliometric review of the topical trends of every article published in BJET during its 50 year lifetime. Our review is, coincidentally, different in ways that were recommended by Chen et al. They suggested that “further investigations may consider extending the analysis and including comparable journals such as Computers & Education in the research area” (Chen et al., 2020). We included 13 journals from the field of educational technology, including Computers & Education. Chen et al. (2020) also recommended that in order to achieve the depth possible through manual coding, future researchers should “survey representative papers, from a qualitative perspective, so as to provide more profound and fine-grained understanding of the domain of educational technology” (Chen et al., 2020, p. 707). We used bibliometrics to select the most cited articles, and then we did qualitative analyses of those articles.

Our findings corroborate many of Chen et al.’s (2020) findings. For instance, a table compiling the most common keywords in the articles Chen et al. analyzed showed a growing diversity in research vocabulary. This was noticeable in our study as well, with the later decades using new keywords and terminology related to emerging technology and advancing theories. Another overlap is visible in the topics that became more popular over time. Blended learning, mobile learning, and game-based learning were common topics in our findings and Chen et al.’s.

These studies demonstrate the work that has been performed in educational technology research, which supports and overlaps in some instances with our current study. However, we also see gaps that were not previously addressed in these studies, such as analyzing a wide range of journals, focusing on highly cited articles, and equally examining every decade of research. It is our purpose to account for the previous limitations by presenting a broad, encompassing analysis of 50 years in research.

## 1970s: The Introduction of Visual Communication Media

Many of the technologies taken for granted today were in their infancy in the 1970s. During that time, researchers strove to understand the efficacy and uses of technologies like television and similar visual communication media (graphic displays, picture books, etc.). Research surrounding different instructional methods and theories also abounded as researchers sought to establish the best paradigms to use for education practitioners. The field of educational technology was young but rapidly growing.

### Visual Communication Media

The majority of research throughout the 1970s sought to understand the role and appropriate uses of visual communication media in education. Researchers recognized the potential of visual communication media to supplement, support, or possibly replace written and oral presentation of information. Haring et al. (1979) examined how pictures affect childrens' comprehension of written text and found that pictures aiding written text do help with recall of main themes in the written text. Haring et al.'s findings were consistent with Levin et al.'s (1978) major literature review, which emphatically supported the general use of visual communication media to improve learning in children. However, Salomon et al.'s (1972) work was ambiguous about the potential beneficial effect of visual communication media on learning.

While most of the research of the decade supported the use of visual communication media, the need to distinguish which types of visual communication media were most effective for which purposes remained. The research of Hsia et al. (1971) was pivotal in establishing that different types of media affect learners in different ways:

The central nervous system capacity is much less than the sum of [audio] and [visual] modality capacity; therefore, its saturation can be reached by either . . . modality. The very fact that information loss . . . occurs even in an ideal communication situation can be partly explained by the disparity between the capacities of the central nervous system and multimodality (p. 65).

The essence of this comment is that not all information can be absorbed. This is due in part to humans' limited capacity to process information and, in this case, information presented through visual communication media when combined with an auditory stimulus. In a similar vein, Allen et al.'s (1975) work highlighted the reality that more cognitively capable students were able to process more information through visual communication media and suggested that the media used in education be adapted to the cognitive capacities of individual students. Holliday et al. (1976) worked on finding more practical applications for practitioners seeking to use visual communication media effectively.

Through experimenting with multiple modes of visual communication media, Holliday and his colleagues (1976) found that single flow diagrams, or diagrams characterized by their linear and relatively simple flow were more effective than textual description alone, as well as more effective than a combination of diagram and text. He also found presenting big picture information in logical chains using picture word diagrams (PWD) and block word diagrams (BWD), rather than as separate unconnected ideas without diagrams, to be most effective. Dwyer et al. supported a similar idea that "the more realistic a presentation, the more effective the transmission of the desired message" (1970, p. 1). Taken together, these findings prepared the way for future practitioners and researchers alike. Though the role and appropriate use of visual communication media was still unfolding to researchers, the question of how to use them effectively remained for decades.

### Television

Closely related to the research of visual communication was the research surrounding television. The research of the decade on this topic was frequent and intense but not entirely concordant. Television and film were widely accepted as useful tools for transferring information, but researchers were eager to know if these technologies could be used for more substantial learning. For example, Salomon et al. (1972) explored television use in learning by attempting to use filming techniques to replace or supplant more traditional forms of communicating ideas, but their results were

inconclusive. Other researchers were interested in whether some of the properties of television were damaging to young children, and they were reluctant to implement it in educational settings. However, Anderson et al. (1977) claimed in their work that there was no evidence that television was harmful to the attention spans of little children. On the contrary, researchers produced evidence that television was actually more effective for instruction than pictures aiding text alone (Spangenberg, 1973) and that some television programs were even effective in teaching children general cooperation and rule following skills (Paulson, 1974). While these findings seemed promising, there was a growing number of researchers who would claim that the positive effects of television and other media forms were not inherent to the technological tools but were actually benefits of the instructional philosophies behind the technological tools which were used in delivering the instruction. This debate grew in the years that followed.

## Emerging Theories and Adaptation

Not all of the research of the 1970s was focused on the emerging technologies of the time. Researchers were also spending their efforts advancing their preferred educational theories and philosophies. While some educational theories had already taken root in many institutions, there were still many challenges to these established theories by the research of the time. Merrill et al. (1975) argued that current curriculum development models, though honorable improvements from the past, were insufficient and that curriculum development needed to be more adaptable to the needs of individual learners. Merrill and his colleagues also heavily criticized Cronbach and Snow's Aptitude Treatment Interaction (ATI) method, claiming that it "stops far short of desirable and possible procedures for adapting instruction to individual differences" (p. 4). At the heart of Merrill's alternative was the freedom and ability for learners to make decisions about their own learning so that their needs would be best met. This theoretical debate was one of many at the time. Mangan et al. (1978) urged practitioners to adapt their teaching to be more culturally aware of their learners, and Ausburn et al. (1978) presented evidence of the existence of at least 11 different learning styles. They claimed that while these learning styles did not determine aptitude, the styles should point the way to personalizing and adapting instruction to the needs of specific learners.

## 1980s: New Technologies and Old Debates

In the 1980s, research in the largely independent fields of education, technology, and psychology began to intersect. The rising interaction between these fields brought many challenges as the paradigms, theories, and interests of the researchers were often inharmonious. However, these challenges also proved useful by bringing attention and refinement to the field of educational technology.

### New Media

Many new technologies emerged in the 1980s. Several of the developments at the time were new audiovisual materials, such as television and illustrative aids, but most notable among these technologies were the Walkman, the videocassette recorder, video game consoles, and the personal computer. Each of these unique technologies had been used by the U.S. military and other government organizations for educational purposes in decades past, and with the radical general change characteristic of the 1980s, these technologies were rapidly becoming more accessible to the private and education sectors. This availability meant more developments were on the horizon for the field of educational technology. Researchers began avidly testing the utility of these potential learning tools and sought to give guidance for how they might best be used in learning across various institutions (Gagnon, 1985; Levie, 1982).

## Determining the Role of Technology in Education

Of the many emerging technologies, researchers and practitioners were particularly eager to understand the possible role of computers in providing and assisting with classroom instruction. Consequently, this led to a surge in empirical studies examining the efficacy of computer assisted instruction or CAI (also often referred to as computer based instruction or CBI; Clark, 1985). What in years previous was a congenial discourse about the role of computers in education was becoming a much more heated debate as research findings boomed in support of and against the role and efficacy of CAI. This debate was certainly strengthened in part by one major literature review, which claimed that

nearly all of the CAI-related empirical studies of the past, many of which attributed student achievement to CAI, were confounded for not controlling for instructional methods (Clark, 1985). The literature review made the claim that instructional methods, not the implementation of CAI, were responsible for disparities in student achievement (Clark, 1985). Similarly, Dalton et al. (1987) found that students receiving CAI underperformed when compared to their peers who received no CAI but worked in pairs.

Despite such claims against CAI, many of the researchers of the decade produced empirical evidence showing the significant benefits of CAI. Kinzie et al. found “a strong positive effect of computers on continuing motivation” (1989 p. 12), while Tennyson et al. (1980) showed how computers can aid and empower learners in taking control of meeting their own learning needs. This was similar to Dalton et al. (1987), who claimed that computers aid instructors and practitioners in providing personalized learning experiences to students. Yet the research of the decade continued to be rife with conflicting opinions as researchers sought to understand and define the role of technology, specifically computers, in education.

## Applying Technology Through Behaviorism and Cognitivism

Behaviorism was a dominant theory used in instructional design models during the 1980s. Because of this, researchers noticed some of the drawbacks of the behaviorists’ theoretical approach and called for more methodologies to be applied to instructional design, namely cognitivism (Clark 1985). Hannafin et al. (1989) were adamant about the benefits of allowing room for multiple psychological theories to guide instructional designers in meeting the needs of students and stated the following:

The differences between behavioral and cognitive strategies involve more than mere semantics. Considerable research exists suggesting qualitative and quantitative differences in learning might result from each. The issue is not which models are best, but which design decisions are most appropriate given the demands of the learning tasks (p. 98).

Studies from the decade show that researchers began designing to test the uses of cognitive theory in educational technology (Butterfield, 1989; Clark, 1985). Clark et al.’s (1985) article showed that instructional designs using a behaviorist approach were most effective in promoting short term memory of declarative or factual information as well as procedural tasks, while instruction designed using a cognitivist approach was more effective in promoting long term memory and the ability to creatively apply learned concepts in multiple new contexts. Butterfield et al. (1989) were also strong proponents of using cognitive theory to improve instructional methods and outcomes. These findings precisely supported the work and comments from Hannafin et al. and advanced the ongoing discussion about how differing psychological theories could be applied in educational technology.

## Naturalism Versus Rationalism

Throughout the decade, researchers also questioned the utility of different paradigms and modes of inquiry for research in the field of education and technology. At the forefront of this debate were the naturalistic and rational modes of inquiry. Rationalistic inquiry, often referred to as rationalistic research or scientific inquiry, is a mode of inquiry that relies heavily on reason and experimentation as the path to a true understanding of the world. It also claims that all events in the world have a cause and effect or that the world is deterministic. Rationalistic inquiry is almost always carried out with quantitative research methods, and it had been the dominant mode of scientific research for the past century and a half (Guba, 1982). In contrast, naturalistic inquiry, often referred to as naturalistic observation, is a mode of inquiry that relies primarily on observation of the natural world without any attempt to manipulate that which is being observed. Naturalistic inquiry is most often associated with qualitative methods of research.

Despite the dominance of rationalistic inquiry, researchers of the decade had little trouble finding fault with this mode of inquiry. For example, much of the criticism was reflected by Guba et al.’s (1982) statements about how “the rationalistic model is difficult to apply and results [are] used infrequently” as well as how “practitioners lack the insight and creativity to see how research results can be applied” (p. 235). These types of obstacles were particularly emphasized by proponents of naturalist inquiry who were hoping to broaden the field’s tools of inquiry. Proponents of naturalistic inquiry were quick to defend the unique insights that this type of inquiry could produce, especially in light of

rationalism's shortcomings, but the true challenge with accepting naturalism lay with its lack of clear, trustworthy criteria by which the findings from this mode of inquiry could be generalized to larger populations (Guba, 1981).

## 1990s: Technology and Theory

In the 1990s, the internet became a global, public network and grew from one site in 1991 to over three million sites in 1999. Yahoo, Amazon, and Google were founded. Web browsers, PalmPilots, and SMS text messaging were invented. Digital cameras and CDs became affordable. Notwithstanding these technological advancements, the 20 most cited articles of this decade were mainly concerned with deepening the theoretical foundations of the field rather than exploring new technology.

Of the 20 most cited articles from the 1990s, 17 were theoretical. The overrepresentation of theoretical papers in the 1990s may have been a response to the debates and conflicting findings of research from the 1980s. Some authors wrote about problems with existing theoretical frameworks and proposed new frameworks. Other authors explained and defended their theoretical bases in order to make more compelling arguments about the proper use, development, or evaluation of educational technology. The most cited article of the decade (Garrison et al., 1999) did both. Garrison et al. (1999) proposed a theoretical framework and argued that it was a proper template for evaluating the educational merits of computer conferencing.

## Technology

Even though theory was making the biggest impact on the field, there were plenty of practical discussions about the use of technology in classrooms. Some of the articles indicated that not enough was being done to use and integrate technology in the classroom. For example, Ertmer (1999) stated that schools had done little to change in response to the affordability of computing power. However, other authors cautioned against over-enthusiasm for technology.

One of the major debates over technology during the 1990s occurred between Kozma and Clark. Their debate centered on the role of technology in fundamentally changing education. The debate also discussed whether changes in technology had a transformative effect on education or if changes in technology were merely improvements in efficiency. Kozma (1994) claimed there was an urgent need to understand the relationship between technology and learning to facilitate the integration of emerging technologies. He argued technology had the potential to significantly impact how students learn and construct knowledge. In contrast, Clark's (1994) response was while media is necessary to deliver instruction and can decrease the cost of doing so, media is never directly responsible for learning. He critiqued the emergence of unrestrained support for technology in the field, claiming technology does not fundamentally change learning. Clark also warned that researchers who indicate media is responsible for learning are likely misinterpreting their findings and are possibly laying a groundwork for inadvisable investments. This debate over the role of technology in education opened a discussion on technology integration that even affected other fields in education research.

Kozma and Clark's debate impacted other researchers as well. In an earlier article supporting Clark's argument, Johnstone (1991) argued that teachers' enthusiasm for new technologies for classroom demonstration (like ticker tapes and the Wilson Cloud Chamber) were partly to blame for why science is difficult for students to learn. In support of Kozma's position, Jonassen and Rohrer-Murphy (1999) claim technology allowed us to accomplish innovations in areas like instructional design that would not have been possible without technology. This debate continued in succeeding research, it and posed questions that impacted the field of educational technology for many years.

Aside from debating the integration of technology in the classroom, researchers also discussed different types of commonly used technology. Computer technology was the most common, and video technology was the second most common. Authors would either talk about technology in broad terms ("computer technology," "media," etc.) or be very specific ("ASK Jasper," "GeometryTutor," etc.), rather than talking about established categories of technologies. Researchers in the 1990s employed a less stratified vocabulary for technology than we have today.

## Discussion

Constructivism gained popularity in this decade. Prior to the 1990s, instructional systems technology (IST) scholars had been actively rejecting the behaviorist foundation of IST (Jonassen, 1991) and the field of instructional technology had become increasingly accepting of the constructivist philosophy of learning (Rieber, 1996). During the 1990s, activity theory was being used to realize constructivist practices (Jonassen & Rohrer-Murphy, 1999).

Among the articles we considered for this decade, there were 40 distinct keywords or key phrases, including “paradigm shift,” “media theory,” “theoretical underpinnings,” “conceptual framework,” and “early discussion.” These key phrases point at the overrepresentation of theory in the 20 articles from the 1990s. Only three of the 20 articles in this decade were experimental (Mayer et al., 1995; Hill & Hannafin, 1997; and Byrne et al., 1999), and two of these were the least cited of the 20 (Mayer et al., 1995 and Byrne et al., 1999). Perhaps these three articles were early indicators of a shift to empirical research in the 2000s.

The 1990s were a formative time for educational technology research. Regarding the 1960s, Johnstone (1991) wrote “[they] made us stand back and ask serious questions about science, its concepts, its overarching theories and insights, its consequences, its issues and its place in education and in society in general” (p. 75). Something similar happened in the 1990s. During this time, researchers pondered the place of computer technology in education, what insights it could provide, and what theories could or should drive its development.

## 2000s: Students and Technology

At the beginning of the 21st century, expanding uses for technology were paralleled by a dramatic increase in access to technology. These twin advancements brought with them several research questions concerning learners of this new age—learners who had been surrounded by technology since childhood. New debates arose about this upcoming computer-literate generation (often referred to as “digital natives”), and a dialogue ensued concerning the needs of these new students, the technological advancements and proper ways to integrate unfamiliar resources in the classroom (Hew & Brush, 2006; Ertmer, 2005), and the underlying strategies to best help learners and teachers with emerging educational materials.

While the '90s gave us much research focused on the theoretical implications of educational technology, the 2000s showed a major jump to empirical studies and tests related to these questions. Several controlled experiments and randomized survey-based studies were at the forefront of the research. Of the top 20 articles analyzed for this period, 13 were empirical studies. The first seven articles of the decade—which span from 2000 to 2007—were either theoretical papers or literature reviews. The remainder of the articles—spanning only from 2008 to 2009—were all reports on empirical studies. This shows a major shift in the most common research strategies as well as a shift in which articles were most likely to be cited.

Looking at the common themes researchers of this decade focused on helped us identify the issues researchers were most concerned with and the state of technology in education during the 2000s. The most common research topic during the 2000s was “e-learning” with three articles using the term e-learning directly in the titles and five articles listing the term as a keyword (Sun et al., 2008; Liaw, 2008; Park, 2009; Motiwalla, 2007; So & Brush, 2008). Other important topics researched in the 2000s were (a) blended learning, (b) mobile learning, gamification, and Facebook, and (c) pedagogy.

## E-Learning

The first publication on e-learning we analyzed in this decade was a general analysis of e-learning participants and their course satisfaction (Sun et al., 2008). Those authors conducted an empirical study to discuss what created a satisfying e-learning environment and what influences contribute most to a learner’s experience. The results of the study concluded that “learner anxiety toward technology is one of the biggest influencers in a learner’s satisfaction” (2008, p. 1194).

The second article concerning e-learning similarly analyzed the overall learner satisfaction in online courses, but it also focused on the effectiveness of the course layout using the software Blackboard as an empirical case study (Liaw, 2008). In the third e-learning article, the discussion was more narrowed, focusing on the use of the Technology Acceptance Model (TAM) within an e-learning design (Park, 2009). TAM is a theoretical model used to explain user behavior in technology by analyzing the perceived usefulness and perceived ease-of-use, which are believed to directly influence how the technology will then be used.

## Blended Learning

Blended learning was another repeated topic. In 2004, Garrison and Kanuka defined blended learning as “thoughtful integration of classroom face-to-face learning experiences with online learning experiences,” and argued that, “blended learning is consistent with the values of traditional higher education institutions and has the proven potential to enhance both the effectiveness and efficiency of meaningful learning experiences” (Garrison & Kanuka, 2004, p. 95).

Four years later, So and Brush (2008) investigated a more focused aspect of the topic: student interactions and relationships in a blended learning environment. In their study, they analyzed empirical research supporting the claim that student perceptions of collaborative learning have statistically positive relationships with perceptions of social presence and satisfaction.

## Mobile Learning, Gamification, and Facebook

Three other topics that were repeated in the early 2000s were mobile learning, educational gaming, and Facebook. Two mobile learning articles were published in 2007 and 2009, the first presenting an evaluation of mobile learning in general (Motiwala, 2007) and the second focusing on gender and age differences in mobile learning (Wang & Wu, 2009).

Gaming in education was addressed in two articles in this decade. Kiili’s (2005) article, “Digital Game-Based Learning: Towards an Experiential Gaming Model,” presented the “flow” theory model (Csikszentmihalyi, 1975) and argued that game learning creates an engaging environment for students to experience flow (e.g., highly absorbed or focused interest). Papastergiou’s (2009) article, “Digital Game-Based Learning in High School Computer Science Education: Impact on Educational Effectiveness and Student Motivation,” also centered on the effects of gaming in education. She analyzed the comparisons of students participating in game-based curricula as opposed to those who were not and found that the students in game-based learning exceeded the performance of those in the original format.

The last of these three topics, Facebook, was discussed in two separate articles that were both published in the same journal (*Learning, Media and Technology*) and on the same day in 2009. Selwyn’s piece, “Faceworking: Exploring Students’ Education-Related Use of Facebook,” analyzed the use of Facebook among university students to determine if it was an asset or hindrance in education. The other article explored the social aspect of the platform to see how university students shared informal information related to their classes in an effort to connect socially with other students (Madge et al., 2009).

## Pedagogy

The remainder of the articles in this decade dealt with pedagogical-related topics broadly in connection with technology. “Toward a Design Theory of Problem Solving” (Jonassen, 2000) articulated the need for a problem-based learning design in our school systems and only briefly mentioned technological devices students may encounter. As opposed to advocating for one learning model, Merrill (2002) presented several different models and discussed the underlying principles of pedagogy design that connected and supported them all. Ertmer (2005), as mentioned earlier, was concerned with the pedagogical beliefs of teachers in relation to their classroom practices, and she presented research which suggested many teachers have learning beliefs that are not carried out in practice. Two other articles explored the principles of learning design in a digital environment and discussed ways to enhance teaching with technology (Angeli & Valanides, 2009; Wang & Hannafin, 2005). Lastly, the ‘Digital Natives’ debate was discussed by Bennett et al. (2008) and Kennedy et al. (2008) as a means of addressing the learners of this generation. Both articles

questioned the reality of this “new breed” of learners and argued that while learners of the generation were exposed to technology more than previous generations, they were not automatically experts and did not have different pedagogical needs than previous generations.

Reviewing the topics holistically, we see the themes of e-learning, blended learning, gaming, mobile learning, Facebook, and pedagogy leading the research of this decade. With many of the above examples, we can also notice a trend of initial research being more broad and encompassing in its scope, and later studies on the same topic being more narrow, focusing on a targeted aspect of the subject. For instance, the first e-learning article that was analyzed provided a broad study on e-learning satisfaction, while the later articles focused on specific software or a particular aspect of e-learning interaction.

## Discussion

Both of the articles discussing Facebook conducted surveys and analyzed a large collection of Facebook posts to provide data for their research (Madge et al., 2009; Selwyn, 2009), while the mobile learning articles used similar methods of data collection (Motiwalla, 2007, & Wang & Wu, 2009). Several of the e-learning, blended learning, and pedagogy with technology articles were heavily based on surveys but also included face-to-face interviews (Garrison & Kanuka, 2004; So & Brush, 2008; Merrill, 2002; Park, 2009).

Research in the 2000s focused on advances in technology such as e-learning, Facebook, blended learning, digital native, learner satisfaction, TAM, environment, and technology integration. We can see that with growing technology, the diversity of models and platforms for how technology could be used in education rapidly expanded. The research of this decade rose to meet the developing questions by addressing these new and various topics, conducting empirical studies to assess tangible implications, and presenting ideas to help educators and researchers moving forward.

## 2010s: Mobility, Connectivity, and Flexibility

The already brisk pace of technological advances in the 2000s accelerated during the 2010s. At the beginning of the decade, only 20% of mobile phone users were on smartphones, or phones that could access the internet, but by 2019 that percentage had grown to 70% (Kremer, 2019). People grew comfortable using their mobile phones not only for entertainment but also for shopping, banking, social networking, and education. This integration of mobile technology into everyday life had an immense impact on educational technology.

More people using smartphones meant more people were playing mobile games, and this sector of the gaming industry grew rapidly. Educators and researchers began examining how incorporating game elements (i.e., gamification) into educational situations could impact learning. Along with gamification, educators were also interested in how to harness social networking and augmented reality to bolster learning. Besides being interested in educational technology itself, researchers were also curious about the ways technology could be utilized to improve the traditional classroom experience.

Out of the 20 most cited articles from this decade, 13 were literature reviews. The other main direction of inquiry during this decade was learning how specific technologies or interventions impacted education. Besides the 13 literature reviews, the remaining seven articles analyzed for this section were empirical studies focused on the impacts of specific technology-driven educational interventions.

## Mobile Devices in Learning

As mobile devices became more widely used by the general populace, research involving mobile devices grew in popularity as well. Gikas and Grant (2013) examined the perspectives of these “new, 21st century” students regarding mobile devices and social media. They collected data by conducting focus groups of university students in the attempt to answer the question, “What are students’ experiences when mobile computing devices are integrated into higher education courses?” (p. 18). They found that students’ mobile device use often allowed them to access course content

anywhere and empowered them to “captur[e] information outside of the learning environment and mak[e] connections with the material” (p. 24). This finding that “learning happens regardless of location” is one of the main findings of Gikas and Grant’s study (p. 25).

Sung et al. also examined mobile technology’s impact on learning in their 2016 article. They examined 110 journal articles that addressed the use of mobile devices in teaching and learning. Of the 110 articles, about 73% examined hand-held devices while approximately 22% studied laptop usage. The most popular learning stage to study was higher education (43 studies), followed by elementary schools (38 studies; p. 258). While the portability of hand-held devices may encourage their use in nontraditional settings, the classroom setting was the most studied with half of the examined studies focusing on it.

## Social Media

In 2011, Junco et al. examined the effect of Twitter on the grades and learner engagement of college students. They found that “using Twitter in educationally relevant ways had a positive effect on student engagement” and a positive effect on grades (p. 128). The following year (2012), Junco published another paper on student engagement, this one focusing on how it was impacted by Facebook. Junco’s Facebook study found that time spent on Facebook or engaged in Facebook activities yielded mixed results depending on the specific variable being considered (p. 170). Other researchers were also interested in Facebook’s influence. Roblyer et al. (2010) surveyed both college students and faculty to compare usage and attitudes regarding Facebook and found that faculty and students did not use Facebook much for educational purposes (p. 138).

Another article we analyzed examined how social media can empower learners to customize their Personal Learning Environments (PLEs). In their 2012 article, Dabbagh and Kitsantas described how social media had enabled learners to “create, organize, and share content” by creating their own PLEs, which allowed them to curate and share content as they saw fit (p. 4). They cautioned that not all students possess the “knowledge management and the self-regulatory skills” needed to create the PLE they desire for their learning experience and advocated “teaching students to become effective self-regulated learners” so they will have the skills needed for “creating, managing, and sustaining PLEs using a variety of social media” (p. 7).

## Understanding Teacher Attitudes

With social media and technology evolving so rapidly during the 2010s, Ertmer et al. (2012) sought to analyze the beliefs and practices of teachers as they related to technology and student-centered learning. They found that “in general, teachers were able to enact technology integration practices that closely aligned with their beliefs” (p. 432), which they saw as a change from Fang’s 1996 research finding that while “teachers could articulate their beliefs, practices were influenced by ‘classroom realities’” (p. 432). Ertmer et al. gave some possible reasons for teachers’ new ability to align their technology practices with their beliefs: (a) increased student access to computers and online learning resources (i.e., Web 2.0), (b) increased teacher understanding of the “new, 21st century student,” and (c) increased changes in curricular emphases (p. 432).

Others were also interested in teachers’ adoption of technology in their classrooms. In their 2019 paper, Schere et al. attempted to use the TAM to explain and model teachers’ adoption of digital technology. This interest in the TAM is a continuation from scholars’ interest in the 2000s. Schere et al. explain the continued interest in the TAM thusly:

The TAM has gained considerable prominence, particularly due to its transferability to various contexts and samples, its potential to explain variance in the intention to use or the use of technology, and its simplicity of specification within structural equation modeling frameworks (p. 14).

## Gamification

Along with mobile learning, another aspect of online learning that students grew more familiar with during the 2010s was gamification. Educators sought to harness their students’ enthusiasm and familiarity with gaming by incorporating elements such as “the use of narratives to change the context around a typical activity, the creation of social

competition, and the incentivizing of behavior through badge and reward systems” (Hanus & Fox, 2015, p. 152). During the 2010s, schools began to embrace elements of gamification, but clear evidence of which gamification elements had the most beneficial impact was lacking.

The obstacles to distilling learners’ experiences into empirical data are reflected by the details of Connolly et al.’s (2012) systematic literature review of empirical evidence on computer games and serious games. Connolly et al. gathered 7,392 papers using key words such as “computer game,” “video game,” and “games-based learning.” However, after applying criteria requiring papers to include “empirical evidence relating to the impacts and outcomes of playing games” they narrowed the list to 70 papers, less than 1% of the original list (p. 666). This meant less than 1% of the papers they initially gathered met their requirement for high quality empirical evidence.

In Connolly et al.’s opinion, “The most notable point about the current review was the diversity of research on positive impacts and outcomes associated with playing” (2012, p. 672). The 2010s saw a wider acceptance from the public of using games to improve learning outcomes. While puzzles and simulations were the most common types of games used in learning, Connolly et al. sought to “develop a better understanding of the tasks, activities, skills and operations that different kinds of games can offer and examine how these might match desired learning outcomes” (p. 672). According to our research, Connolly et al.’s review was the most cited article from the 2010s, with 1,270 total citations, and has become a touchstone for gamification research.

Acknowledging the continued interest in digital games, Boyle et al. revisited the topic in 2015 and updated Connolly et al.’s systematic literature review. Three of the scholars from the original Connolly et al. paper also contributed to the Boyle et al. update. For their updated review, they coded the reviewed papers by geographical location, and the wide distribution of papers showed that research on games was being conducted worldwide: United States (53), Europe (45), Asia (26), South America (5), and Australia (5; p. 181).

In their 2015 mapping study, Dicheva et al. searched the research for papers presenting empirical studies regarding gamification as used in education. According to them, “the most used gamification design principles in educational context are visual status, social engagement, freedom of choice, freedom to fail, and rapid feedback” (p. 79). Within the papers they analyzed, the most popular game mechanisms cited were points, badges, and leaderboards (p. 80).

This emphasis on elements designed to set learners apart from one another may be one of the most common elements of gamification within education. However, according to Hanus and Fox (2015), it may cause harm to learning outcomes (p. 159). Hanus and Fox’s longitudinal study of student outcomes from a gamified course compared to a traditional course found that students in the gamified course decreased in satisfaction, motivation, and empowerment relative to the non-gamified course (p. 159). They suggested that “giving rewards in the form of badges and coins, as well as encouraging competition and social comparison via a digital leaderboard, harms motivation” (p. 159). Since their studied class was an elective, they assumed that students who took the class did so because they were at least somewhat interested in the material and suggested that “when a reward system is imposed on top of a class students already find interesting, it may feel constraining and forced” (p. 159).

While Hanus and Fox attributed negative impacts on motivation to certain gamification elements when the learner was already interested in the subject, they proposed that incentives could increase intrinsic motivation for boring tasks and so they viewed gamification as “a double-edged sword” (p. 160). Gamification could possibly help motivate learners regarding tasks they viewed as boring, but it also appeared to smother existing intrinsic motivation learners had for subjects that already interested them. Dominguez et al. (2012) designed gamified alternatives to exercises in an existing course and students had the option of doing the traditional exercises or the gamified versions. They found that some students had mixed feelings about games, citing a “dislike and uneasiness created by the leaderboard and the feeling of competition among students” (p. 390). These findings supported the existing thought that while gamification could be a benefit in the classroom, there were certain significant drawbacks to its use.

## Flipped Classrooms

Access to mobile devices or computers is essential for students to participate in “flipped classrooms,” a model which grew in popularity during the 2010s. With flipped classrooms, what was “previously class content (teacher led instruction)” is replaced with “what was previously homework (assigned activities to complete) now taking place within the class” (O’Flaherty & Phillips, 2015, p. 85). This method of instruction emerged in the 2010s in response to increased access to technology and understanding of its benefits.

In their systematic review of literature pertaining to flipped classrooms, Akçayır and Akçayır (2018) found that the number of articles published on the topic steadily increased from one paper in 2012 to 32 papers in 2016, reflecting increased interest in the model by scholars (p. 337). One reason for this interest that O’Flaherty and Phillips (2015) suggested was “The flipped classroom foster[ed] student ownership of learning through the completion of preparatory work and being more interactive during actual class time” (p. 85).

Besides student ownership, other benefits of flipped classrooms scholars have found include “enhanced learning motivation and students’ positive attitudes” (Akçayır & Akçayır, 2018, p. 343). However, questions remained about whether these benefits were due to active learning rather than the flipped model itself. As Akçayır and Akçayır (2018) asked, “if a researcher use[d] active learning strategies in a traditional course instead of flipping the classroom, would s/he gain the same positive academic outcomes?” (p. 343). They went on to posit that “if the answer is ‘yes,’ then maybe there is no need to devote considerable time to designing and implementing the flipped classroom (developing video lectures, quizzes, etc.) or to subjecting students to large changes in their instructional format” (p. 341). This study called into question the need for the widespread implementation of flipped classrooms and provided suggestions for research on active learning instead.

## MOOCs

The term MOOC (Massive Open Online Courses) was described as “the educational buzzword of 2012” (Liyanagunawardena et al., 2013, p. 203). MOOCs are online courses that typically offer free enrollment. Jordan (2014) reported that a survey in February 2013 suggested that the average MOOC enrollment was 33,000 students with an average of 7.5% completing the course (p. 134). In her paper, Jordan gathered enrollment numbers and completion rates as they were available from public sources online.

According to Jordan’s data, total enrollment in MOOCs decreased over time from October 2011 to July 2013 (p. 145). She also found a trend that enrollment in a MOOC increased as the course length in weeks increased (p. 146). However, as course length grew, a smaller proportion of students completed the longer courses (p. 148).

## Augmented and Virtual Reality

In the 2010s, advances in augmented reality (AR) and virtual reality (VR) technology led to increased research interest in how AR and VR could be used in education. Wua et al. (2013) conducted a literature review which gathered and analyzed 54 articles dealing with AR in education. They argued that “viewing AR as a concept rather than a type of technology would be more fruitful for educators, researchers, and designers” (p. 42). While viewing AR as a concept, Wua et al. explored different ways AR could be used in instruction and issues that possibly impact such usage.

In a similar fashion, Dalgarno and Lee (2010) examined the learning affordances of 3-D virtual environments (VE). They suggested that “because 3-D technologies can provide levels of visual or sensory realism and interactivity consistent with the real world, ideas learnt within a 3-D VE should be more readily recalled and applied within the corresponding real environment” (p. 21). This was supported by Merchant et al.’s (2014) finding that “the effectiveness of games was the same whether students were assessed immediately or after the passage of time,” which indicated to them that “students learning in games have retention level beyond short-term learning” (p. 36).

## Discussion

The 2010s brought dramatic technological changes to societies and classrooms worldwide. The terrain of educational technology was shifting rapidly and many researchers sought to understand the new realities of classrooms on the ground. Researchers also sought to find their bearings and map which specific aspects of education technology had already been studied by their colleagues by conducting literature reviews. The 20 most cited articles from this decade revealed that researchers were especially interested in how learners were impacted by mobile learning, social media, gamification, MOOCs, and augmented and virtual reality. The articles analyzed for this section were primarily concerned with the following questions: (a) “How does the integration of mobile technology into everyday life impact educational technology?”, (b) “In general, how can educational technology improve learning?”, and (c) “How do specific technologies impact learning?” The rise of mobile devices and wider adoption of online learning enabled teachers and learners to experience new models of learning such as flipped classrooms and to envision more flexible learning environments.

## 2020 and Beyond

There are intrinsic constraints with discussing a decade while it is still in its infancy. We would argue that the period of scholarly discourse in educational technology that began in 2010 ends, not on December 31, 2019, but once the ramifications of the COVID-19 pandemic of 2020 became apparent. Many of these articles were written before the pandemic reached global proportions and they explored similar themes as those articles analyzed from the 2010s: (a) the use of gamification in education (Troussas et al., 2020; Zainuddin et al., 2020), (b) the impact of the flipped classroom model on students (Turan & Akdag-Cimen, 2020; Lo & Hew, 2020; Bond, 2020), (c) the application of virtual reality in education (Radianti et al., 2020), and (d) the adoption of new learning technologies (Liu et al., 2020). However, three of the articles from 2020 focused on the pandemic and its impact on the field of educational technology.

The abrupt shift to remote learning related to the COVID-19 pandemic strained the capacities of educators, schools, students, and families worldwide. Two of the articles in this section discuss impacts of the COVID-19 virus. The article by Almaiah et al. (2020) asked how regional e-learning systems were affected by the COVID-19 pandemic and discussed the main challenges and factors that led to successful usage of those systems. The researchers’ list of critical factors that need to be addressed for successful usage included the following: (a) technological factors, (b) e-learning system quality factors, (c) trust factors, (d) self-efficacy factors, and (e) cultural aspects (p. 5273). We anticipate that many other scholars will examine the impact of COVID-19 with similar papers in the months and years to come.

Rather than analyze the effects of the pandemic on specific learning environments in their editorial, Williamson et al. (2020) explored the macro view of how the pandemic will shape pedagogy going forward.

A distinctive approach to pedagogy has emerged as a global norm in the opening months of 2020. Distance education, remote teaching, and online instruction are not new approaches to pedagogy or curriculum design, but they have taken on renewed salience (p. 108).

Williamson et al. urged caution regarding the “educational platformization” and decentralization of public schooling necessitated by the pandemic (p. 108). They speculated the following:

The current state of ‘pandemic pedagogy’, in other words, may not be seen by some businesses as simply an emergency response to a public health and political crisis, but as a rapid prototype of education as a private service and an opportunity to recentralize decentralized systems through platforms (p. 109).

This concern that Williamson et al. have of public education morphing into a decentralized system enabled by the use of private platforms called for critical studies of these “changes in the broader political economy of the COVID-19 pandemic, its antecedents, and long-term consequences” (p. 109).

A major concern Williamson et al. address in their editorial is the inequality among students, especially the lack of access many students had at home to distance learning (p. 110). They cautioned that such inequality could not simply be solved by giving students laptops for home use and that as the pandemic continued inequalities in society were likely to widen (p. 110). Williamson et al. urged us to “see this time as an important moment to support, regulate and design an inclusive digital future for us all, that is part of a society that is more socially just” (p. 111).

At the beginning of the 2020s, educational technology research was still concerned with understanding the effects of technology on pedagogy in both general and in specific instances. However, the dependence on distance education necessitated by the COVID-19 pandemic exposed the inequalities that existed in many educational systems and highlighted many questions about “politics, pedagogies, and practices” (Williamson et al.) that will need to be answered in the future.

## Synthesis of 50 Years

In this section, we will discuss or summarize the themes common to every decade, important themes unique to particular decades, the evolution of educational technology, and the probable future trajectory of educational technology research.

### Core Question

As we look back over 50 years of research and try to sketch a holistic picture of the field of educational technology, we note a few significant themes. The main theme that was common in every decade was research that questioned the effectiveness of specific educational technologies. For this reason, it seems a fair assessment to say that the core question of educational technology research is—or has been for 50 years—whether a particular educational technology is effective. While this is a simple question, educational technology research has remained dynamic and complex for over 50 years. This, of course, is due to the constant innovations in educational technology that allow that core question to be asked again and again, always of a new technology (and sometimes before anyone is fully done studying the old technology). If technology were static, then educational technology would very likely become a closed question.

Technological developments have frequently altered the relevance of research topics. In the '70s, audiovisual aids in learning were the most technologically relevant. By the 2000s, e-learning was the most relevant discussion. During the 2010s, gamification was used in the hopes of increasing learner engagement. Increased access to tech and mobility led to experimenting with flipped classrooms, MOOCs, and how social media could be used to increase engagement. The increasingly rapid pace of technological advances has outstripped researchers' ability to compete with the new information. As this chapter illustrates, educational technology research does not always focus on the newest available educational technology. Instead, researchers typically study new technology after it has made its way to the classroom (Kimmons et al., 2021). In the field of educational technology, the efforts of practitioners and researchers are closely intertwined, with researchers often considering which innovations practitioners are making in their classrooms as they consider which questions to study. It is a different model than, for example, the medical field, where research is carried out before adoption by practitioners. This symbiosis with practitioners creating innovations and researchers then mapping and verifying them increases the relevance of research to real life classrooms at the same time it necessitates a lag between the release of new technologies and research concerning them.

### Important Trends

Continuing from the 1970s through the 1990s, theoretical analyses appeared in—and eventually even dominated—the highly cited research of each decade. However, from the 2000s onward, theory was no longer the focus of the most cited articles. Theoretical trends during the first three decades should be expected because the field was quite young in the 1970s, troubled by conflicting paradigms in the 1980s, and still grappling with those conflicts even as the internet exploded onto the scene in the 1990s. Even with the introduction of the internet, the most cited articles from the 1990s do not directly concern technology, instead focusing on conflicting theories and models.

What were these theoretical difficulties and disagreements that concerned educational technology research previous to the dawn of the internet age? In the 1970s, new technology created or exposed insufficiencies in established theories and models. In response, researchers challenged those theories and models. In the 1980s, much of the dialogue of educational technology centered on the behaviorism/cognitivism debate. In the 1990s, both Ertmer (1999) and Kozma (1994) urged faster implementation of technology while Clark (1994) and Johnstone (1991) warned against overenthusiasm for technology. Clark (1994) and Kozma (1994) also disagreed about the role of media in learning.

Based on the 20 most cited articles from the 1990s, there is no reason to believe that every practitioner and researcher in the field of educational technology achieved intellectual harmony regarding these debates. However, enough theoretical foundation had been built by 2000 that researchers could at least clearly communicate about their theoretical differences. Perhaps this explains why research began to trend away from theoretical papers. Beginning with papers published in 2000, we saw a trend of researchers asking whether practitioner beliefs are aligned with practice. For instance, Ertmer (2005) investigated whether there was a gap between teacher practice and the theoretical framework (like constructivism) that the teachers aligned themselves with. It appears that by the 2000s, the theoretical roots of the field had matured enough to accommodate new types of discussions.

## Future Trajectory and Conclusions

In the 1980s, the knitting together of previously disparate fields created theoretical tension that had a major impact on the field of educational technology that lasted for at least 20 years. Perhaps this indicates that if cross-disciplinary discussions once again becomes central to educational technology research, then the theoretical foundations of the field may undergo another seismic shift. Or perhaps cross-disciplinary research would instead result in the formation of sub-fields. It may be that only a dramatic evolution of technology on par with the invention of the internet would result in a similarly dramatic evolution of the field of educational technology.

It seems that a natural course for educational technology research is for researchers to (a) solidify their theoretical base, (b) determine the affordances of a technology, and (c) investigate pedagogical strategies related to that technology. In 2020, many of the studies that used familiar technology were focused on pedagogy. However, the AR/VR research was meant to determine the affordances of AR/VR. Once it is clear what the affordances of AR/VR are, we would expect to see pedagogy-related research in this area.

We have speculated about why, starting in the 2000s, theoretical papers stopped having such an impact on the field, but we recommend a more thorough investigation of this topic. We also recommend continued bibliometric studies similar to ours that synthesize decades of educational technology research into a holistic picture of the field (perhaps from 2020 to 2070). As research continues, we anticipate further expansion in the field of educational technology.

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## Synthesis

- Kimmons, R., Rosenberg, J., & Allman, B. (2021). Trends in educational technology: What Facebook, Twitter, and Scopus can tell us about current research and practice. *TechTrends*, 65, 125–136. <https://doi.org/10.1007/s11528-021->

## Literature Review Articles

Bond, M., Zawacki-Richter, O., & Nichols, M. (2019). Revisiting five decades of educational technology research: A content and authorship analysis of the British Journal of Educational Technology. *British Journal of Educational Technology*, 50(1), 12–63. <https://doi.org/10.1111/bjet.12730>

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# Educational Psychology



## A History of Research Trends from 1970 to 2020

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Measurement

Self-regulated Learning

Cognitive Load Theory

Self-efficacy

Educational Psychology

Self-Concept

Motivation

Teachers

*The purpose of this study was to evaluate and thematically synthesize educational psychology and counseling research over the last 50 years. We used bibliometric measures to identify the top 20 articles for each decade, from 1970–2019. We then systematically reviewed and coded each article, looking for thematic trends. Themes for each decade were discussed in detail. Some of these major themes included schema theory in the '70s, self-efficacy and self-regulation in the '80s, cognitive load in the '90s, motivation in the 2000s, and student learning outcomes in the 2010s. A preliminary discussion about where the field is going during the 2020s is also included. While some themes were decade specific, we found that several themes spanned the entire 50 years. Those themes included the following: (a) teachers; (b) self-concept, self-efficacy, and self-regulation; (c) motivation; (d) measurement tools and statistical processes; and (e) cognitive load. Taken together, the field of educational psychology and counseling has evolved and shifted over the last 50 years with the research bearing evidence of important themes across time.*

Psychology and counseling have existed as fields of research for hundreds of years. However, educational psychology and counseling did not exist as a distinct field of study until recently. In fact, it was not until 1931 that the British Journal of Educational Psychology was established. The Journal of School Psychology was established years later in 1963. While educational psychologists and counselors existed in Britain and other parts of the world prior to these dates, they were reliant on research from other related disciplines to inform their practice. The development of these field-specific journals was a milestone that “signaled the commitment of the specialty of school psychology to wean itself from other’s [sic] scholarship and to establish scholarship that drew more heavily on its own literature” (Liu & Oakland, 2016, p. 105). Many other educational and school psychology journals were developed soon after, including Contemporary Educational Psychology in 1976, School Psychology Quarterly in 1986, and Educational Psychology Review in 1989.

Since 1931, the field of educational psychology and counseling has grown and developed as a distinct area of scholarship. A handful of attempts have been made to summarize the research using bibliometric and scientometric analysis. Three such articles provide insights into educational psychology literature but are limited due to their focus on

either just one journal or just one topic each. Jennings et al. (2008) conducted a bibliometric analysis of *School Psychology International* from 1995–2007, and Mitchell and McConnell (2012) analyzed *Contemporary Educational Psychology* from 1995–2010. Jennings et al. examined citation and author trends. In contrast, Mitchell and McConnell focused on thematic and theoretical trends in the articles published during the 16-year period. According to their analysis, the most common topics in articles published in *Contemporary Educational Psychology* from 1995–2010 were motivation and academic subjects, particularly reading and math. Mitchell and McConnell (2012) also reported that the theoretical perspectives most often discussed in *Contemporary Educational Psychology* were cognitive and social cognitive theories.

More recently, Graves et al. (2020) published a bibliometric study in which they extended their analysis to a total of nine educational psychology journals; however, they focused strictly on the singular topic of social justice. Thus, while the article provides unique insight on a relevant topic in educational psychology, it does not give a comprehensive view of the field as a whole.

A few other studies have attempted more comprehensive analyses of educational psychology and counseling literature and are summarized here.

Price et al. (2011) reviewed five educational psychology journals and identified the top 100 most cited articles of all time and the top 25 most cited articles from the previous decade (2000–2010). They specifically analyzed article type and content topics. Price et al. (2011) reported that these articles were 50% qualitative and 50% narrative, with no quantitative studies represented. Six broad content categories were identified: (a) 23 assessment articles, (b) 27 intervention articles, (c) 29 explicative articles (“Explicative articles describe the relations between two or more phenomena or variables” [p. 65]), (d) 12 professional issues articles, (e) 10 consultation articles, and (f) one other article. While similar to our present study, one weakness to be considered is that identifying the most cited articles of all time favored more recent articles to historic ones; thus, articles published prior to 1990 would have been underrepresented in Price et al.’s analysis.

Kranzler et al. (2011) conducted a somewhat similar study researching the publications of school psychology program faculty from 2005–2009. They did not limit their study based on journals; rather, they selected publications by faculty from 59 selected school psychology programs. The majority of their analysis focused on faculty scholarship, but they included a brief discussion on the topics most represented. Similar to Price et al. (2011), they found the majority of the articles could be categorized as professional issues, intervention, assessment, and consultation (Kranzler et al., 2011).

Finally, Liu and Oakland (2016) completed a scientometric analysis of all the articles referencing “school psychology” from 1907–2014. Using this data, they identified 4,806 scholars authoring 3,260 articles in 311 journals. The most prominent publishers and various citation relationships were discussed in depth. Liu and Oakland briefly discussed relationships between the most highly cited articles. These relationships are very similar to those mentioned by Price et al. (2011) as “the top 15 most highly cited articles in this study, are also included in Price et al.’s list” (Liu & Oakland, 2016, p. 118).

Our study builds on and adds to the existing literature by providing a deeper, topical analysis of the research in the field of educational psychology over the last 50 years from 14 journals. We identify and discuss trends and themes associated with the 20 top cited articles for each decade from 1970–2019, with a short section dedicated to the top trends in 2020 and moving forward. Of the 14 journals represented, three are broadly related to the fields of educational psychology and counseling: (a) *Journal of Counseling Psychology*, (b) *Counselor Education and Supervision*, *Learning and Individual Differences*, and (c) *Journal of Counseling and Development*. The majority and remainder of journals are specifically educational psychology journals, including the five listed at the beginning of this chapter. A complete list of the journals utilized in our analysis can be found in the Appendix A. A more thorough explanation of our analysis methods can be found in the “Methodology” chapter of this book.

# 1970s: Motivation, Teachers, Math Anxiety, and Schema Theory

The top articles in this decade centered around four main themes: motivation, the impact of teachers, math anxiety, and schema theory. We saw schema theory and motivation develop as themes throughout almost every decade of top cited articles in this chapter. Other topics from research in the 1970s touched on the role of randomized control trials in education psychology, how to properly determine interrater reliability, and how to improve the happiness of students.

## Motivation, Effort, and Attribution of Students

The second-most cited article from the 1970s explored a topic that was discussed by two other articles in our analysis: motivational underpinnings of students in a classroom. In this article, Weiner (1979) elaborated on the attributional theory of motivation and how it related to different situations that students may face in the classroom. Attribution theory focuses on a learner being able to look back and understand why success did or did not occur. There is a direct connection between a student's future motivation and what they attribute to their success or failure as a learner in the classroom. If a student perceived they failed due to lack of effort, then they may be more motivated to try again because they believe they can adjust the effort variable. If the cause of failure is believed to be external to the learner, then the learner's motivation will decrease substantially. This theory was meant to augment the contemporary theories of motivation that primarily focused on pleasure seeking and pain avoidance.

Another top article went into more detail on effort and how it played into student-teacher interactions and student motivation. "Effort: The Double-Edged Sword in School Achievement" (Covington & Omelich, 1979) discussed the way that effort affected student-teacher interaction and student achievement in a classroom. According to Covington and Omelich, teachers tend to praise and place a high value on effort and even threaten students if they do not try. For students, however, effort can have a large impact on how they feel about themselves and their self-confidence. If students exert significant effort and still do not succeed, then they infer low ability in themselves and feel discouraged. However, if they do not try hard and do not succeed, then at least they can use their lack of effort as an excuse. Thus, students sometimes may not give their best effort to preserve their sense of self-worth.

Two other articles touched on similar topics. One evaluated a chicken-or-the-egg question in academic performance and found that academic achievement clearly precedes a student's evaluation of their ability, rather than the other way around (Calsyn & Kenny, 1977). The other article evaluated the logic of student attributions at different age levels and found that as students mature in elementary school their attributions of failure or success become more logical (Nicholls, 1979).

## Teachers

Research in the 1970s was important for understanding the impact of teachers. Previous research centered around the idea that academic achievement was "determined by factors within students, little if at all by teachers" (Brophy, 1979, p. 733). This belief started to change throughout the decade as more and more researchers demonstrated that how a subject is taught can have as much significance as the subject matter. Teachers have an important role to play, but it can be difficult to fully understand that role given the myriad variables at play in any given classroom. Brophy attempted to navigate many of these variables and give direction to the field on how to approach research given the changed landscape of education. To do this, Brophy argued effective compilations of research and data need to be made, and eventually generic conclusions about teaching in a classroom need to lead to specific studies designed within specific contexts.

One of Brophy's (1979) discussed variables was teacher expectations on classroom performance. Brophy and Good (1970) studied the interactions of teachers and students in four different first-grade classrooms. The observations focused on the behavior of the teachers and the students. They noticed that some of the differences between the behaviors of various teachers was caused by student behavior, while other differences in teacher behavior could not be attributed to the behavior of the students. Teachers gave the greatest praise to students whom they had the highest expectations of. Brophy and Good concluded that teacher expectations of students are in some ways self-fulfilling prophecies.

## Measurement: Math Anxiety

Two articles discussed the introduction and subsequent use of a scale designed to measure the level of anxiety students experience with learning math. The first article explained how a psychometric test (called the Mathematics Anxiety Scale) was developed that demonstrated internal reliability and predictability when it came to measuring the level of anxiety a student felt about math (Richardson & Suinn, 1972). A follow-up article in 1978 sought to understand how common math anxiety is among college students using the Mathematics Anxiety Scale (Betz, 1978). That study found that math anxiety is relatively common among college students but also noted that it is more prevalent among certain subgroups of students, such as women and students who did not have as much math education in high school.

## Schema Theory

During the 1970s, schema theory became more developed and robust, which is reflected in the sixth- and seventh-most cited articles. Schema theory states that when learners are introduced to new material they must assimilate it into their preconstructed understanding of a subject or broader understanding of the world. Wittrock (1974) discussed a model that can be used to try to better understand human learning. Learning, as proposed by the author, is better understood when looking through the lens of the previous knowledge of the learner. Learners generate understanding and recall from what they construct of the material learned and how it fits into the bigger schema that the learner has already preconstructed in their brain.

This concept was later tested by Pichert and Anderson (1977). Their study tested how well college students remembered different elements of stories based on the perspective they were given in reading the story. The results showed that the perspective the students were given influenced their recall of particular ideas. That is, the perspective of the student determined the importance of the ideas. This meant ideas are not important in and of themselves but rather are important depending on the perspective the person brings to the text.

## Other

The most often cited article from the 1970s was “Estimating Causal Effects of Treatments in Randomized and Nonrandomized Studies” (Rubin, 1974). It has been cited in almost three times as many instances as the second-most cited article, with 3,345 citations as of the writing of this chapter. This article addressed some of the criticisms that had been levied against the field of education psychology—mainly, that the field does not utilize randomized control trials as much as it should. The authors argued that there is merit in randomized control trials, but in many instances such trials are not feasible. Given the meta-issue addressed in this article, it is logical that it is still frequently cited. However, it is the only top-20 article that addressed this topic. Authors who cited this article list it as one of the founding arguments making the case for exceptions to randomized control trials and how to work with situations where randomized control trials are not feasible (Holland, 1986).

Other top articles from the 1970s introduced and developed many other important subjects that are prevalent in today’s understanding of learning. Methods for calculating interrater reliability and agreement were more fully developed (Tinsley and Weiss, 1975), and the first psychological study designed to improve human happiness among college students was also conducted (Fordyce, 1977). These topics, as well as the themes mentioned above, are a reflection of larger trends that took place during this decade.

## 1980s: Self-Concept, Self-Efficacy and Self-Regulation, Motivation and Goals, Longitudinal Studies, and Measurement Tools

In comparison to the 1970s, the most cited articles from the 1980s focused less on the impact of teachers (though there were still some articles in the early ’80s with that theme) and more on the impact of the individual, their sense of self, and their performance. Self-concept, self-efficacy, self-regulation, and self-motivation were prominent topics

among the most cited articles of the '80s. There were also a number of highly cited articles covering longitudinal studies as well as articles aimed at advancing various measurement and analysis tools.

## Self-Concept

Throughout the '80s, many authors, but particularly Marsh, sought to study self-concept and its impact in various areas. In the mid-'80s, Marsh and Shavelson (1985) focused broadly on breaking down the multiple areas of self-concept by compiling existing research. The factors considered and rated in their effects on an individual's self-concept were verbal skills, problem solving, appearance, parents, religion, and emotional stability, along with various other factors.

Later, Marsh (1987) aimed to investigate the practicality of the "big-fish-little-pond effect" (the BFLPE) in students. In this longitudinal analysis, he focused on children's academic self-concept and subsequent academic performance. Marsh was able to use the BFLPE to conclude that a student's academic self-concept could be shaped positively or negatively depending on whether they were placed in a higher or lower ability school. For example, an average student placed in a high ability school was at risk for developing poor self-concept and performing poorly academically.

Towards the end of the '80s, Marsh (1989) published a widely cited study analyzing how gender and age shape self-concept in preadolescents. He found that self-concept declined in middle-adolescence through early adulthood. According to Marsh (1989), younger children's self-concept is unreasonably high, and the subsequent decline in self-concept is a naturally occurring process as children become more aware of themselves in relation to their environment. Self-concept was also observed to increase again in adulthood (Marsh, 1989).

## Self-Efficacy and Self-Regulation

Two more popular themes from the '80s, self-efficacy and self-regulation, attracted various authors. Towards the beginning of the decade, Betz and Hackett (1981) investigated the applicability of Bandura's self-efficacy theory and sought to apply it to the career decision-making process for women in particular. The authors found that women reported lower self-efficacy in regards to traditionally male positions such as engineer, accountant, mathematician, and police officer. In contrast, women reported higher self-efficacy in traditionally female positions such as elementary teacher, dental hygienist, and secretary. The authors concluded that self-efficacy could influence career development. Betz and Hackett recommended the development of programs aimed at increasing self-efficacy in women regarding traditionally male jobs.

Self-efficacy in teachers became the topic of Gibson and Dembo's 1984 article. The authors aimed to develop an instrument to measure teachers' self-efficacy and study it in relation to observable teacher behaviors. High- and low-efficacy teachers were divided up based on this measurement tool. The authors observed that low-efficacy teachers spent more time in small groups, intellectual games, and giving feedback in the form of criticism. Low-efficacy teachers also lacked persistence in helping the student figure out answers for themselves. High-efficacy teachers, in contrast, spent less time in small groups, more time preparing paperwork, and did not give any feedback in the form of criticism. High-efficacy teachers were also more likely to persist in getting a student to an answer, rather than just giving them the answer, for example.

Also in 1984, Salomon published an article investigating television versus print as learning media. The author sought to understand whether the medium affected the individual in terms of the amount of invested mental effort (AIME), perceived self-efficacy, and subsequent achievement. The author reported that individuals with higher levels of self-efficacy expended less mental energy and achieved less when presented with television content. On top of that, children, in general, felt more efficacious with television content as a whole. Thus, Salomon (1984) concluded television content could be assumed to be "too easy" in comparison to print media in providing effective learning experiences.

In the late '80s, Zimmerman (1989) sought to determine the effects of the following variables in the self-regulation of K-12 students: (a) self-efficacy, (b) self-observation, (c) self-judgment, (d) self-reaction, (e) personal influence, (f) behavioral influence, and (g) environmental influence. The author found that telling students the group before them had completed X amount of problems or recommending that students complete X amount of problems resulted in students

displaying higher self-efficacy and performing better than the control group. Furthermore, children who were encouraged to self-record reported higher self-efficacy than the control group. Additionally, Zimmerman (1989) found that a child's selection of learning strategies determined whether they would continue to self-regulate via those learning strategies.

Finally, Grolnick (1989) authored an article focusing primarily on self-regulation. Grolnick (1989) sought to evaluate parental style and its subsequent influence on children's self-regulation. The author assessed multiple variables, and key factors emerged. Areas such as combined parental support of autonomy positively correlated with children's self-regulation and, additionally, appeared to help keep children from acting out in school. Grolnick also noted that a healthy parent-to-child control balance was necessary for children's own internal regulation.

## Motivation and Goals

Similar to the 1970s, the '80s were still concerned with motivational factors and the structuring of goals. In 1983, Paris et al. (1983) examined the motivational factors they deemed critical to an individual becoming a "strategic reader." The authors determined that the personal significance of the goal, its meaningfulness, the social contexts of setting the goal, and the intentions of the goal-setter were important factors in self-guided and self-motivated learning.

Five years later, Meece et al. (1988) analyzed students' cognitive engagement as related to science activities. According to the authors, students who were motivated to focus on goals around task-mastery reported being cognitively engaged. In contrast, students who aimed to achieve goals centered around social recognition or avoiding excess work reported being less cognitively engaged. Therefore, motivational goals centered around task mastery would lead to greater cognitive engagement. The authors further linked these results to the students' self-motivation and enthusiasm for science.

Also in 1988, Ames and Archer (1988) sought to understand the effects of mastery goal orientation (attaching importance to learning a new skill) vs. performance goal orientation (attaching importance to ability to succeed) in instruction. According to the authors, mastery goal orientation resulted in students "using more learning strategies, preferring tasks that offered challenge, and having a more positive attitude towards their class" (p. 263). Performance goal orientation, on the other hand, was linked to mildly negative "self-perceptions of ability" (p. 263). The authors' findings indicated that classroom environments emphasizing mastery positively changed the way that students approached tasks and engaged in learning.

Lastly, we give a special note to the 1984 study conducted by Solomon and Rothblum (1984) investigating procrastination. In a study of the antithesis of motivation, the authors aimed to discover the reasons for procrastination and frequency of procrastination among college students. According to the authors, factors such as fear of failure and aversiveness of task were the main reasons accounting for procrastination. These factors also correlated with self-reported depression, anxiety, low self-esteem, and other similar mental disorders.

## Longitudinal Studies

Of the 20 most cited articles of the '80s, two were longitudinal studies. Juel's (1988) study tracked the reading development of a group of students from first through fourth grade. Juel aimed to find out whether children remain poor readers and poor writers over the span of multiple years. The author also intended to determine what skills poor readers lack and what factors keep poor writers from improving. According to Juel, a child's poor reading ability at the end of the first grade was a reliable indicator of the child continuing to remain a poor reader by the fourth grade. Additionally, there was a tendency for poor readers to become poor writers. In terms of influential factors, entering the first grade with little phonemic awareness was a common factor among the poor reader group.

In the second longitudinal study of the list, Gottfredson (1981) focused on four different life stages and evaluated how an individual's evolving self-concept affected their occupational aspirations. The various stages that Gottfredson observed were "orientation to size and power (ages 3–5 years), orientation to sex roles (ages 6–8 years), orientation to social valuation (about ages 9–13 years), and orientation to the internal, unique self (beginning around age 14 years)"

(p. 545). According to the author, a child's sense of self-concept (in relation to their gender and level of prestige) and subsequent career aspirations begin to set in by age 13. And, after age 13, adolescents experience difficulty in deciding what career options to pursue. This is due to the fact that they have little idea of what they like to do or what they are good at. Therefore, the author suggested career counseling take place earlier in the child's life and adolescents be assisted in discovering careers and skills through self-discovery tools.

## Measurement Tools

Various measurement tools were introduced in this decade. In the early '80s, Rosenthal and Rubin (1982) introduced the binomial effect size display (BESD). This tool was aimed to more accurately account for changes in success rate as "attributable to a new treatment procedure" (p. 166). Also in 1982, Heppner and Peterson investigated the validity and application of the problem-solving inventory (PSI), which, according to the authors, was "a 6-point, Likert-type format of 35 items constructed by the authors as face valid measures of each of the five problem-solving stages, based on a revision of an earlier problem-solving inventory" (p. 67). The authors further suggested that the PSI may be useful as an indicator of an individual's perception of the problem solving process and their ability to conceptualize ways to solve hypothetical problems.

Tinsley and Tinsley (1987) furthermore introduced the factor analysis technique with the goal of explaining the maximum amount of variance using the least amount of "explanatory concepts." Lastly, Horvath and Greenberg (1989) authored an article on the Working Alliance Inventory (WAI), which measured client counselor relationships. Study data suggested that the WAI demonstrated promise in early prediction of successful counseling outcomes. However, its validity, reliability, and utility were still in the early stages.

## 1990s: Self-Efficacy, Motivation, Schemas, Cognitive Load, Counseling Relationships, and Knowledge

Some of the major themes in the 1990s included self-efficacy, motivation, cognitive load (which was grouped with similar topics such as schemas and working memory), counseling relationships, and knowledge. This continued the trend of self-efficacy from the 1980s while bringing in more work on counseling and relationships, cognitive load, and motivation.

### Self-Efficacy

Self-efficacy, according to Bandura (1993), is the belief in one's own ability to excel in academic activities through the use of various cognitive strategies. These strategies are determined by the degree to which the learner is motivated, their goals, and their previous academic record. Has the student accurately predicted in the past how well they will do on an assignment? Did an employed strategy help the student to feel that they performed well on a specific activity? Having high self-efficacy helps learners exert more control over their own learning. With this quasi-definition in mind, Bandura and several others wrote well-cited articles regarding self-efficacy and self-regulation, including the article with the most overall citations from this decade by Pintrich and de Groot (1990). This empirical study researched the three components that make up self-regulation: student metacognition, student self-management, and control of one's own effort in the classroom. Tips and tools were brought up that can help students to develop strategies to help with their learning processes.

Most of the other articles in this theme are theoretical. Blumenfeld et al. (1991) discussed the implementation of problem-based learning as well as offering help to those who are looking for the motivation to sustain that implementation. Elliot (1999) expounded on approach and avoidant motivations and whether or not these should be included in the conversation on achievement goals when it comes to performance goals. Zimmerman (1999) explored the interplay between motivation and self-efficacy. Schunk (1991) also discussed the interplay between self-efficacy and motivation when writing about the academic motivations of students. Self-efficacy continued to be an important theme in the field of educational psychology as researchers focused on students and student-centered learning.

## Motivation

Motivation continued to be a theme in the literature. As mentioned above, Schunk (1991) discussed the impact of different types of motivation (approach and avoidant) on the goals that a student sets. Blumenfeld et al. (1990) discussed problem-based learning and how to implement, sustain, and motivate its use in the classroom. Skinner and Belmont (1993) studied the relationship between the teacher's classroom (i.e., structure, involvement, and autonomy) and student engagement, both in behavior and emotion. Deci et al. (1991) reviewed existing literature to see the role of motivation in the classroom, how it is created, and what types of motivation exist. Zimmerman (1990) and Schunk (1991) were both mentioned in the section on self-efficacy and wrote about similar facets of the interplay between motivation and self-efficacy. They both focused on how self-efficacy can play a role as a motivator in academic settings. The final study on motivation in the top 20 was based on an experiment conducted by Cordova and Lepper (1996) in which they analyzed the effects of personalization and contextualization on the learning of students who were practicing mathematical problems on the order of operations.

## Cognitive Load

Several '90s articles spoke of creating schemas to help with working memory and reducing cognitive load, including the most highly cited article of the 1990s: Sweller et al.'s (1998) theoretical article is an explanation of working memory and how it can be improved through the use of schemas to lower the cognitive load for those who are learning new tasks or skills. This article was cited an average of nearly 120 times per year.

Other articles that fell under this theme included Bandura's (1993) article that researched how an individual's perception of their own self-efficacy played a role in their cognitive development at various stages of development. Bandura noted that those with higher self-efficacy were faster to discontinue the use of ineffective strategies, and this happened from a very young age. Those who did this were able to perform better overall and to learn more. A study in the Netherlands (Paas, 1992) explored the effects of cognitive load and schemas on the ability of students to: (a) solve a problem from the beginning, (b) complete a problem that had already been partially worked, or (c) understand and check a problem that had already been completed. Paas concluded that creating frameworks or schemas aided in the acquisition of new skills by reducing the cognitive load placed on the students from those skills. This left more room in the working memory to make adjustments, transfer other useful pieces of information, and use the schema as a foundation to learn more.

## Counseling Relationships

There were also three top cited articles that covered relationships and counseling in this decade. Sue (1992) primarily studied counseling and the education that goes into the preparation of counselors. The article advocated for greater inclusion of multicultural perspectives in these preparation programs. According to Sue, diverse perspectives are often not taught or even mentioned during the education of counselors, so professionals are not being adequately prepared to build relationships and help others after they graduate. There were also articles that discussed the relationship between counselor and client (Horvath & Symonds, 1991) as well as that of teacher and student (Birch & Ladd, 1997). Horvath (1991) did a meta-analysis on the relationship dynamic between the therapist and patient, specifically researching the interplay between the two. Along similar lines, Birch and Ladd (1997) explored student- and teacher-reported relationships. They specifically studied a student's feelings for school and their relationship with the teacher on three scales: warmth, dependency, and conflict. Wentzel (1998) also used student and teacher surveys to analyze a student's relationship between their school performance and their relationship with teachers, parents, and peers. In each case, they found that having a strong positive relationship with parents, peers, and teachers was important because these relationships impacted different behaviors in the student.

## Knowledge

Knowledge was a minor theme since a few empirical studies focused on the acquisition of and different types of knowledge. Schommer (1990) built on Perry's (1968) different dimensions of knowledge. Perry built those dimensions of knowledge as a linear model, while Schommer structured a model that was built on each dimension increasing at its

own rate. Schraw and Dennison (1994) wrote an article on their attempts to validate their inventory on metacognition. Their initial intention was to test the eight processes that are components of knowledge and self-regulation. Those eight components were very similar to those mentioned by Schommer (1990) earlier in the decade. Both articles reviewed the different types of knowledge that could be obtained and how such knowledge could be structured, controlled, and made accessible to students. In the case of Schraw and Dennison (1994), the study validated their Metacognitive Awareness Inventory and also included investigations into how certain strategies used by students were necessary to regulate that knowledge.

## Other

There were only two articles that did not fit within any of the themes discussed above. Ames (1994) wrote a theoretical paper that discussed the perception of students in the classroom and the role that those perceptions played in their learning. Ames researched the perceptions of students regarding the structure of the classroom and encouraged teachers to move toward a mastery orientation to learning. This was the fourth-most cited article of the decade. The eighth-most cited article was a theoretical work by Wolf and Bowers (1999) in which they proposed a new concept, that of the double deficit, regarding reading dysfunctions in dyslexia.

## 2000s: Motivation, Cognitive Load, Problem-Based Learning, and Student Emotions and Counseling Psychology

The top two themes for the 2000s were student motivation and cognitive load. Other themes were student emotions in a school setting, problem-based learning, and counseling psychology. Motivation was the most prominent theme with six out of the top 20 articles addressing some aspect of student motivation, one of which is the most cited article of the decade. The two articles on student emotions are so closely connected to motivation that it is almost hard to distinguish them from the six discussing motivation. Nevertheless, because they attempt to focus on emotions over motivation exclusively, we have separated the themes for the purpose of this chapter.

### Motivation

As mentioned in previous decades, the topic of motivation is a recurring theme through education psychology research. However, unique to this decade is that motivation was overwhelmingly the primary theme of the top 20 most cited articles.

The top cited article of the decade is called "Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions" (Ryan & Deci, 2000). This article has received 6,133 citations as of this writing. In this article, the authors described the current understanding of intrinsic and extrinsic motivation and the superior regard for intrinsic motivation that seemed to exist in the field. However, the authors argued, there are different types of extrinsic motivation, and it is not proper to lump all types of extrinsic motivation together. The best types of extrinsic motivation were those where the learner identified with the subject and endorsed its importance and those where the learner integrated the topic with his or her other knowledge. When students grasped the meaning and importance of a topic they were much more likely to identify with it and integrate it into their own knowledge. Learning is much more effective when it supports the needs of students to (a) feel connected to others, (b) feel competent, and (c) determine their course of action.

In the same year Ryan and Deci's (2000) article was published, Wigfield (2000) published a top cited article about the expectancy-value theory of motivation. This theory purported that students made decisions based on the expected potential rewards that could result from the decision. The article defined the important components of this theory's model and compared those components to the concepts of self-efficacy, intrinsic and extrinsic motivation, and interest. The author also reviewed longitudinal studies about how children value different activities over time, concluding that over time, children's views and beliefs generally declined from a more optimistic belief in their earlier years.

Hidi and Renninger (2006) later introduced a process by which interest is generated in a topic. The authors argued that interest started with triggered situational interest and then became maintained situational interest. After maintained

situational interest, individual interest could emerge and then potentially turn into a well-developed individual interest.

The other three articles discussed other topics related to motivation. The 15th-most cited article reviewed the motivational research regarding seven important questions related to motivation and education (Pintrich, 2003). The following year, Pintrich (2004) published another often-cited article that introduced a new way of understanding motivation. Their model was based on qualitative interviews with students rather than top-down theories. The model focused on a self-regulatory perspective rather than a student approach to learning perspective. The 19th-most cited article was published in 2000, reviewing and reinforcing the concept of self-efficacy (Zimmerman, 2000).

## Cognitive Load

The second-largest theme of the 2000s is cognitive load. Three articles focused on different components of cognitive load. The major subthemes were (a) ways to reduce cognitive load and (b) the importance and potential of measuring cognitive load to advance the theory. All three of the articles came from the same volume of the same journal in 2003, a special issue focusing solely on cognitive load (Mayer & Moreno, 2003; Paas et al., 2003a, 2003b). The 20th-most cited article (Paas et al., 2003) was, in fact, an introduction to this journal volume, summarizing the developments of cognitive load to date and the topics addressed in that journal volume.

The eighth-most cited article, "Nine Ways to Reduce Cognitive Load in Multimedia Learning" (Mayer & Moreno, 2003), was a straightforward article that addressed the challenge of cognitive load and strategies for its reduction. The strategies were based on the foundational components of cognitive load (i.e., that our brains have two separate channels for processing multimedia content—hearing and sight—and that each channel has limited bandwidth for new information).

An additional article pointed to the need for measurements of cognitive load (Paas et al., 2003). The authors posited that if cognitive load was going to continue as a valid theory, then effective measurement strategies were needed. Without this, the theory of cognitive load would not be able to establish an empirical basis.

## Problem-Based Learning

Problem-based learning was focused on in three of the top 20 articles. Two of the articles represented opposite sides of a debate about minimal guidance instruction and its effectiveness (Hmelo-Silver et al., 2004; Kirschner et al., 2006). In the second-most cited article of the decade, "Why Minimal Guidance During Instruction Does Not Work: An Analysis of the Failure of Constructivist, Discovery, Problem-Based, Experiential, and Inquiry-Based Teaching" (Kirschner et al., 2006), the authors conducted a study that combined problem-based learning with minimal guidance instruction and stated that the evidence showed that minimal guidance instruction did not work. The 13th-most cited article was a response to this and argued that problem-based learning should not be categorized as minimal guidance instruction due to the amount of scaffolding present (Hmelo-Silver et al., 2007). The authors then presented evidence that problem-based learning was a very effective method of achieving learning outcomes as well as helping students develop other important skills along the way.

The fifth-most cited article was a literature review covering the current knowledge and understanding of problem-based learning as of 2003 (Hmelo-Silver et al., 2004). The authors outlined how problem-based learning had potential to develop students' abilities to (a) gain knowledge that is flexible, (b) develop self-directed learning skills, (c) improve their abilities in problem-solving, (d) become intrinsically motivated, and (e) improve students' skills in collaboration. The first three abilities had been demonstrated in research, while the latter two were lacking in support.

## Student Emotions and Counseling Psychology

The other two ancillary themes of the decade were student emotions and topics related to counseling psychology. For student emotions, the articles focused on summarizing fragmented research about student emotions and creating a taxonomy of emotions that were experienced by students in an academic setting (Pekrun, 2006; Pekrun et al., 2002). Both articles pointed to the need for further research in this area in order for it to develop into a robust field of study.

The two articles regarding counseling psychology research both focused on research constructs. One focused on the difference between moderator and mediator effects, while the other focused on how to discern quality and trustworthiness of qualitative studies in counseling psychology (Frazier et al., 2004; Morrow, 2005).

## Other

There were four articles in the top 20 that did not fit into any of the aforementioned themes. One of the articles developed a more robust method for assessing the extent to which a person has meaning and purpose in their life (Steger et al., 2006). Other topics addressed were consensual qualitative research (Hill et al., 2005), teacher burnout and work engagement (Hakanen et al., 2006), and spatial ability within Science, Technology, Engineering, and Mathematics (STEM) subjects (Wai et al., 2009).

## 2010s: Student Learning Outcomes, Best Statistical Practices, Instructional Technology, Teachers, and Cognitive Load Theory

A few novel themes emerged from 2010–2019, including student learning outcomes, best statistical practices, and instructional technology. However, teachers re-emerged as a dominant theme, continuing the trend from the 1990s and 2000s, and cognitive load theory remained a prominent topic in the literature. Only one of the most highly cited articles of the decade did not seem to fit into any of the main topics mentioned above. This article reviewed the gender gap in STEM fields. Wang and Degol (2017) summarized the most recent research associated with six possible explanations for this gender gap: (a) cognitive ability, (b) relative cognitive strength, (c) occupational interests or preferences, (d) lifestyle values or work–family balance preferences, (e) field-specific ability beliefs, and (f) gender related stereotypes and biases. The authors also discussed implications for practice and future research directions.

## Student Learning Outcomes

Of the 20 most cited articles of the 2010–2019 time period, nine articles focused on student outcomes as the dependent variable. Six of these articles focused solely on student learning outcomes; however, three articles looked beyond learning outcomes and also included behavioral, psychological, or social outcomes. Throughout these articles, student learning outcomes were primarily discussed in terms of academic achievement and measured using a student's grade point average.

Notably, the independent variables in nearly all of these articles were contextual or external to the student. In other words, researchers during this decade were focused on improving student outcomes, but they approached this with the acknowledgment that many factors contributing to or limiting student success were outside of the students' control. The main purpose of these studies was to better understand the nature of the relationships between student learning outcomes and these external variables. While the majority of authors tentatively discussed implications for practice at the end of their articles, no specific or intentional interventions were being studied or proposed. The contextual or external factors studied as independent variables during this decade included the following: teacher support and structure (Jang et al., 2010), instructional methods (Alfieri, 2011), engagement strategies (Pekrun, 2011), classroom emotional climate (Reyes et al., 2012), school climate (Wang & Degol, 2016), and teacher competence (Kunter et al., 2013).

The only student-specific independent variables studied in relation to student outcomes were student engagement (Chi & Wylie, 2014), student executive function (Best et al., 2010), and student mindset (Yeager & Dweck, 2012). However, even when studying factors that are arguably in students' control, the focus of the research was on implications for teaching and instruction. For example, in the third-most cited article of the decade, Chi and Wylie (2014) introduced a new student engagement framework that delineated four different modes of student engagement, ranging from most impactful to least impactful on student learning. While these forms of engagement were measured based on student behavior, the focus of the study was not on what students could do to become more engaged; rather, the researchers

were primarily concerned with instructional strategies teachers could employ to elicit the highest levels of student engagement behaviors—namely, dialoguing and constructing.

Another example of this comes from the fourth-most cited article of the decade on student mindset and resilience. Here, Yeager and Dweck (2012) introduced the idea that what students believe about their (and others') intellectual abilities and social attributes impacted their achievement, stress, and aggression in certain settings. Again, the bulk of discussion about the implications for these findings surrounded the idea that educators and parents can shape student mindsets—for better or for worse. Unlike other articles from this decade, Yeager and Dweck (2012) did discuss specific implicit theory intervention practices that were appropriate for helping students develop healthy mindsets. Taken together, the literature during this decade gave us additional considerations and insights into how to support student learning outcomes.

## Statistical Processes

### Missing Data

The second- and tenth-most cited articles of the decade were published in 2010 and addressed the same topic: missing data practices. One was published in the *Journal of Counseling Psychology* and the other in the *Journal of School Psychology*. The article written by Schlomer et al. (2010) established this as an issue worth addressing in the field when they reported that only 14 of 37 quantitative studies in the most recent volume of *Journal of Counseling Psychology* reported any missing data at all. Of those, 11 used deletion as their method of handling missing data.

According to the authors in both studies, deletion methods, as well as single imputation and mean substitution methods, were “poor” (Schlomer et al., 2010, p. 6) and “archaic” (Baraldi & Enders, 2010, p. 33). Subsequently, both sets of authors called on school and counseling psychology researchers to replace these methods with the most up-to-date, “state of the art” approaches recommended by the American Psychological Association (APA): maximum likelihood and multiple imputation. Schlomer et al. (2010) extended an additional call to editors, imploring them to heighten their standard of missing data reporting and to “insist that missing data be attended to in quantitative articles” (Schlomer et al., 2010). While both articles discussed the advantages of maximum likelihood and multiple imputation in detail, Baraldi and Enders (2010) also provided two analysis examples for reference. These examples can be particularly helpful for researchers who have not been exposed to the newer methods of handling missing data.

### Multilevel Modeling

Another best statistical practices article similarly called on school and counseling psychology researchers to become familiar with the multilevel modeling methodological approach. This article, “A Practical Guide to Multilevel Modeling” (Peugh, 2010), was intended to assist researchers in learning and applying this methodology to their work. To do so, Peugh provided a detailed, seven-step process for conducting multilevel modeling and walked through two examples.

Overall, these three articles represented a trend toward more sophisticated and regulated methods of statistical analysis and research in the field.

## Instructional Technology

Three top articles of the decade reviewed and discussed innovative instructional technologies: computer tutoring, serious games, and immersive virtual reality. The computer tutoring and serious games articles were meta-analyses, whereas the immersive virtual reality article was an empirical study. All three articles discussed these technologies in comparison to traditional instructional methods.

Regarding computer tutoring, VanLehn (2011) challenged the longstanding belief that human tutoring is, in all cases, superior to computer tutoring. The meta-analysis found that when tutoring is considered based on the granularity of knowledge, rather than the mode of tutoring, human tutoring reached a plateau; at that point, certain types of computer tutoring have the potential to be superior (VanLehn, 2011). As these meta-analysis findings contradicted previous studies, further research on the topic was recommended.

The serious games meta-analysis, which was the most cited article of the decade, was concerned with the cognitive and motivational effects of serious games compared to conventional instructional methods. Wouters et al. (2013) analyzed 38 articles on serious games published from 1990–2012. Seven hypotheses were tested. Four of the seven hypotheses were confirmed, indicating that serious games yielded higher learning gains and a higher level of retention than other conventional instruction methods. These higher learning gains were further strengthened when serious games were combined with other methods of instruction and when multiple training sessions for serious games were employed. Hypotheses that were not confirmed led to three conclusions. First, serious games were not more motivating than other instructional methods. Second, students did not learn more when engaging in serious games by themselves; rather, students learned more when engaging in serious games in groups. And, finally, learning gains between serious games and passive instruction were not higher than learning gains between serious games and active instruction.

Finally, Parong and Meyer (2018) compared immersive virtual reality with PowerPoint slideshow instruction. They found immersive virtual reality to be more motivating for students than the conventional PowerPoint instruction but not more effective for teaching. While the authors acknowledged that these findings may indicate that “the conversion of multimedia lessons into virtual reality may not yet be warranted” (Parong & Meyer, 2018, p. 785), they discussed the importance of motivation on learning and recommended further research on the topic.

This research showed strides being made toward a better understanding of the use of various technologies in education. However, in all cases, further research was recommended. Thus it can be concluded that instructional technologies is an area of research that could benefit from additional study and understanding.

## Teachers

Six articles had a heavy emphasis on teachers. The majority of these articles were referenced previously in the Student Learning Outcomes section, as researchers seemed primarily concerned with how teacher practices or instructional methods impacted students (Alfieri et al., 2011; Kunter et al., 2013; Reyes et al., 2012). However, there were two articles about teachers where student learning outcomes were not the main focus.

One review article specifically addressed research on teacher scaffolding over the last decade. Van de Pol et al. (2010) agreed that the research shows scaffolding to be effective, but they stated that “the measurement and analysis of scaffolding appears to be in its infancy” (p. 287). Next steps for this area of study were to find an agreed-upon definition and measurement instrument for scaffolding. Another article from this decade researched relationships between teacher self-efficacy, job satisfaction, teacher gender, years of experience, and job stress. While this was the only top cited article from the decade that was strictly teacher-focused, several key insights regarding work-related stress, job satisfaction, and self-efficacy can be gained from Klassen and Chiu’s (2010) findings. For instance, this study found that female teachers had higher levels of work-related stress. Overall, work-related stress negatively impacted job satisfaction. Also related to job satisfaction was teachers’ self-efficacy. Specifically, “teachers’ self-efficacy for instructional strategies and classroom management positively [influenced] job satisfaction” (Klassen & Chiu, 2010, p. 747).

## Cognitive Load

Two articles surrounded the topic of cognitive load theory—one theoretical piece published at the beginning of the decade and one literature review article published at the end of the decade. Sweller, an Australian educational psychologist, was the lead author of both. In the 2010 article, he added nuance to cognitive load theory when he suggested that element interactivity underlies not only intrinsic cognitive load but extraneous cognitive load as well.

Sweller et al.’s (2019) review article discussed this theoretical work, as well as many other theoretical pieces written from 1998–2018 on cognitive load theory. Furthermore, Sweller et al. comprehensively summarized the empirical research on the topic of cognitive load theory and presented possible directions for future research, although it was ultimately recommended that we “not try to predict the future but create it by continuing to do good research” (Sweller, 2019, p. 288).

# 2020 and Beyond: Self-Efficacy, Student Learning, Cognitive Load, and Motivation

Moving forward into the next decade, four themes continue to emerge: self-efficacy, student learning, cognitive load, and motivation. Self-efficacy was grouped together with similar topics such as self-regulation and self-determination. Several articles published in 2020 discussed how students learn and what can be done to help students to learn more effectively. Cognitive load was grouped with other topics such as working memory and seductive details theory. Motivation was a theme unto itself as researchers typically use this exact term along with other words to distinguish their meaning, such as intrinsic or extrinsic. Three other articles, including one about the effects of the COVID-19 pandemic were the last of the articles in the top 20 of 2020.

## Self-Efficacy

Seven of the top 20 articles explored or explained self-efficacy or self-regulation. These included various types of articles that explored how students gained a better understanding of their own understanding and how that may impact student learning and learning strategies. Vasconcellows et al. (2020) was the most cited article of the year and dealt specifically with self-determination when it comes to physical education. Ryan and Deci (2020) explored intrinsic and extrinsic motivation from a self-determination perspective, examining their definitions and what new perspectives may arise through a self-determination theory lens. An article that fit into a few of these themes was Nückles et al.'s (2020) study, which researched how journal writing helped students learn to self-regulate and work with cognitive load. Bardach et al. (2020) conducted a meta-analysis examining achievement goal theory, looking for evidence that achievement goal theory is accurate. Kim and Burić (2020) researched the relationship between teacher burnout and the teachers' sense of self-efficacy. Van Gog et al. (2020) examined the role of mental effort while students were learning to solve problems using self-regulation strategies. De Bruin et al. (2020) created the Effort Management and Regulation Framework synthesizing cognitive load and self-regulation theory to point out an area they believe is being ignored, asking questions such as how students monitor effort.

## Student Learning

Student learning covers a variety of specific topics in these articles that explore how educators can more effectively teach students. Sailer and Hommer (2020) conducted a meta-analysis on the gamification of learning. Nückles et al. (2020) explored how journal writing could help with cognitive load. Tenenbaum et al. (2020) did a meta-analysis studying the effectiveness of peer interaction in learning. Bernacki et al. (2020) examined how the use of mobile technology has changed the learning process as well as how the role of technology in education is being better understood and measured. And Bowers (2020) argued that the use of systemic phonics in reading may not be more effective than alternative methodologies. These all centered around the theme of questioning how students learn, whether it is questioning traditional practice or in considering non-traditional benefits for current practices.

## Cognitive Load

Cognitive load, combined with schemas and working memory, continued to be a strong trend. As mentioned above, Nückles et al. (2020) studied journal writing as a way to help students learn self-regulation skills, particularly regarding cognitive load. Related to working memory, Sundararajan and Adesope (2020) conducted a meta-analysis on the seductive details theory, which describes and quantifies the effect of tangential details that, while nice, act as distractors from the purpose of the material. By adding in these tangential details, students are being seduced into trying to remember more than they are capable of and may lose important information. De Bruin et al. (2020), as mentioned above in the section on motivation, created a framework that pointed out how cognitive load is related to self-regulation and identified research that should be done to further explore how students use self-regulation strategies to manage their cognitive load.

## Motivation

Two articles continued the trend of researching motivation: Eccles and Wigfield (2020) and Schunk and DiBenedetto (2020). Eccles and Wigfield (2020) considered expectancy-value theory from a variety of perspectives (e.g., developmental and sociocultural) to see how these perspectives would make a difference when researching situated expectancy-value theory. Schunk and DiBenedetto (2020) discussed how motivation can be understood through Social Cognitive Theory and motivation, analyzing the processes that influence goals and self-evaluations of progress.

## Other

When considering trends moving into the future, there were a few articles from the top 20 that did not seem to fit into a particular theme with some of the other articles. Conoley et al. (2020) wrote a review researching how school psychology was performing and how it was lacking. Sinatra and Lombardi (2020) discussed how evaluating sources for scientific data may need to adjust. O'Brien et al. (2020) examined challenges minorities face and the degree to which the culture of ecology and evolutionary biology are inclusive.

Only one article on the coronavirus and the ensuing pandemic was included in this grouping. Kim and Asbury (2020) wrote about the impact on teachers after six weeks of being in lockdown because of the pandemic. It is expected that this will continue to be a popular theme in the short term since many teachers, students, and families tried online learning for the first time during the pandemic.

Looking to the future, there are a few trends from the last 50 years that will most likely continue to be studied. Self-efficacy and self-regulation have been major themes throughout the last 50 years, and they were well represented in 2020. Cognition, motivation, and student learning were other trends that have been closely examined during the last 50 years and continued to be well represented as the field moves into the 2020s.

## Synthesis of 50 Years: Common Themes Throughout the Decades

Since the 1970s, motivation, self-efficacy, and self-regulation continue to be common areas of interest in the field of educational psychology. The literature also frequently touches on schemas and cognitive load. Significant numbers of new measurement tools and standards were also developed and advanced. Repeatedly, educational psychology studies outlined the factors affecting learning and counseling, observed and organized insightful findings, and suggested how this cognizance could lead to improvements for students, teachers, counselors, and clients alike. Because of this, articles and studies throughout the past five decades were centered around determining the effects of external and internal factors on both learning and counseling outcomes. The subject consistently comprised teachers, students, counselors, or clients. With all of this in mind, we delve into more detail regarding common themes.

## Teachers

In the 1970s, researchers began to study teachers and the effect that they had on the learning process. A major article described the impact of teachers on the classroom experience. Brophy (1979) discussed how the behaviors of teachers are very influential on their students. In the 1990s, there was a continuation of this research on the relationship between the effect of the teacher in two studies. The first (Birch & Ladd, 1997) explored the relationship of the teacher and student for children who were just entering school based on three scales: closeness, dependency, and conflict. Through these three characteristics, it was determined how well the students were adjusting to school. The other (Wentzel, 1998), explored which relationships (student–peer, student–parent, or student–teacher) affected different types of motivation (e.g., social, academic).

In the 1980s, Gibson and Dembo (1984) studied the behavior of teachers in relation to their self-efficacy. The 2010s saw a focus on instructional strategies teachers could use to promote student engagement (Chi & Wylie, 2014). Van de Pol et al. (2010) discussed how scaffolding could be a very effective tool for teachers to use, though scaffolding will need

to be more clearly defined in the future. Klassen and Chiu (2010) studied how teacher self-efficacy, job satisfaction, teacher gender, years of experience, and job stress were related. This was followed up by Kim and Burić (2020) who studied the directionality of the relationship between teacher self-efficacy and teacher burnout.

## Self-Concept, Self-Efficacy, and Self-Regulation

The topics of self-concept, self-efficacy, and self-regulation were present throughout multiple decades. Beginning in the 1980s, one author in particular, Marsh, published numerous articles setting the framework for the idea of self-concept. In his popular 1985 study with Shavelson, Marsh worked to break down the different areas of self-concept. This allowed him to later build on this research with other authors, such as Parker (1987), and investigate conjecture such as the big-fish-little-pond effect, as well as the hypothesized ways in which self-concept might form and impact an individual.

In many ways, the idea of self-concept transitioned into the idea of self-efficacy. Self-efficacy appeared in the 1980s, when Betz and Hackett (1981) applied Bandura's self-efficacy theory to the career decision-making process. It was also used when Salomon (1984) employed it as a basis for determining the combined effects of self-efficacy and amount of invested mental effort on subsequent achievement. Self-efficacy was also used as a measure in Zimmerman's (1989) study on self-regulation in K–12 students. In the '90s, Bandura (1993) formally defined self-efficacy, and this played a role in multiple articles with various authors throughout the '90s. In the 2000s, the concept of self-efficacy was referenced in multiple popular articles. Teachers' self-efficacy in relation to their effectiveness in the classroom became more apparent in the 2010s and 2020.

Self-regulation was commonly tied to both self-concept and self-efficacy. In the late '80s Zimmerman (1989) utilized variables such as self-efficacy to further understand self-regulation in K–12 students. And, in the '90s, Pintrich and de Groot (1990) considered the fundamental makeup of self-regulation. Skipping ahead to 2020, a number of popular articles exist regarding self-regulation, and self-regulation began to intertwine with other popular topics, such as cognitive load. For example, Nückles et al.'s (2020) article on student journal writing and the effect on self-regulation and cognitive load. Additionally, we saw self-regulation evolving into the concept of self-determination. Or, according to Wehmeyer et al. (2017), an evolution from self-regulation's "focus on goal-directed actions" (p. 232) to self-determination's focus on "perceived internal vs. external loci of causality" (p. 232). For example, Vasconcellos et al.'s (2020) article centers on self-determination, rather than self-regulation, in relation to physical education.

## Motivation

The topic of motivation may have been the most discussed theme throughout the 50 years covered in this chapter. What motivates students and how to get students more motivated to learn seem to be the predominant questions asked throughout these decades. In the '70s, the questions were general, focusing on how effort plays into motivation and how students think about their previous successes or failures. In the '80s, the focus shifted to goals and what types of goals lead to the best learning outcomes. Mastery-oriented goals stood out from the research as the best type of goals to encourage in the classroom. The '90s started to evaluate how students approach motivation and how it is created within a classroom. The 2000s expanded upon this, delving into the details of intrinsic versus extrinsic motivation and parsing out the different types of extrinsic motivation. Eventually, the discussions on motivation have become much more specific, analyzing the way motivation works within specific contexts.

## Cognitive Load

The theme of cognitive load spanned multiple decades. Beginning in the '80s, Meece et al. (1988) began to think about cognitive processing via their study analyzing students' cognitive engagement. In the '90s, Sweller et al.'s (1998) theoretical article explaining various aspects of the working memory opened up the concept for future decades. In the 2000s, popular studies focused on methods of measuring and reducing cognitive load. Multiple authors contributed to this theme by way of various articles during the 2000s. The 2010s also saw authors building on existing cognitive load theory. Sweller (2010) split the concept into both intrinsic and extraneous cognitive load. Additionally, at the close of the decade, Sweller summarized existing research regarding cognitive load. Finally, in the 2020s, a handful of popularly cited articles regarding cognitive load emerged. Nückles et al. (2020) studied the correlation between student

journaling, self-regulation, and cognitive load. De Bruin et al. (2020) constructed a framework consisting of elements of both self-regulation and cognitive load theories. De Bruin et al. (2020) also explained student-driven efforts to self-regulate cognitive load.

## Measurement Tools and Statistical Processes

Advanced measurement tools and statistical processes were introduced and discussed in several of the top cited articles over the last 50 years. This started in the 1970s with the introduction of the Mathematics Anxiety Scale (Betz, 1978). Three other highly cited measurement tools that developed over the last 50 years included the binomial effect size display (BESD; Rosenthal & Rubin, 1982), the Working Alliance Inventory (WAI; Horvath & Greenberg, 1989), and the Metacognitive Awareness Inventory (MAI; Schraw & Dennison, 1994). Despite this progress, there are still areas of educational psychology and counseling research where the development of measurement tools is needed. For instance, in their meta-analysis Van de Pol et al. (2010) recommended a measurement tool for scaffolding be developed.

In addition to new measurement tools, advanced statistical processes have been discussed in the literature. Factor analysis technique (Tinsley & Tinsley, 1987) and multilevel modeling (Peugh, 2010) are two statistical techniques that educational psychology and counseling researchers have discussed in the literature and encouraged others to use. Additional attempts to advance the statistical rigor of research came from Schlomer et al. (2010) and Baraldi and Enders (2010) when they discussed best statistical practices regarding missing data.

## Most Important Issues, Topics, and Trends by Decade

Throughout the period, writings on educational psychology and counseling led to the emergence of topics and trends that seemed to define each decade. Additionally, once an idea was established in any given decade, the material and literature could then go on to serve as a building block or reference point for future decades. Problems and concerns that spanned multiple decades, such as cognitive load and how to motivate, became somewhat of a backbone for the overall literature of this field.

In the '70s, schema theory was a novel idea introduced to the discipline. Schema theory focused on the learning of new materials and how those new materials become incorporated into existing understanding. Wittrock (1974) proposed that previous preconstructed knowledge of a subject contributes to newly generated understanding in learners. Pichert and Anderson (1977) showed that the preexisting perspective of a learner influenced the ideas that they subsequently recollected. Additionally, Pichert and Anderson (1977) also found that the perspective of an individual student contributed to setting the level of importance.

The '80s brought about important insights into self-efficacy and self-regulation, beginning with Betz and Hackett's (1981) investigation into Bandura's self-efficacy theory and the authors' efforts to apply the theory to the process of deciding on a career. In 1984, Salomon analyzed the achievement levels associated with television versus print media using the idea of self-efficacy. Zimmerman's (1989) study five years later involved determining the effects of self-efficacy, among other factors, in students' self-regulation. In the same year, Grolnick (1989) discussed the role of parents in a student's self-regulation capabilities.

The '90s placed a spotlight on cognitive load that would carry on in future decades. Sweller et al. (1998), in the most highly cited article of the decade, explained working memory and built on the idea of using schemas to decrease the necessary amount of cognitive load for learning purposes. Paas (1992) paired the ideas of cognitive load and schemas to observe the problem-solving abilities of students at various levels of a problem's completion (i.e., not at all complete, partially worked, or completed).

In the 2000s, the common theme of motivation exploded in popularity. As the most cited article of the decade, "Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions" aimed to more deeply explore the two types of motivation (Ryan & Deci, 2000). Also high on the list was Wigfield's (2000) study on the intrinsic and extrinsic decision-making process in relation to a student's expected rewards. Hidi and Renninger (2006) analyzed the development of

interest in a topic and how it then transforms into a motivating factor for continuing interest. A handful of other articles in the 2000s rounded out the decade's impact on the area of motivation.

In the 2010s, articles regarding student learning outcomes dominated the list of top cited articles. Authors in this decade researched whether the factors affecting learning outcomes were contextual or external to the student. The majority focused on student learning outcomes in relation to external variables. Some factors considered were teacher support and structure (Jang et al., 2010), instructional methods (Alfieri, 2011), engagement strategies (Pekrun, 2011), classroom emotional climate (Reyes et al., 2012), school climate (Wang & Degol, 2016), and teacher competence (Kunter et al., 2013). Student-specific areas studied were student engagement (Chi & Wylie, 2014), student executive function (Best et al., 2010), and student mindset (Yeager & Dweck, 2012).

As outlined in this synthesis, multiple common themes and trends emerged over the past 50 years in the field of educational psychology and counseling. The general literature has evolved the concept of students, teachers, counselors, and clients in relation to a variety of factors and has focused on improving the outcome as defined by multiple variables. We are interested to observe how the effects of the unprecedented 2020 pandemic work to shift the literature in decades to come.

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## Synthesis

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# Higher Education



## A History of Research Trends from 1970 to 2020

Melissa Franklin, Johanna Chan, Krista Gardner, Erin Measom, Bobbie Sandberg, Julie Irvine, & Royce Kimmons

Assessment

Engagement

Feedback

Retention

Effective Teaching

Employability

*Research within the field of higher education has rapidly expanded over the past 50 years. The purpose of this study was to synthesize the research of higher education from 1970 through 2020 and identify the trends and themes in that time period. While many authors have surveyed higher education research by studying all publications (output), we reviewed the field by focusing on the publications that made the biggest impact through the number of citations (outcome). We used a bibliometric literature analysis to identify the 20 most highly cited journal articles of each decade and then measured the number of citations. This comparison of citation counts allowed us to trace the growth and changes in topics of the most interest to higher education researchers and determine which themes had the most impact on the field. Themes centering on students and learning—such as effective teaching, retention, engagement, assessment, feedback, and employability—were the most common among the high-impact articles. Our findings suggest that over time, the field of higher education has moved away from a teacher-centered approach and more towards a student-centered focus in order to encourage deep, applied learning. The results of our analysis also showed that many of the identified trends are connected to the social, political, and economic influences of the same time periods, including an increasingly diverse and growing student population and a transformation in education delivery methods.*

Higher education has changed dramatically in the last 50 years. The casual observer may point out the increasingly diverse and growing student population despite rising tuition costs or the transformations in education delivery methods due to worldwide technological advances. They might have even noticed an expansion of the possible areas of study. In our analysis of the last 50 years in higher education, we also observed these same changes and other developments not so easily identified by the casual observer.

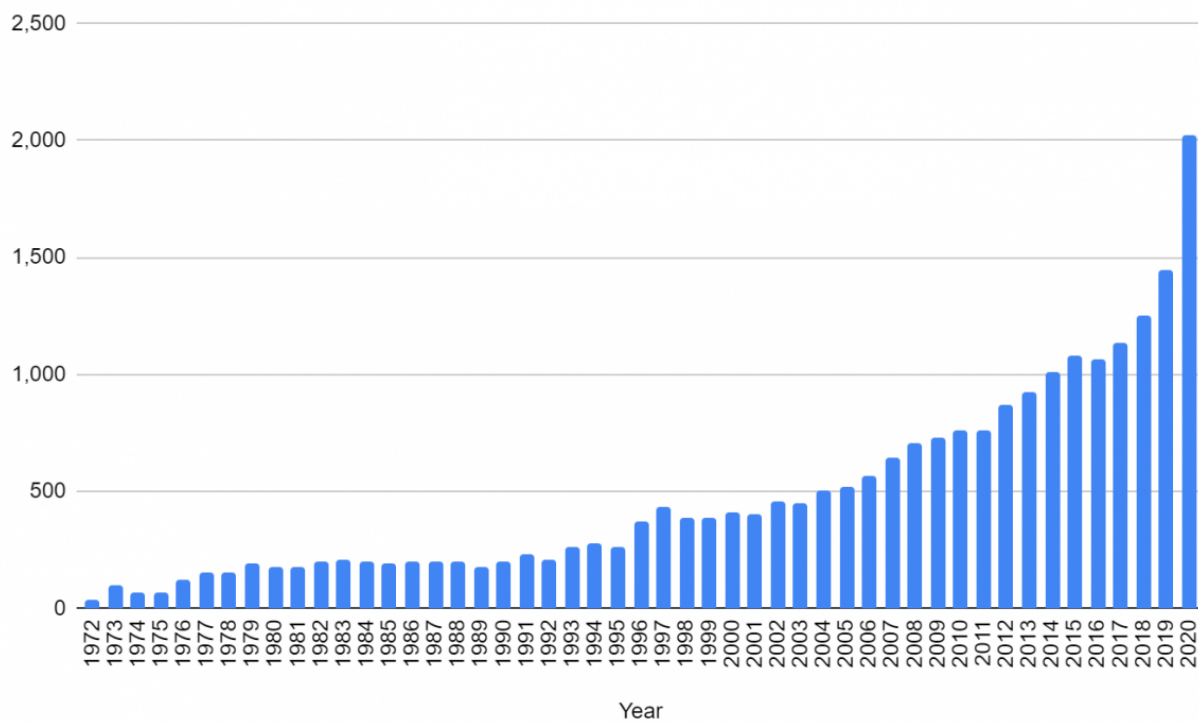
Just before the 1970s, the Higher Education Act was introduced in the United States, which made education more accessible for lower-income individuals, while simultaneously encouraging growth at smaller colleges. In this same period, during the Vietnam War (1955–1975), college enrollment increased 4–6% in young men (Card & Lemieux, 2001). The end of the war brought a shift in educational progress, evidenced by the rapid growth of higher education research, and the beginning of a quantitative leap in research (Marton & Svensson, 1979).

In the last 50 years, publications on the topic of higher education have grown rapidly. In our analysis of major journals from the field, we found the 883 articles that were published on the topic in the 1970s grew to more than 10,000 articles in the 2010s and more than 2,000 articles in the year 2020 alone (see Figures 1 and 2). This reflects the enormous growth of higher education institutions and researchers around the world (To & Yu, 2020). A variety of reasons have been identified for this exponential growth, but one likely reason is funding. As early as 1985, having noted that higher education research had already begun its dramatic rise, (see Figure 2) Altbach (1985) wrote,

In recent years, funds have become available for higher education research and a variety of institutions have sponsored research. . . . Agencies have been concerned with specific policy-related questions, and researchers have, in general, responded to the questions posed by funding sources and government agencies. Thus, the scope, sophistication, and coverage of the research [have] increased dramatically.

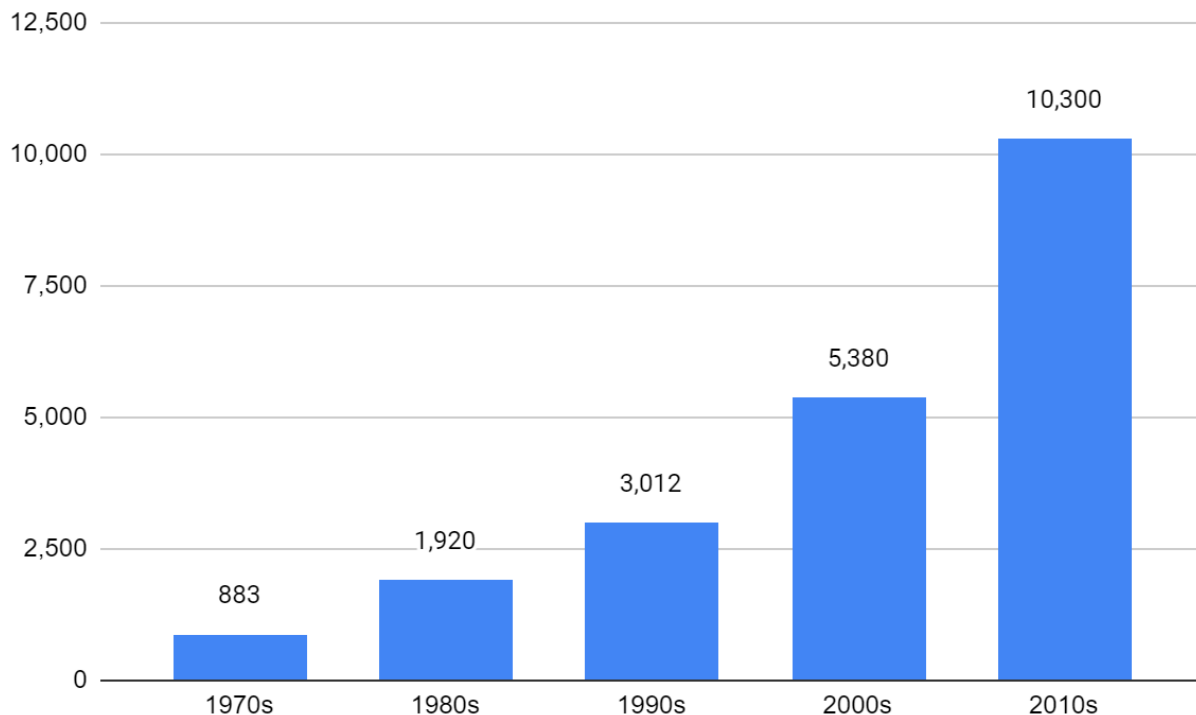
**Figure 1**

*Number of Articles Published by Year*



**Figure 2**

*Number of Articles Published by Decade*



Since 1985, other influences and reasons for the increase of publications have been identified, including the large number of researchers working and publishing in all fields of higher education. To and Yu (2020) recently recorded a three-fold rise in the number of active higher education level researchers since the 1980s from 4 million in 1980 to 13.1 million in 2018. They also registered a four-fold increase in publications, from 0.65 million in 1980 to 3.16 million in 2018 (To & Yu, 2020). While the dramatic increase represents researchers and research interests across an array of fields, the numbers also explain the drastic increase in publications focused on the area of higher education.

Understanding trends in the field of higher education as a whole has become increasingly difficult due to the large number of articles published in the past 50 years. Several researchers have previously attempted to understand common themes and patterns using both different topics and methods of analysis. Trow (1972) used the topic of analysis approach, and his research focused on access to education. Using a method of analysis, both Altbach (1985) and Budd (1988) completed literature reviews. Altbach's literature review centered on a topical analysis and Budd's research tracked authors with repeated citations. Other methods of analysis included Teichler's (1996) and Frackman's (1997) attempts to organize the growing amount of research in the field of higher education into categories and major themes, which divided the research into specific areas that could then be analyzed more closely.

These thematic studies as well as topically focused bibliometric studies (see Appendix) have contributed to the discussions on broad themes and trends within higher education research. Tight, a prominent higher education researcher, has completed extensive research in order to organize higher education research themes into eight categories (2020c). To build on this comprehensive research, we have not only identified emergent themes from the last 50 years, but we have also attempted to show the impact specific publications have had on broader thematic discussions by comparing the themes addressed by the most cited articles with Tight's eight themes. Citation counts indicate the popularity of an article within its decade and indicate topical priorities among the larger body of literature.

## Higher Education Research Themes (Tight, 2020)

1. Teaching & Learning
2. Course Design:
  - a. Types of Instruction
  - b. Types of Learning
  - c. Distance, Online and Elearning
  - d. Curriculum
  - e. Assessment
  - f. Outcomes
3. The Student Experience
4. Quality
5. System Policy
6. Institutional Management
7. Academic Work
8. Knowledge & Research

We analyzed 20 journals with the most influence in the subdiscipline of higher education research (see “Methodology” chapter) to identify articles with the most citations per decade and also per year. We examined the 20 top cited articles of each decade, which were pulled from 15 of the original 20 journals of influence. (Refer to the Appendix for a complete list of journals and the number of cited articles.)

In the following sections, we have connected and grouped articles addressing common topics by decade. In the 1970s, researchers addressed learning environments, student ratings, study processes, and attrition. Attrition continued as a topic of interest in the 80s, along with instructor effectiveness and self-assessment. By the 1990s, topics were shifting towards student-centered learning, and we started to see newer perspectives influencing researchers’ topics, resulting in more top cited research in the areas of critical theory and postmodernism. In the 2000s, student-centered topics continued to be of interest; internationalization also became prominent, showing the growing globalization of higher education. Finally, the 2010s brought a focus on the employability of graduates from higher education institutions as well as continued interest in engaging students. In anticipation of the 2020s, a survey of the research from one year (2020) showed a growing interest in online learning as well as continued interest in employability and internationalization.

To conclude our research, we (a) compared impactful topics identified by citation count (output) with those identified by Tight (outcome), (b) traced the evolution of both the student experience and the role of instructors, (c) discussed the emergence of the internationalization of higher education, and (d) evaluated the changes in researchers’ perspectives as evidenced by increased publications in the areas of critical theory and postmodernism.

## The 1970s: Learning Environment, Student Ratings, Study Processes, and Attrition

Multiple themes of research in higher education emerged when we analyzed the most popular articles written in the 1970s. The research examined student–professor relationships and student-centered learning environments. The research also emphasized students’ learning processes and student motivation. Less than half of the 20 most cited articles of the decade were empirical research, which was completed primarily with questionnaires and in-person interviews. Most of the articles were theoretical, pulling from previous studies to make conclusions.

# Learning Environment

In the research of the 1970s, we saw an interest in learning methods and best teaching practices. This revealed an experiential focus, as understanding the experience of the learner became more important in helping the learner (Marton & Svensson, 1979). Experiential learning was not a new idea in the 1970s, but this was the decade that the phrase was coined and presented as a theory by Kolb in 1976 (Fry & Kolb, 1979). The focus on individual student experiences made it more difficult to translate theory and research into practice. However, Marton and Svensson made the point that learning and teaching is a “human act” that cannot just be prescribed (1979, p. 483).

When Ramsden (1979) asked students what helped them learn, the students responded with three aspects: when a teacher can (a) reach the students’ level through lecture, (b) create a warm environment for learning rather than an environment of fear, and (c) be humble as a teacher. The students’ responses reflected a careful balance between being too harsh and too lenient. To Ramsden, it seemed that a teacher’s attitude was an important factor in the learning environment.

Elton and Laurillard (1979) wrote that educational research in the past had been done using the same methods as the physical sciences (i.e., creating a hypothesis and testing it in a controlled environment). They found this to be less effective in the field of education, suggesting instead that researchers study students and teachers within their current environments. In their article, they mentioned that in place of a hypothesis, the purpose of a study could reveal itself as teachers and students are observed. They thought the focus of an educational research study should be more on the relationship between teacher and student, rather than on a particular event. Elton and Laurillard advocated for more research to be done in the natural environment of the classroom rather than the laboratory, with closer interaction between researcher, teacher, and student.

Students, as well as teachers, benefited from being more involved in research and the learning process. Students tended to be more involved in their learning and to seek deeper understanding if they took more active (rather than passive) roles in their learning (Dahlgren & Marton, 1978). Student-centered learning was implemented through peer teaching; it was enacted for social reasons—namely, greater support and relatability—and stemmed from an effort to encourage students to be more active in the learning process (Goldschmid & Goldschmid, 1976).

Depending on the field of study, the learning process differed. Various disciplines viewed learning differently; some disciplines were more focused on experiential learning, and some were more theoretical in their approach (Marton & Svensson, 1979). The applied sciences preferred formal education with a focus on lectures, graduation rates, and employability. In contrast, the social sciences had a much less formal learning environment with more interaction between students and teachers. However, Ramsden (1979) found that students in the social sciences were seen as less employable. In a further comparison of disciplines, Ramsden also found differences in levels of processing by students. Where students had weaknesses or less interest in a subject, there was shallower processing and less learning involved.

In a further discussion of students’ processing levels, Laurillard (1979) investigated what made students more likely to engage in deep-level processing versus surface-level processing. She noted that students using a surface-level processing method to complete a project were not necessarily lazy but were simply reacting to the particular learning situation. How well students processed material was related to the learning environment, not just the students as learners. For instance, students tended to spend more time on assignments that were crucial to their grades. If their learning environments promoted surface-level learning (e.g., regurgitating facts on a test), then students would likely use surface-level processing. In one popular article, researchers addressed processing depth by advocating for a qualitative approach to learning: lessening the materials quantitatively (reducing an overload of facts and information) for the sake of deeper understanding (Dahlgren & Marton, 1978).

Many students tended to take for granted the learning processes they used, while some were able to pull from their learning experiences and better able to analyze what made their learning successful (Säljö, 1979). Those who took their learning processes for granted often misperceived their learning as mere memorization of facts, but other students

became “cue conscious” as they became more aware of their learning environment and what might be important to their learning (i.e., classrooms where certain materials will be on a test). Being cue conscious meant they became aware of the implicit rules of a classroom and adapted their level of processing to meet the different demands of each learning environment (Säljö, 1979, p. 448). For example, a student was cue conscious if they recognized that their teacher expected them to prepare for multiple choice answers on a test rather than full sentence answers. Ramsden (1979) mentioned that these students had also been labeled “cue-seekers” in other studies (p. 414). As students started to understand learning, especially outside of the formal structure of school, they started to see learning as a process (which Säljö termed “thematized” learning), rather than a method to reach a goal (Säljö, 1979, p. 446). These learners started to gain deeper understanding of the material and made changes to their study habits. These changes influenced other significant research in the 1970s.

## Study Processes

Approximately a quarter of the research in the 1970s sought to understand students' study methods and whether they were helpful in the retention of material. In the most cited study of the decade, Biggs (1979) researched possible effects on the quality and quantity of learning. In the study, students were either given instructions to focus on the facts or the purpose of the experiment they were reading. Students who were asked to retain facts were successful if they were already familiar with memorization as a type of learning. However, researchers found the quality of those students' learning to be less robust than if they had focused on understanding instead of rote memorization. Biggs demonstrated that students would adjust their study methods based on the quality of learning required of them, but their study methods were still affected by previous study habits.

The theme of study processes was also represented by the second-most cited publication of the decade; it was a theoretical analysis categorizing methods of study using the Lancaster Inventory. The Lancaster Inventory measured study methods and categorized them as “[a] deep level approach” or “intrinsic[ly] motivat[ed]” (Entwistle et al., 1979, p. 370). The researchers found three types of student study habits: (a) meaning, some students studied to find greater meaning; (b) reproduction, some students studied to follow the instructor's requirements exactly; and (c) achievement, some students studied to receive the grade or recognition they desired. Study processing research provided another way to understand students' experiences, providing methods to help students learn through observation of their environment. Study process methods are an ongoing area of interest; expanded research studies in this area frequently cite these foundational studies from the 1970s.

## Student Ratings

Research on student ratings was also a popular research topic in the 1970s. Feldman wrote five of the 20 most cited articles of the decade, all focused on student ratings of teachers. With a recognition of the growing popularity of student ratings, Feldman (1977) sought to better understand their reliability, though it is possible his interest stemmed from curiosity about his own students' ratings.

Feldman (1979) found that students were likely to give higher ratings when they felt the consequences were higher (for example, if the professor would be evaluated for promotion based on the ratings). The amount of students who completed ratings also tended to go up when the ratings were completed anonymously or if the teacher was present during completion. In another article, Feldman (1978) studied student rating consistency, either between disciplines or over time and contexts. He found the factors that influenced ratings were larger class sizes, student motivations, course levels, course requirements, meeting times, and fields or materials studied. In a research review, Feldman (1976a) also found that students' grades were positively correlated to the ratings students left for their professors. Feldman was unable to find instructor bias as a factor in this correlation.

Feldman did not hold a monopoly on the topic of ratings. At least two other articles sought to understand how students felt about their learning experience and their teachers' effectiveness. Frey (1978) pointed out that most students were incapable of understanding and judging the scholarship and research that professors engage in; therefore, they could not be adequate judges of professors' teaching. Students often based their ratings on professors' teaching styles or

class rigor rather than on the material the professors taught. Frey questioned students about professors' most important characteristics and found respect and friendliness to be the most important, followed by knowledge of the material. This was similar to Feldman's (1976b) findings that respect and friendliness were rated highest, followed by knowledge of topics taught, enthusiasm, and organization. Feldman pointed out that students could be basing their ratings on initial impressions and cautioned against analyzing ratings without considering all the possible influences affecting student perception. Similarly, Powell (1977) found a correlation between the level of work students were asked to complete in a class and their corresponding instructor rating, finding that although students learned less in a course with less work required of them, they gave higher ratings. Also, students who received higher grades rated their instructors more highly. Perhaps student ratings have been a large focus of higher education research because professors want to better understand the feedback they receive and how much weight it can be given. This understanding, in turn, can improve students' experiences.

## Freshman Attrition

Another focus of research in the 1970s was helping college freshmen continue their studies rather than abandoning the university experience. Terenzini and Pascarella (1977) found that freshmen who eventually left without graduating were lacking places on campus where they could fit in both socially and academically. These same authors also conducted another study focused more on previous factors affecting freshmen, including high school extracurricular activities and grade point average (Terenzini & Pascarella, 1978). Interest in the topic of freshman attrition continued well into the 1980s.

## Outliers

Two articles in the 1970s focused on unique topics. The first article was by Neave (1979). He concluded that higher education became less accessible to many people in the 1970s due to "academic drift," or a shift away from the institutions' founding principles. This shift caused institutions to focus more on research and less on students, especially part-time students, returning students, or students with a career background. The second article, "Innovation Processes in Higher Education," explored the tendency of systems in education to resist changes and innovations (Berg & Östergren, 1979). These outlying articles focused on higher education as an institution; overall, research in the 1970s focused primarily on student-related themes, many of which carried into the 1980s.

## The 1980s: Instructor Effectiveness, Attrition, and Self-Assessment

Interest in higher education research increased in the 1980s with twice as many published articles compared to the 1970s. In a continuation of research from the 1970s, there was much interest in student ratings and the effectiveness of instructors. Researchers continued to focus on issues of attrition and retention with the development of enrollment management programs at institutions. These programs took a more comprehensive view of the university and provided ways to keep enrollment steady or increasing (Demetriou & Schmitz-Sciborski, 2011). Compared with the previous decade, self-assessment gained interest as a research focus; a literature review on self-assessment became one of the top three most cited articles in the decade. In this section, we will discuss the research on teacher effectiveness, attrition, and self-assessment, as well as a brief mention of other topics from the top 20 most cited articles, such as cheating and critical thinking.

## Teacher Effectiveness

Following the large growth of Faculty Development Centers at universities in the 1970s (Lewis, 1996), the 1980s started to respond to a new set of needs. A report from the Carnegie Foundation for the Advancement of Teaching in the late '70s, which criticized current college teaching practices (Gaff, 1999), caused institutions to more carefully assess their curriculum (Watson 2019). Institutions considered "general education, review[ed] majors and minors, embedd[ed] writing across the curriculum, address[ed] diversity issues, and incorporat[ed] international perspectives" and also

encouraged faculty development centers to focus on “mental processes and conceptual constructs” alongside student behavior (Watson 2019). Later, in the 1990s, this translated to an amendment of the earlier Higher Education Act requiring institutions to produce instructor report cards (Sass, 2021).

Many of the most cited articles in the 1980s carried a major theme of effective teaching and developing faculty teaching ability. One of the most influential articles (the second-most cited in the 1980s) discouraged additive approaches to learning—the types of teaching that viewed students as a ‘vessel to be filled’—labeling them as ineffective and encouraging more interactive and contextual approaches to teaching (Biggs, 1989). This reflects the decade’s major shift away from behaviorism towards more cognitive methods and attitudes about teaching.

Four meta-analyses on effective teaching were also heavily cited in the ‘80s, the first of which came out in 1980 and combined two studies addressing the effectiveness of student ratings on teaching. Researchers found a modest improvement in teacher effectiveness due to student ratings; in the second study, however, researchers found a more marked increase in effectiveness when student ratings were combined with colleague consultation (Cohen, 1980).

The other three meta-analyses were performed by the same author, Feldman, whose work in the 1980s appeared as five of the most cited articles, the same number among the top 20 as in the 1970s. Much of Feldman’s research in the 1970s was focused on student ratings, and this continued into the 1980s. Chronologically, the first of Feldman’s analyses investigated the connection between faculty research productivity and teaching. He found the effect so small as to be unrelated (1987). Feldman’s 1988 analysis centered on student ratings, stemming from a general concern about the criteria students used to rate teachers. He found that students’ and teachers’ views on what constitutes effective teaching were rather similar; both groups placed high importance on teacher preparedness and organization, clear and understandable instruction, and sensitivity to class level and student progress. Some importance was placed on instructors being open to discussion and other opinions in class, but he found instructor enthusiasm, personality, and research productivity to be relatively unimportant.

Feldman’s (1989) last meta-analysis of the decade considered instructor effectiveness as rated by the teachers themselves, current and former students, and colleagues and administration. He compared the ratings of current students, colleagues, and administrators, and he found the latter two groups gave the most similar ratings. Surprisingly, it was not the teachers themselves and students who had the most similar ratings. Feldman interpreted the results of this research to mean that either (a) teachers already thought they knew how their students would rate their strengths and weaknesses and rated themselves accordingly (but wrongly), or (b) teachers really did not know how students would rate them.

## Attrition

By the 1980s, attrition concerns had been plaguing institutions for 20 years (Metzner & Bean, 1987). Concerns continued for two main reasons: a desire to develop and improve theories explaining student behavior and because attrition is costly to the student and the institution alike (Metzner & Bean, 1987). This research, however, could not stop a decline in enrollment at universities by the end of the 1970s. These factors led to the development of enrollment management in the early 1980s (Demetriou & Schmitz-Sciborski, 2011) whereby student retention became one part of a university-wide approach to recruitment and marketing. Three of the most cited articles in the 1980s were empirical studies of attrition and retention in universities.

Bean’s 1980 publication on attrition was the most cited article of the decade. His research focused on attrition by applying an employee turnover model to a group of university freshmen, thereby developing a causal attrition model to investigate reasons students might stay at or leave a university. Both male and female students were found to have been most affected by the perceived institutional commitment to students, but secondary reasons for departing differed: GPA was the second-most cited reason males left, and performance was the second-most cited reason for females (Bean, 1980). Several years later, the causal model was a topic of further interest. As a second part of the research, the model specified “intent to leave” as the most significant variable affecting students. Unexpectedly though, a student’s major or job certainty correlated positively with intentions of leaving. Bean explained this correlation with the

recognition that a student's interest in a job not requiring a degree, or a student's certainty about a major of study better served at another institution, would cause them to intend to leave (Bean 1982). Bean and Metzner further adapted the model for non-traditional students and published research in 1985 concerning the rise in non-traditional students—such as part-time students, older students, and commuters—and found that “nontraditional students [were] more affected by the external environment than by the social integration variables affecting traditional student attrition” (Bean & Metzner, 1985, p. 485). By the late '80s, Metzner and Bean revised the model even further and used it to investigate specific reasons non-traditional students were leaving a university. They found the two most significant variables to be related to academic performance (GPA and previous high school performance) and commitment to the institution, which involved things like enrolling for fewer credit hours or ongoing intent to leave. They offered a variety of approaches for retaining nontraditional students, such as entrance assessments and career or faculty counseling, in an attempt to increase the students' perceptions of the institution (Metzner & Bean, 1987).

## Self-Assessment

Self-assessment was another highly cited topic in 1980s education research, with a literature review of the research on self-assessment among the top three most cited articles. According to Boud and Falchikov (1989), two publications laid the groundwork in this area. The first was an influential book, *Freedom to Learn for the '80s* (Rogers 1983), which analyzed “the nature and politics of the assessment process.” The second publication was “Assessment Revisited” (Heron 1988), in *Developing Student Autonomy in Learning*, which discussed “the role of self-assessment in promoting student responsibility for learning” (Boud & Falchikov, 1989, p. 531). These works propelled interest in self-assessment research forward, culminating in the 1989 literature review of self-assessment studies to that date, which sought to incorporate self-assessment research completed from the 1930s (Sumner, 1932) through the 1980s.

In 1986, an empirical study compared the grading of tutors (today, they would be called “teaching assistants”) with a collaborative, peer-created self-assessment and found them to be similar and beneficial to students (Falchikov, 1986). This research also found that older students had less tendency to over-inflate their grades on the self-assessments.

By the end of the decade, two influential researchers had emerged whose work focused on self-assessment: Boud and Falchikov. Boud's publications on self-assessment during the 1980s especially showed a keen interest in the topic, with ten publications during the decade.

Three of Boud's publications or co-authored publications appeared in 1989, two of which ranked in the most cited of the decade. A theoretical article, “The Role of Self-Assessment in Student Grading” (1989), focused on the role of self-assessment in formal grading and encouraged its adoption in higher education. Based on evidence from previous research finding that students graded themselves as consistently as staff (Boud & Falchikov, 1989), the article recommended strategies for incorporating self-assessment: scheduled grading with marks moderated by staff, grading moderated by peers, weighting grades based only on the quality of the self-assessment, counting grades by students only after demonstrated competence in self-assessment, or implementing grade contracts (Boud, 1989).

A literature review (the first of its kind on self-assessment) and meta-analysis were also published the same year by the research team. The team's review of the literature found some inconclusive results but also identified a clear link between students' overall ability and capability of assessing themselves (Falchikov & Boud 1989). The researchers found students who lacked ability overall tended to overassess themselves. The meta-analysis (Falchikov & Boud, 1989) evaluated important corresponding factors between instructor grading and student self-grading, including (a) the quality of the design study and the importance of having closer student-teacher correspondence; (b) the course level, with students in advanced courses appearing more accurate; and (c) the area of study, with science courses producing more accurate student self-assessors. Boud continued to publish extensively, and several other of his articles also made an impact by citation count in future decades.

## Outliers

Many other topics appeared in the list of most cited articles, but unlike teacher effectiveness, attrition, and self-assessment, they were single-topic articles; no other articles of the same topic were as highly cited in the 1980s. These

articles are discussed in chronological order. First, Fox's (1983) article focused on theories of teaching. His article was more a collection of observations than a research study or theoretical model development, but it attempted to categorize teachers' teaching theories, which Fox claimed influenced teaching style. Another article focused on knowledge creation (Eraut, 1985). In a preview of research in future decades, Eraut analyzed the connections between higher education and the employability of graduates. His research encouraged institutions to recognize the expertise based outside university systems and that students' ability to access that knowledge and create knowledge was a valuable skill for employment.

Other unique themes in 1980 were cheating, critical thinking, non-native English speakers, and study skills. One empirical study identified three factors as impactful to student cheating: immaturity, lack of commitment to academics, and a neutralizing attitude toward the practice of cheating (Haines et al., 1986). Another researcher used a literature review to discuss the possibilities of improved critical thinking by students attending a university (McMillan, 1987). Other researchers highlighted faculty perceptions of the highest needs of non-native English speakers (Samuelowicz, 1987). In 1988, a three-part study evaluated effective ways to study and implement an accompanying study pack in a large open-enrollment math course (Vermunt & Van Rijswijk).

The final theme in the single-topic articles from 1980 was student ratings and student achievement. Feldman (1989), mentioned previously as the most cited researcher in the 1970s and 1980s, completed a meta-analysis using the same data and extending the previous work of Cohen (1980, 1981, 1987). Feldman found a good association between student achievement and perceptions of students' own learning and a modest connection between student achievement and the instructors' openness and encouragement of discussion. He found less correlation between student achievement and instructor impartiality and none between student achievement and course difficulty or workload.

Research in the 1980s increased the focus on students in the following ways: (a) engaging students, (b) understanding their experiences in learning and assessing themselves, (c) discussing students' perceptions of their instructors, and (d) recognizing their reasons for staying or leaving the university. These were all themes present in the most cited articles of succeeding decades.

## **The 1990s: Student-Centered Learning and Ethnicity, Race, and Power Structures**

The 20 most cited articles from the 1990s built on themes from previous decades—improving the effectiveness of instructors, creating active instead of passive learning environments, addressing attrition rates, and discovering more about cheating on college campuses.

In addition to the established research trends, other emergent topics appeared within the top 20 most cited articles, indicating a shift in research priorities within higher education. For the first time, the most cited articles of the decade included research on race and ethnicity from a critical theory perspective, and postmodern ideals began to receive representation, addressing issues of power structures within institutions of higher education.

### **Student-Centered Learning**

One of the strongest themes throughout these highly cited articles in the 1990s was reshaping the student experience based on constructivist models of learning, where learners could be active participants in constructing their own knowledge based on previous experience. Researchers were interested in the shift from surface-level to deeper-level understanding when students were required to engage as active participants.

### **Changes in Teaching to Promote Constructive Learning**

Research from this decade recognized the deficiencies of past models of learning, which were teacher-focused with an emphasis on information transmission. Biggs (2014) explained,

Until the nineties, teaching in universities was generally seen as a departmental responsibility, which in most cases devolved to the discretion of individual teachers to teach pretty much how and what they wanted to, in the name of 'academic freedom'. The result was a huge range in the quality of teaching and learning, from the irresponsibly bad to the individually excellent (pp. 9–10).

Research from this era called on teachers to replace former practices of information transmission with learning activities that allowed students to actively construct knowledge (Biggs, 1996; Trigwell et al., 1999).

The most cited article of the 1990s was a proposal for how to integrate the well-established principles of constructivist learning with good instructional design (Biggs, 1996). Biggs noticed the divide between the espoused theories and actual theories-in-use of practicing teachers. He developed a theory, Constructivist Learning, to align principles of constructivism with the learning objectives, activities, and assessments that were actually happening in the classroom. The number of references to his work suggests the widespread recognition of the need to integrate theory and practical applications.

Many researchers found that when teachers replaced information transmission with a more interactive learning environment, students were better able to construct their own knowledge. Vermunt (1996) stated that education is "an active, self-directed, constructive process" (p. 48). He investigated whether learning activities actually led to learning and advocated for teachers to encourage students to discover meaning and application, instead of relying on reproduction. Boud and Walker (1998) argued that reflection activities were problematic "when combined with a teacher—rather than a learner—centered approach to education" (p. 193). They posited that reflective activities were only effective in classroom environments where students were invited to discover meaning and understanding rather than memorizing answers to regurgitate on a test. Trigwell et al. (1999) compared teachers' descriptions of their teaching with students' perceptions of their learning. Their interviews confirmed that students felt the teachers' instruction was better when it required active participation and deeper engagement with the material. Their perception was that merely transmitting information led to lower learning outcomes. The Trigwell et al. (1999) study demonstrates another instance of a theme of students viewing themselves more as consumers of their education and demanding higher quality learning from their teachers.

Ramsden (1991) noted that performance indicators in higher education measured faculty based on their research without assessing the quality of their teaching. In response, he created a Course Experience Questionnaire (CEQ) where student evaluations could be used to measure the quality of teaching and give students a method to hold faculty accountable for the quality of their teaching. Harvey and Green's (1993) theoretical article concluded that improving the quality of education involved empowering students to evaluate their learning and the programs of the institution, to make selections about their learning, and to develop critical thinking skills.

## Using Assessment to Facilitate Learning

Considering how assessments could be used to facilitate deeper learning was also important to researchers in the 1990s. Dochy et al. (1999) noted that the goal of testing had shifted significantly enough to merit using a different term: assessment. Since the purpose for assessments was no longer just as a measurement of the final grade, Dochy et al. argued for the integration of instruction with assessments to provide students with opportunities to learn more deeply. They recommended making assessments more true to life through "authentic tasks" and using assessments as "tool[s] for learning" (pp. 331–332).

Scouller (1998) also addressed the connection of assessment to learning by considering how students prepared for assessments. She required students in a course to take a multiple-choice test and write an assignment essay. After completing both assessments, students reflected on their experience, noticing that they used surface-level learning approaches for the multiple-choice test and deeper-level learning strategies in writing the assignment essay. The results suggested that the form of assessment can affect the way students learn the material.

Although Boud et al. (1999) researched the effects of peer collaboration on learning, they discovered that assessment choices could undermine students' willingness to fully engage in collaborative work. The study concluded that

“[a]ssessment exerts a backwash effect on learning” if it encourages surface-level regurgitation (pp. 418–419). Conversely, the authors suggested that when assessments are carefully selected, they can simultaneously move students toward more effective learning and encourage, rather than discourage, peer collaboration.

## Influence of Peer Interactions on Learning, Retention, and Cheating

In addition to Boud et al. (1999), many researchers in the '90s studied how peer interaction impacted students' learning experiences. Topping (1996) found that the metacognitive work involved in students' ability to act as peer tutors led to a deeper understanding of the subject matter. Tinto's (1997) research also concluded that students' learning improved when classes were structured with social interactions in mind. Students placed in a Coordinated Studies Program with the same peer group worked together more collaboratively to construct knowledge, rather than relying solely on a teacher's instruction.

Tinto's 1997 study on peer collaboration led to additional research on the impact of student involvement on both learning and retention. Tinto (1998) discovered that when students became socially and academically involved in college, both learning and persistence improved. He found involvement was especially important during the first year of college since that was the year with the highest rates of attrition. In Astin's (1999) research on the power of student involvement, he developed a theory positing that “[t]he amount of student learning and personal development associated with any educational program is directly proportional to the quality and quantity of student involvement in that program” (p. 519). He found student–faculty involvement particularly influential, similar to Nagda et al.'s (1998) findings which confirmed early student–faculty involvement to have drastic influences on retention.

Interestingly, two articles focused on one specific form of student involvement: service. Bringle and Hatcher (1996) argued that universities were uniquely positioned to offer community service. Their research suggested a curricular model for expanding student service opportunities where universities offered courses with service assignments built into the curriculum. They argued that such courses would provide both a chance to get involved and a chance to learn through written or verbal reflections. Astin and Sax (1998) also studied the impact of service involvement on learning, concluding that participation in service “enhances the student's academic development, life skills development, and sense of civic responsibility” (p. 251). Although opponents argue that serving in the community will take time away from studies, Astin and Sax found a positive correlation between giving service and all 10 academic outcomes tested, including student persistence in completing degrees.

Unfortunately, research in the 1990s found that not all peer interactions strengthen learning outcomes, rather the opposite, that some peer interaction is connected with academic dishonesty. Whitley (1998) conducted a review of literature on cheating in higher education spanning 26 years from 1970–1996. His review of 107 articles revealed one factor correlated with cheating to be “perceiving that social norms support cheating” (p. 235). McCabe and Trevino (1997) also found that peer interactions influenced cheating. In their empirical study of students from nine universities, they discovered many factors that influenced whether undergraduate students would cheat, with peer disapproval being the strongest deterrent to cheating. Their findings suggested the need for students to be the driving force in creating a social environment on campus that supports academic honesty.

## Ethnicity, Race, and Power Structures in Higher Education

Notably, only two articles of the 20 most cited in the 1990s dealt directly with issues of diversity and inclusion in higher education (Hurtado et al., 1998; Nagda et al., 1998). Hurtado et al. (1998) provide the clearest example of critical theory research in the articles we reviewed, acknowledging that “[p]robably few policy areas of higher education have received more recent attention than the issue of race on campus” (p. 279). To give this statement context, they reviewed and summarized much of the literature through the framework of considering historical, structural, psychological, and behavioral climates of race in higher education institutions. Then, the authors made strong recommendations for actions that are needed in order to address the concerns that emerged from the research.

Improving higher education for minority students was also a focus in the study conducted by Nagda et al. (1998). In this study, Nagda et al. determined whether or not retention rates increased when students were integrated into strong

communities of academic and social support. First- and second-year students were placed into research partnerships where they worked closely with faculty, had access to peer mentors, peer support groups, and faculty advisors and received other academic services. Although retention rates improved for all students who participated in the study, minority and at-risk students benefited the most from the intervention. Studies such as those conducted by Nagda et al. demonstrated an increased awareness of the need to make learning opportunities in higher education more equitable, particularly in terms of access for minority groups.

In addition to critical theory research, postmodern ideals, such as deconstructing the inequitable power structures of higher education, were woven into many of the highly cited articles from this decade. Lea and Street (1998) suggested that many of the traditional power structures of university settings posed challenges to students in developing academic writing skills. In researching challenges with writing, they considered three areas: students, student-tutor work, and institutions. They concluded that “all three . . . are located in relations of power and authority” (p. 170), and the authors formulated an academic literacy framework to address the problems they saw.

While Lea and Street (1998) wrote about the need to deconstruct power overtly, power deconstruction was also an underlying theme in several other highly referenced articles. Ramsden (1991) advocated for students to have a greater voice in the university through assessing their instructors’ performance. Boud et al. (1999) addressed the way assessments create an imbalance of power when they concluded that “[a]ssessment is the principle mechanism whereby staff exercise power and control over students” (p. 418). And Boud and Walker (1998) encouraged teachers to carefully consider their use of reflective activities in classrooms because acquiring too much personal information may lead to a “misuse of power” (p. 195). Although this was the first time these research paradigms appeared in the top cited articles, they quickly became common features in higher education research.

As we continued to review the decades after the turn of the century, we found many of the well-established topics of the past being studied through critical theory and postmodern research. Other themes related to student-centered learning continued to evolve from the 1990s into the following decades.

## **The 2000s: Student Success, Internationalization, Teaching and Learning Practices, and Survey Response Bias**

The top cited higher education research during the turn of the 21st century continued to discuss the strong themes of student support and success from previous decades. This is apparent through the abundance of literature focused on varying aspects of retention, engagement, supporting feedback, and proper preparation of college students. Authors in this decade also revealed an emerging focus on the internationalization of education, including perceptions of discrimination toward international students. Researchers in this decade focused attention on effective teaching and learning practices, such as conceptual frameworks for teaching and learning, and the alignment of assessment with long-term learning. Similar to previous decades, authors addressed feedback conceptually and proposed it as a specific way to support college students. Additionally, the growing effects of widespread internet adoption influenced top publications of this decade with a new focus on the potential biases of online versus paper survey responses.

### **Student Success**

At least half of the 20 most cited publications of the 2000s could be categorized by a focus on student success, with the most cited article on formative assessment and feedback leading the way. Nicol and Macfarlane-Dick (2006) proposed that formative assessment and feedback could be used as self-regulation tools and techniques to help students take control of their own learning, creating a proactive, rather than reactive, role in their success. Specifically, the authors proposed principles of good feedback practice with implications for teacher implementation and allowing for greater facilitation of student success.

A pronounced theme related to the idea of student success was student engagement. Several authors addressed various angles of this influence on student success, three of which focused specifically on the effect of student

engagement on first-year college students. Kuh et al. (2008) found student engagement in educationally purposeful activities to have a positive relationship with grades in the first year and student persistence into the second year of college. Similarly, Carini et al. (2006) confirmed that engagement could support first-year college students and seniors in their academic achievement and higher performance on critical thinking tests. Other researchers arrived at similar, positive findings and concluded that students with the lowest ability benefited the most from increased attention to engagement (Carini et al., 2006).

Kuh (2009), a repeat author in the category of student success, focused a literature review on the benefits of student engagement in educationally purposeful activities, specifically focusing on students coming from low-income or historically underserved backgrounds. Kuh found that engagement increased the odds that these students would achieve their academic goals. Krause and Coates's (2008) research provided a different but confirming perspective. They reported on calibrated scales of student engagement and considered implications for policy and pedagogy that could enhance the quality of the student experience.

Parallel to the research of student engagement, other top cited authors in this decade devoted efforts to the study of student success as related to student retention, students' perceptions of the learning environment, and the mentoring of college students. Tinto (2006) conducted an extensive literature review examining past and present research on student retention. He acknowledged the complex components that influenced student persistence and identified specific areas of future research and practice.

Lizzio et al. (2002) investigated the relationship between students' perceptions of their environments on their academic outcomes and success. The researchers analyzed responses from a large, cross-disciplinary sampling of college students according to "hard" (academic achievement) and "soft" (satisfaction and development of key skills) learning outcomes. Results indicated that students' perceptions of their current learning environment were an even stronger predictor of learning outcomes than their prior academic performance was.

Through an extensive, critical review of the literature spanning almost two decades, Crisp and Cruz (2009) made efforts to reframe and update definitions and characteristics of mentoring and presented theoretical perspectives on the effects of mentoring college students, specifically from the literature of business, psychology, and education.

Lastly, other researchers studied yet another component of student success: considerations for the success of students post-graduation. Bridgstock (2009) acknowledged that shifts in the education and labor markets of the time were placing increased pressure on universities to produce more employable graduates, even though there was no agreement on how employability was defined. In her highly cited article, Bridgstock proposed that more than skills, graduates needed to be able to proactively navigate the world of work and self-manage the career process. More specifically, in a combined literature review and four-year longitudinal study, Austin (2002) argued that graduates seeking to fill available faculty positions must demonstrate even more talent than their predecessors. She also identified reforms that would guide changes in education to better prepare students for the realities of the academic workplace.

## Internationalization of Education

Research in the 2000s brought new insight into the internationalization of education. Altbach and Knight (2007) proposed that intentional efforts to stay aware of international initiatives and ensure quality are essential to the environment of international higher education. They also offered important and helpful clarification about the distinction between the meaning of globalization and internationalization of education, explaining that globalization is the context of the economic and academic trends of the century, while internationalization refers to the policies and practices of individuals and academic institutions that adapt to the global academic environment. This distinction offered an important lens through which to view the remaining top cited articles on the internationalization of education.

Knight (2004) updated the conceptual frameworks of internationalization in light of the changing world of higher education, studying the meaning, definition, rationales, and approaches to internationalization from the perspective of

the institutional level, a bottom-up view, where she argued the real process of internationalization takes place, and from the national/sector level, a top-down view encompassing policies, funding, and programs. Through this framework, she identified key questions and policy issues essential to the future direction of internationalization.

Deardorff (2006) recognized that a move toward internationalization increased the need for intercultural competence. Deardorff (2006) sought to define intercultural competence and determine an appropriate assessment with which to measure this competence as a student outcome of these efforts. She found that both intercultural scholars and administrators agreed that it was possible to assess cultural competence by degrees, and two models of intercultural competence were presented in the findings of her article.

Further top cited research of internationalization in the decade focused on the reality of national and global competition in higher education. Marginson (2006) noted that higher education, along with potential research performance, has been postulated as 'positional goods' that increase income earnings and social prestige. He noted a worldwide market of elite universities in the United States and United Kingdom and the reality that the English language dominates the research capacity. Marginson's work proposed the need for a more balanced distribution of capacity globally.

Finally, with the growth of education globalization and the increase of intermingling multicultural students, opportunities increased for either hospitality or unfair treatment towards international students. In a frequently cited article, Lee and Rice (2007) analyzed the experiences of international university students at a Southwestern university in the United States. Based on the conceptual framework of neo-racism, the authors conducted interviews to explore the students' perceptions of discrimination. The researchers concluded that some of the challenging issues faced by international students were not just matters of adjustment, as much of the research had suggested, but they could also represent inadequacies within the host society.

## Teaching and Learning Practices

Efforts to improve teaching and learning practices were also evident in varying forms in the top cited literature from 2000 to 2009. Researchers Meyer and Land (2005) addressed complex issues of threshold concepts within and across disciplines, with an effort to transform the internal view of subject matter. They sought to (a) examine these concepts within the personal understanding of discipline-specific discourses, (b) develop more extensive notions of boundaries and borders, and (c) provide a conceptual framework teachers could use to advance their own reflective practice.

Addressing very different aspects of teaching and learning practices, and similar to previous decades, researchers Boud and Falchikov (2006) examined the alignment of assessment with long-term learning. They discussed the kinds of practices needed to refocus the placement of assessment within higher education and explored the characteristics of assessment tasks that might be used to promote a more sustainable approach to helping students with future learning challenges.

Lastly, Carless (2006) contributed to the growing body of research from previous decades concerning perceptions in the feedback process. Carless argued that assessment dialogues were a way to potentially help resolve some of the issues of trust and misconception that at times may be unwanted outcomes in the feedback and assessment process.

## Survey Response Bias

The 2000s also brought the emergence of widespread internet use. This change was manifest in the top educational journal articles through an interest in online- versus paper-survey response bias. Two articles by different authors addressed this topic from similar perspectives, through different methods. Nulty (2008) offered a review of online surveying in general, including a review of data and practical advice to help boost survey response rates. Additionally, Nulty offered recommendations to improve the effectiveness of this evaluation strategy. Similarly, Sax et al. (2003) addressed survey response bias. They collected and analyzed data from first-year college student surveys, which had been administered in four forms: paper-only, paper with web option, web-only with response incentive, and web-only without response incentive. Results indicated that the mode of administration had an effect on response rate.

In summary, the continued themes of student support and success, effective teaching and learning practices, and feedback continued in the 2000s from previous decades. The 2000s also brought an emerging focus on the internationalization of education and the growing interplay between technology and education. These themes persisted into the coming decade.

## **The 2010s: Economy, Student Experience, and Gender Equality**

In the 2010s, new topics developed such as the influence of the economy and gender equality in education. Student experience continued to be a prevalent theme in this decade. Much of the research in this decade also responded to the economic, social, and educational challenges from the previous decade.

### **Economy**

The economy played an increasing role in education research during the 2010s. “Between 2000 and 2018, total undergraduate enrollment in degree-granting postsecondary institutions increased by 26% (from 13.2 million to 16.6 million students)” (National Center for Education Statistics, 2021). This rapid increase was likely driven by a growing global and highly competitive knowledge-based economy requiring workers with postsecondary education and training. Barro and Lee (2013) argued that education is essential in a knowledge-based economy because it increases the ability of a workforce to carry out existing tasks more quickly and promotes the transfer of knowledge about new information, products, and technologies. Marginson (2016) stated, “this worldwide trend foreshadowed a world in which knowledge, skills, and personal agency would be much more widely distributed” (p. 414). Marginson’s top cited research in the 2010s discussed the effects of high participation in tertiary education on social stratification and inequality. Recognizing the universal desire for social betterment is articulated through higher education systems, he argued that the quality of mass higher education could be problematic and there was a limit to the number of socially advantaged positions on offer. He claimed that higher education “can never bring every family what it seeks” (p. 415).

### **Consumerism**

The global financial crisis of 2007–2008 was considered by many economists to have been the most serious financial crisis since the Great Depression (Williams, 2010). This event spotlighted the link between the economy and education and caused governments to expand higher education while at the same time reducing public expenditure and shifting more costs to students. Students, now paying more in tuition and fees, were viewed not just as students, but consumers of education. Students as consumers (SAC) viewpoints shifted power from providers to consumers, who, with more control over expectations and the ability to evaluate services, expected higher standards and quality of service (Tomlinson, 2014). Universities have not historically regarded education as a product or service, so the SAC approach represented not only a political and financial shift in higher education but also a fundamental educational shift. Williams (2013) found that the SAC approach reinforced attitudes toward learning and inhibited students from taking responsibility for developing their own knowledge and skills. Researchers found that students who were personally responsible for paying their tuition fees (e.g., through a loan from student finance), as opposed to having their fees paid on their behalf (e.g., by a scholarship or employer), did express a higher consumer orientation, which, surprisingly equated to lower academic performance (Bunce et al., 2017).

### **Employability**

The economic influence on higher education also increased policy makers’ interest in higher education’s ability to produce more measurable outcomes (Holmes, 2013), including graduate employability. Clark (2018) researched the trend of adopting skill-based learning outcomes in order to increase graduate outcomes. She developed a framework that incorporated six key dimensions—human capital, social capital, individual attributes, individual behaviors, perceived employability, and labor market factors—as a method of explaining graduate employability. Clark claimed that graduate employability remained underexplored and underdeveloped and that its complex nature had often been oversimplified.

Another top cited article approached employability by evaluating work-integrated learning (WIL) programs used to equip new graduates with the required skills to function effectively in the work environment. Jackson (2015) investigated best practices in the classroom and placement activities to both develop employability skills and identify factors impeding skill performance during WIL.

Pickering and Byrne (2014) discussed the employability of PhD candidates in terms of how they benefited from increased publication rates, emphasizing the importance of publishing early and often. The authors described a successful method used by PhD candidates and early career faculty to undertake and publish literature reviews.

## Entrepreneurship

Also on the topic of economic influences, we saw a top cited article centered around entrepreneurship. Researchers and public policy makers widely recognized that entrepreneurship is an important driver of economic growth. Nowinski et al. (2019) found that entrepreneurship education does have a positive impact on the development of entrepreneurial intentions, particularly among females.

## Student Experience

Student experience was a common theme throughout the research in this decade. Topics in this theme included engagement, feedback, cheating, and the use of technology. Researchers in this decade found understanding the student experience can influence policy and practice as well as improve student retention.

## Engagement

Student engagement was found to be key to student achievement and retention in earlier decades (Krause & Coates, 2008). In the 2010s, Kahu (2013) found that other researchers had studied, theorized, and debated student engagement with growing evidence of its critical role in achievement and learning; it was even suggested later that the value of engagement is no longer questioned (Trowler & Trowler, 2020).

Kahu (2013) reviewed and critiqued the four dominant research perspectives on student engagement: the behavioral perspective, the psychological perspective, the sociocultural perspective, and the holistic perspective, which takes a broader view of engagement. Kahu presented a conceptual framework attempting to overcome student engagement problems and frame future research to improve student outcomes. An expansion of her framework affirmed students' engagement is influenced by a combination of student factors and institutional factors. Continued research found there were psychosocial constructs that strongly influenced student outcomes such as academic self-efficacy, emotions, belonging, and well-being. She claimed "critical mechanisms [are needed] for mediating the interactions between student and institutional characteristics and student engagement and success" (Kahu & Nelson, 2018, p. 58).

## Feedback

The most prominent theme within the 2010s' top cited articles was centered on the pedagogical practice of giving and receiving feedback. This trend was probably also influenced by the SAC approach as faculty were expected to be increasingly available to students and to respond more promptly to questions and concerns.

Giving students detailed feedback about the strengths and weaknesses of their work, with suggestions for improvement, is common practice in higher education. Building upon feedback research conducted in previous decades, this decade produced diverse approaches to the topic. Nicol (2010) worked with a goal of understanding the purpose of feedback and increasing its effectiveness, concluding his research with a call for wider changes in teaching and learning and in the pedagogical models underpinning feedback designs. Additional research completed by Nicol et al. (2014) consistently showed that students were less satisfied with feedback than with any other feature of their courses. Another highly cited article even went so far as to argue that feedback seems to have little or no impact, despite the considerable time and effort put into its production (Sadler, 2010). One qualitative investigation led researchers to argue that effective feedback should lead to demonstrable improvements in student work and learning strategies (Dawson et al., 2019).

Other research findings from the 2010s proposed criteria for understanding and applying feedback. For students to be able to apply feedback, they need to understand the meaning of the feedback statements (Sadler, 2010). They also need to identify the particular aspects of their work that need attention. In order to identify those aspects, Sadler asserted that students must possess critical background knowledge.

Some of the feedback research presented possible suggestions for improvement to existing feedback models. Carless and Boud (2018) identified four interrelated features underpinning students' feedback literacy: appreciating feedback; making judgments; managing effect; and taking action. In addition, teachers were identified as playing important facilitating roles in promoting student feedback literacy through curriculum design, guidance, and coaching. Another article explored a model that positioned learners as having a key role in driving learning, enabling them to generate and solicit their own feedback. Boud and Molloy (2013) identified the design of the curriculum as an important means of encouraging students to operate as judges of their own learning. Researchers also identified learning benefits resulting from giving and receiving peer feedback (Nicol et al., 2014). Finally, researchers reviewed the skill of evaluative judgment to improve feedback, suggesting that the capability to make decisions about the quality of one's own and others' work should be a goal of higher education. Researchers argued that employing evaluative judgment within a discourse of pedagogy would enable students to improve their work and to meet future learning needs (Tai et al., 2018).

## Technology

Research in the 2010s also discussed some of the ways in which technology continued to change the student experience. Interest in flipped classrooms grew exponentially after the introduction of the model in 2011. In the top cited article of this decade, researchers attempted to provide a catchall definition for the flipped classroom, while at the same time retrofitting it with a pedagogical rationale. Researchers found that despite the enthusiasm of the approach, well-designed, rigorous research on flipped classrooms was lacking, causing the researchers to construct a theoretical argument that flipped approaches might improve student motivation and help manage cognitive load. But, they also encouraged more specific types of research on the effectiveness of the flipped classroom approach (Abeysekera & Dawson, 2015).

Another technology-focused study explored the potential use of various digital technologies to enhance student learning. Henderson et al. (2017) attempted to show that digital technologies were central to the ways in which students experience their studies but also found that those technologies were not transforming the nature of university teaching and learning. They issued a call for university educators to temper enthusiasm for what might be achieved through technology-enabled learning and encouraged a better understanding of the realities of students' encounters with digital technology.

## Cheating

In 2015, a series of reports by the Australian media suggested there was a potentially large and unaddressed problem of Australian university students outsourcing their assessments to third parties—a behavior termed “contract cheating” (Bretag et al., 2018). Researchers sought to explore students' experiences with, and attitudes towards, contract cheating and the contextual factors that may influence this behavior. Their findings suggested that to minimize contract cheating, universities needed to support the development of teaching and learning environments that nurture strong student-teacher relationships, reduce opportunities to cheat through curriculum and assessment design, and address language and learning needs of students speaking a Language Other than English (LOTE) at home (Bretag et al., 2018).

## Gender Equality

For the first time, research in the 2010s addressed topics within feminist research. One study attempted to determine how the gender of an instructor influenced student ratings. The researchers did not disclose the gender of the instructors in the study, so the instructors were able to teach an online course while operating under a different gender identity. The researchers discovered that students rated the male instructor significantly higher than the female instructor, regardless of the instructor's actual gender (MacNeill et al., 2015). Researchers believed this information about gender biases could have a significant effect on academic career trajectories. Other research considered how

gender influenced the amount of academic service performed by faculty. Using data from a large U.S. national survey and an online performance reporting system, researchers discovered evidence that on average female faculty performed significantly more academic service than male faculty (Guarino & Borden, 2017).

Our synthesis of this decade shows the prominence of teaching and learning research topics that were centered around improving the student experience. Of special note in this decade is the introduction of research showing how technology was changing the educational landscape in higher education. We were also surprised feminist scholarship in higher education research didn't emerge within the article database until this decade.

## **2020 and Beyond: Academic Research, Partnerships and the Economy of Education, Employability, Teaching and Learning Practices, and Online Learning**

Beginning the decade, research in 2020 was directed at improving higher education practices. Some research focused on improving academic research itself, while other research focused on relational and pedagogical practices. Researchers examined how students and staff interact and what impact that has on students' education. Some articles discussed employability of graduated students, while other articles discussed the impact of online learning in college education. These themes from the research in the beginning of the 2020s provide insight into what the future of higher education research may look like throughout the rest of the decade.

### **Academic Research**

A top cited journal article of 2020 was a review of academic research by Daenekindt and Huisman (2020), who mapped and synthesized research in the field of higher education from 1991 to 2018. By creating topic models, they identified themes taken from the abstracts of thousands of journal articles. Additionally, they studied how research topics have evolved over time, which research topics occur together, and they identified gaps in the literature. They expressed concern over the disintegration of the field due to the "isolated islands" of research topics found in their work.

Other top cited authors in 2020 also focused on the topic of academic research and similarly concluded with concerns about research in the higher education field. Horta and Santos (2020) claimed that certain policies and guidelines have robbed the field of collegiality and autonomy, which are both deemed necessary for quality research. Additional studies on academic research noted and encouraged the need for greater rigor in using statistical methods like partial least squares and structural equation modeling to help avoid inaccuracies in future publications (Ghasemy et al., 2020). These articles show a reevaluation of current practices and a call for improvement in academic research.

### **Partnerships and the Economy of Education**

Student-staff partnerships appeared as a new theme in the top cited articles of 2020. Researchers investigated various angles of this arrangement. Mercer-Mapstone (2020) proposed that student-staff relationships could help support institutional equity and diversity and foster unique experiences for both students and staff. On the contrary, Bovill (2020) argued that partnerships of small groups are generally only composed of super-engaged or privileged students and proposed instead a whole-class approach to partnership, adding that all could be co-creators in learning.

Other researchers studied the connection between partnerships and the economy of education. Gravett et al. (2020) were supportive of the concept of students as partners and went a step further to claim that these partnerships could help students become more than customers. Their research supported the theory, continued from previous decades, that education can be an economy. In a parallel way, even student evaluations can affect the economy of education, given the unintended economic consequences of their results. Esarey and Valdez (2020) acknowledged the scholarly quest for valid student evaluations and the need for accuracy. They concluded that the relationship between student evaluations and instructor quality is imprecise and that multiple, even imperfect, measures will produce more fair results.

Tight (2020b) also alluded to this knowledge-based economy as he presented research on an entirely different topic: student retention and engagement in higher education. Tight concluded that the concept of student engagement has now taken over student retention in importance. He argued that this is because of the shift of financial responsibility of higher education from the state to the student. Therefore, the concern and responsibility of student retention and engagement have shifted from the student to the educational institution. Barbera et al. (2020) also acknowledged that decades of effort have sought to identify predictors of student retention and graduation, but historically important indicators should also include newer considerations of nontraditional students and online programs. The success of those students greatly influences the educational economy.

## Employability

Employability, connected to the concept of a knowledge-based economy, is a theme that continued from previous decades into 2020. Universities can have altruistic or economic interests in producing students who possess the needed skills for success in the workplace. Top cited authors Succi and Canovi (2020) found that companies value soft skills more than students and graduates do, and the researchers urged companies and educational institutions to work together to build awareness and student responsibility in acquiring and developing more soft skills. Römgers et al. (2020) researched the need to integrate approaches to employability, conceptual frameworks, and definitions. Another top cited article evaluated employability of international students returning to their own countries, specifically, Vietnamese students who had studied in Australia (Pham & Saito, 2020). Buckner and Stein (2020) also addressed aspects of education and internationalization with research efforts that identified elements of global inequality, certain ethical responsibilities, and possibilities to help.

## Teaching and Learning Practices

The top cited articles of 2020 also added to the long-studied theme of teaching and learning. These topics included feedback, collaborative learning, and assessment. Molloy et al. (2020) addressed the notion of students being active participants and using feedback for their own learning. Molloy et al. encouraged a concept of feedback literacy and put more emphasis on the learners' perspective and role when receiving feedback. Their work connected with Li et al.'s (2020) work, which found that peer assessment promoted student learning and had a positive effect on student performance. Similarly, Meijer et al. (2020) researched the assessment of collaborative learning, including intra-group assessment.

## Online Learning

Much of the top cited literature of 2020 reflected the adoption of online learning and its accompanying challenges. Sharma et al. (2020) addressed the level of student engagement for online learning success, showing that frequency and duration of engagement have a significant impact on grades. Thongsri et al. (2020) researched computer self-efficacy for e-learning adoption and found greater scores of self-efficacy, perceived ease of use, and intention for e-learning in STEM as opposed to non-STEM students. Other issues embedded in online learning included concerns of cheating (Chirumamilla et al., 2020) and oral examinations as an acceptable online assessment tool (Akimov & Malin, 2020).

In summary, the research of 2020 continued themes from previous decades such as the economy of education, the employability of students, internationalization, teaching and learning practices, and the influence of technology in online learning trends. However, with the educational impacts from the COVID-19 pandemic, research trends may make an abrupt shift. We anticipate both continued research on the themes discussed above and research on new themes in response to the events of 2020 as the decade progresses.

## Synthesis of 50 Years: Findings, Trends, and Implications

Researchers as early as 1972 (Trow) attempted to survey the higher education field holistically and to define common topics or themes found in the research literature. Trow focused on access to the university and traced the shift from

only elite access, to mass education, and on to universal access, while other researchers since that time have attempted to categorize more general themes of higher education. Altbach (1985), Teichler (1996), and Hayden and Parry (1997) all grouped research topics based on trends. The two most comprehensive bibliographic studies of higher education literature were published recently (Daenekindt & Huisman, 2020; Tight, 2020c). Daenekindt and Huisman's top cited review mapped the field of higher education research from 1991 to 2018, categorizing themes into four broad categories, while Tight settled on eight major themes in the literature.

## Findings

While many researchers have documented the trends of higher education research by focusing on output (the number of publications), our purpose was to measure the impact of publications by outcome (number of citations). We find this research significant because, as Diem and Wolter (2013) have concluded, "citations actually denote a research outcome, namely the impact of the published research papers on other people's research" (p. 88). Because our review has only focused on the trends which emerged in the highest impact articles (outcome), we find it insightful to compare these trends with those found in output reviews, specifically Tight's research, since we have found it to be the most comprehensive in terms of time and scope (2020c). Table 1 provides a topical comparison between the 120 articles we reviewed and the eight themes identified by Tight. Course design on assessment and course design on outcomes appeared consistently in the top 20 articles of each decade, suggesting a broad and ongoing interest in assessments and learning outcomes across the decades we reviewed.

**Table 1**

*Number of Top Cited Articles Categorized Using Tight's (2020c) Research*

Category	Number of articles
Course Design	61
Assessment	23
Outcomes	25
Quality	17
Teaching & Learning	14

In addition to highlighting the most represented themes, our comparison also illuminated the underrepresented trends in highly cited articles. Tight's themes of academic work, defined as "research on the roles of those who work in the academe" and knowledge, defined as "research on academic disciplines and the research process," were rarely represented in the high impact journal articles we reviewed (2018, p. 2). Only four articles focused on academic work, and only seven articles focused on knowledge.

## Evolution of Trends

By studying 50 years of the most influential articles, we are able to document not only which trends existed in higher education research but also the evolution and emergence of those trends. The highly cited articles we reviewed provide evidence for a change in thinking about the broader trends over time.

Student engagement is a trend in higher education research that evolved significantly over the past 50 years. In the early decades we reviewed, the literature focused primarily on solving the problem of attrition. Early on, researchers looked for empirical evidence about how to improve retention, but by the 1990s, they were publishing extensively about increasing student retention through academic and social involvement. Findings in these studies solidified ideas of involvement—increasingly referred to as engagement—as having a significant impact on more than just retention. Learning outcomes and an improved student experience were some of the byproducts that researchers connected with engagement. In a further expansion of this trend, Tight (2020b) recently stated that future research on the topic of

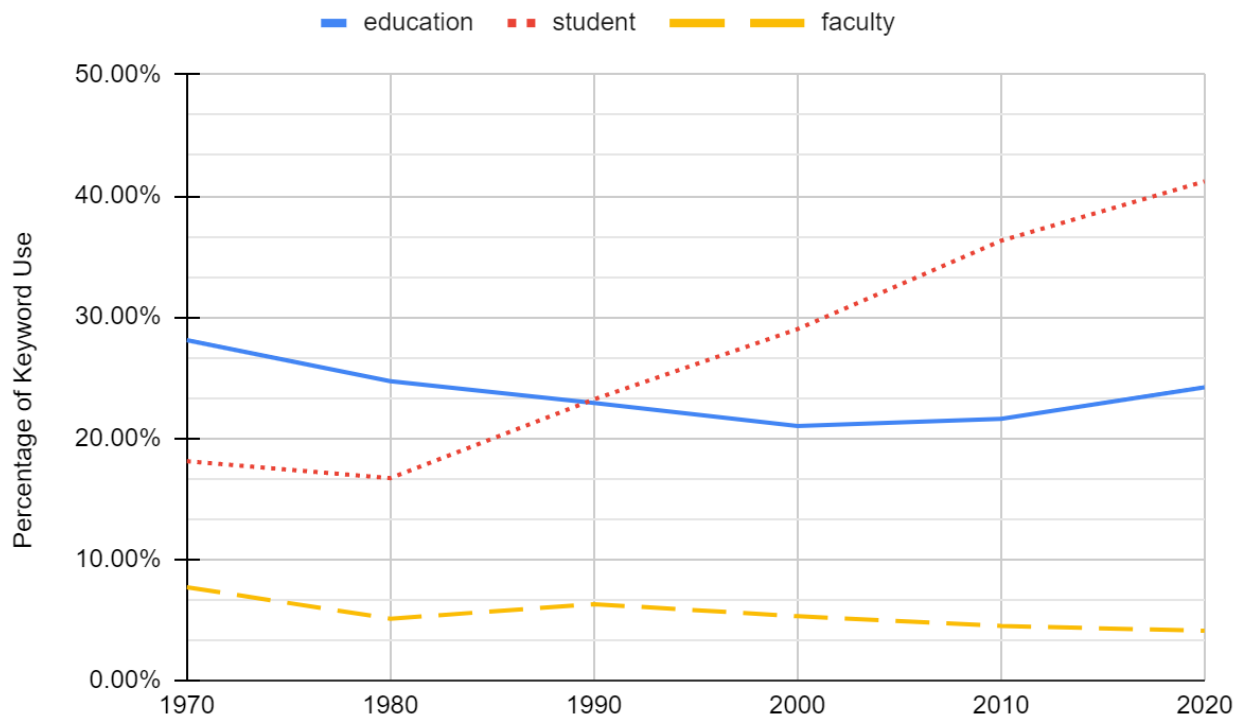
student engagement needed to seek an understanding of the complete student experience instead of narrowly focusing on engagement.

A second example of an evolving trend was the shifting role of instructors within higher education. In the early decades we reviewed, the research focused on moving instructors away from a behaviorist teaching model where information transmission and student regurgitation were the goals (Biggs, 1979; Biggs, 1989; Dahlgren & Marton, 1978; Fry & Kolb, 1979; Laurillard, 1979; Marton & Svensson, 1979). Researchers produced evidence of more effective teaching strategies based on constructivist models, including students as active participants in discovering and creating knowledge (Biggs, 1996; Boud & Walker, 1998; Trigwell et al., 1999; Vermunt, 1996). Studies showed how peer tutoring and collaborative learning experiences produced more student-centered classrooms (Tinto, 1997; Topping, 1996). And in more recent decades, the research has shown a need for professors to reexamine the way they conduct assessments and provide feedback (Boud & Falchikov, 2006; Boud & Molloy, 2013; Carless, 2006; Carless & Boud, 2018; Dawson et al., 2019; Nicol & Macfarlane-Dick, 2006; Nicol, 2010; Nicol et al., 2014; Sadler, 2010; Tai et al., 2018). Finally, the most current research has reconceptualized the role of instructors and emphasized the teacher–student partnership in teaching and learning (Bovill, 2020; Mercer-Mapstone, 2020).

A keyword analysis of the 50 years of articles we reviewed confirms this increasing attention on the student-centered approach. In the 1970s and 1980s, “education” was the top keyword in the literature we reviewed, and “student” was second on the list (see Figure 3). By the 1990s, “education” and “student” had equal representation. From there, “student” continued to climb, widening the gap in each succeeding decade. Interestingly, as “student” increased, the word “faculty” steadily declined.

**Figure 3**

*Patterns of Top Keywords in Article Titles by Decade*

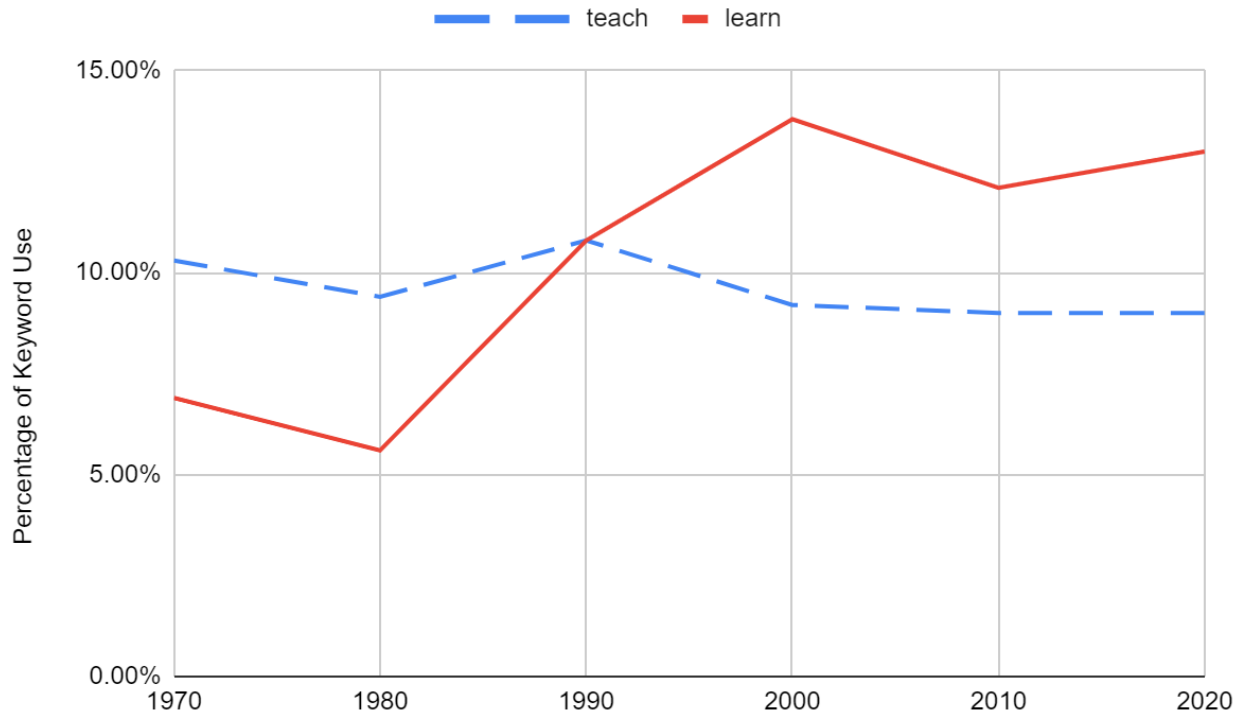


A very similar pattern occurred when we examined the words “teach” and “learn” in connection with their usage over the decades (see Figure 4). Articles in the 1970s and 1980s used the word “teach” with greater frequency than the term

“learn.” By the 1990s, the two terms were used with equal frequency but from there, “learn” overtook “teach” in frequency, with the spread increasing in each subsequent decade.

**Figure 4**

*Patterns of Top Keywords in Articles by Decade*



## Emergence of Trends

In addition to providing insights into how trends have evolved, this study also demonstrates how some newer trends have emerged over the past 50 years. One clear example of an emerging trend has been the internationalization of education. In a bibliometric analysis of 20 years of international comparative studies, Kosmützky and Krücken (2014) documented the growth of international research from the 1990s through the present. One driving force behind the growth was “the establishment of new journals explicitly devoted to international higher education from the mid-1990s onwards” (p. 469). The new journals, coupled with a growing interest in globalization and international education, provided fertile ground for new research. While we rarely saw the theme of internationalization in the early decades we reviewed, the theme emerged prominently in the 2000s with five articles addressing the internationalization of education (Altbach & Knight, 2007; Deardorff, 2006; Knight, 2004; Lee & Rice, 2007; Marginson, 2006). Jing et al. (2020) confirmed this trend with their comprehensive study of over 100 years of research on international students in higher education; they found that the research has expanded significantly from 2006 to the present.

A second emergent trend we found in our analysis was the growth of research from different paradigmatic perspectives, particularly critical theory, postmodernism, and feminism. Despite a growing awareness of the need for critical theory to be applied to education in the 1970s, there was a lapse in time before researchers began to publish from this paradigm’s perspective. The Association for Educational Communications and Technology (AECT) Handbook noted this trend in higher education research concluding that “[t]hough relatively few educators . . . appear to concern themselves directly with critical theory (McLaren, 1994a), a number of influential educators are pursuing the theory” (AECT, 2001, para. 1).

We identified this lapse by comparing the most cited articles of the 1970s and 1980s with articles of the 1990s. It was not until the 1990s that critical theory research appeared in the most cited articles. While this is not an indication of an absence of earlier critical theory research, the high number of citations speaks to the paradigm's growing interest and impact among researchers and practitioners in the 1990s and forward. Similarly, in the 1990s we found the first postmodern research study within our data set (Lea & Street, 1998). The impact of critical theory and postmodern research continued to increase as evidenced by highly cited articles in the 2000s and 2010s (Carini et al., 2006; Kuh, 2009; Lee & Rice, 2007; Marginson, 2006; Buckner & Stein, 2020; Marginson, 2016). Surprisingly, even though women were well represented as authors of the most cited articles, and feminist research and perspectives were developing, research with a feminist perspective did not appear in the top 20 articles until the 2010s (Guarino & Borden, 2017; MacNell et al., 2015; Nowinski et al., 2019).

## Implications

Across the 50 years of higher education research, we noted a shift away from the assumption that teaching equates to learning. The articles that had the biggest impact on the field of higher education came from researchers who were responding to the need to make learning student-centered and were attempting to measure how the best learning happens. These types of research may have been reactions to the ideals of behaviorism that were prevalent in education prior to the 1970s. Behaviorism assumed a reflexive response to learning; as long as something went in, it would also come out. It was in the 1960s that Lev Vygotsky's work on the sociocultural, constructive nature of knowledge was introduced to the English-speaking world. The increasing realization of the complexity of learning underscores the research of these 50 years. Most of the highly impactful research responded to questions about how to help students learn deeply, how to make sure that learning is engaging so students persist in finishing their degrees, and ultimately how to ensure that earning a degree equates to marketability in a global economy. Specifically, we noticed researchers in the 1980s attempted to align teaching practices with the best student learning methods (Biggs, 1989; Biggs, 1996; Cohen, 1980; Feldman, 1988). Many studies in the 1990s showed the need to replace teaching practices that encouraged surface-level learning with deep-learning experiences (Boud & Walker, 1998; Boud et al., 1999; Dochy et al., 1999; Scouller, 1998; Topping, 1996; Trigwell et al., 1999; Vermunt, 1996). Research across several decades showed the importance of student engagement in creating student-centered learning environments (Astin, 1999; Astin & Sax, 1998; Carini et al., 2006; Kahu, 2013; Kahu & Nelson, 2018; Krause & Coates, 2008; Kuh, 2009; Kuh et al., 2008; Nagda et al., 1998; Tinto, 1998; Trowler & Trowler, 2020). Most recently, studies also viewed student-centered learning from a broad perspective regarding the relevance of education in terms of employability and usefulness in the global market (Barro & Lee, 2013; Clark, 2018; Holmes, 2013; Jackson, 2015; Marginson, 2016; Nowinski et al., 2019; Pickering & Byrne, 2014).

These research trends illuminate the way student-centered learning has become the central focus of higher education. Over the decades, keyword counts showed a shift from the terms "teach" and "education" in early decades to the terms "learn" and "student" in later decades, as evidence of the increasingly student-centered approaches to learning we saw throughout the most cited articles. As students have had to shoulder the growing financial responsibility of acquiring higher education degrees, they have sought more power to ensure the quality of their education. Themes focused on student ratings, assessments, and feedback may be related to students' growing demands to have formal education produce economic benefits worthy of the cost. Similarly, we do not find it surprising that 50% of the most cited articles focused on assessment and learning outcomes (both immediate and long-term outcomes) because these categories provide a means of measuring learning improvement efforts.

## Limitations and Suggestions for Further Research

As we reviewed the highly cited articles from each decade, we noticed several authors whose work consistently received high citation counts. When we referenced additional articles published by these authors, we found some of their other highly cited work was published in journals that are not specific to higher education research. The bibliometric analysis in our study guided the selection of journals that would be included in each subdiscipline's dataset (see the Appendix for a complete list of journals). It was evident as we analyzed the articles from each decade that one

limitation of our study is that there may be other highly cited works that were not included because the journal was not a part of our dataset.

One potential area of further research would be to study how citation counts have changed over the decades and to determine what those changes mean in terms of the impact. As we compared decades and articles, we noticed the total number of citations for the most cited articles was higher in the earlier decades than the total number of citations in more recent decades. We feel it would be helpful to understand why citation counts were lower in recent years despite the overall exponential growth within higher education publications. Are journal articles receiving fewer citations because of the increasing number of publications each year? Are other sources of knowledge, such as whitepapers, conferences, internet articles, or listservs, replacing journal articles as primary influences for research ideas? Do these recent journal articles with a smaller number of citations also have a smaller impact on the broader field? Answers to these questions would be helpful in building on the findings of this study.

## Conclusion

While there is still disagreement about whether higher education research qualifies as a discipline or as a multidisciplinary research field (Tight 2020a), interest in higher education as an area worthy of research and study has grown significantly in the last 50 years. In reviewing the most highly cited articles of each decade, we were able to identify the themes and trends that made the biggest impact in higher education research over the past 50 years. Themes that centered on students and learning—such as effective teaching, retention, engagement, assessment, feedback, and employability—were the most common among the high-impact articles we analyzed. Our findings suggest that the field of higher education has moved away from a teacher-centered approach to a student-centered focus where deep, applied learning is the goal.

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# Research Impact Metrics

## A 50-Year Analysis of Education Research Article Feature Effects on Citation Counts

Royce Kimmons & Ross Larsen

Academic Writing

Research Impact

Bibliometrics



*By analyzing 50 years of citation counts of 51,281 research articles across 86 education journals in conjunction with textual analysis of article titles and abstracts, we explore how a variety of article features, such as title length, use of a subtitle, reading difficulty, and open access status, have historically influenced the impact of education research articles. Results indicate that (a) shorter titles are more likely to be cited than long titles, (b) articles with subtitles (designated with a colon) are more likely to be cited, (c) articles with lengthy and more technical abstracts are more likely to be cited, and (d) open access status has no effect.*

The guiding research question of this analysis was “What is the relationship between education research article features and citation counts?” Central to our asking this question is the notion that citation count as a measure of impact may be influenced by a variety of factors that may have little to do with a given study’s scientific or professional merit or that subtle decisions regarding an article’s title or abstract might influence its citability. To answer this question, we utilized hierarchical linear modeling (HLM) to analyze Scopus database metrics for top education research journals to determine the strengths of relationships between two independent citation variables, six independent article feature variables, and two covariates. In total, 51,281 articles from 86 journals were analyzed, inclusively representing the years 1969 to 2020 (see Table 1).

Table 1

List of Journals with Number of Articles and Year Ranges

Journal Title	Number of Articles	Year Range	
		Minimum	Maximum
Assessment & Evaluation in Higher Education	470	1981	2020
Australasian Journal of Educational Technology	783	2008	2020

Journal Title	Number of Articles	Year Range	
		Minimum	Maximum
Australian Journal of Teacher Education	357	2009	2014
British Journal of Educational Psychology	496	1969	2020
British Journal of Educational Technology	1,892	1973	2020
Cogent Education	744	2014	2020
Community College Journal of Research and Practice	345	1993	2020
Computer Assisted Language Learning	641	1990	2020
Computers & Education	3,204	1986	2020
Contemporary Educational Psychology	318	1980	2020
Counselor Education and Supervision	295	1969	2020
Education and Information Technologies	1,303	2000	2020
Education and Urban Society	306	1973	2020
Educational Administration Quarterly	553	1969	2020
Educational Assessment, Evaluation and Accountability	121	2013	2020
Educational Management Administration & Leadership	645	1974	2020
Educational Policy	399	1987	2020
Educational Psychologist	297	1970	2020
Educational Psychology	521	1981	2020
Educational Psychology Review	230	1990	2020
Educational Technology & Society	1,535	2000	2020
Educational Technology Research and Development	932	1993	2020
English Language Teaching	733	2012	2015
English Language Teaching Journal	1,060	1973	2020
European Journal of Teacher Education	861	1982	2020
Higher Education	446	1976	2020
Higher Education Research & Development	516	1982	2020
IEEE Transactions on Learning Technologies	458	2008	2020
Improving Schools	182	1998	2020
Innovations in Education and Teaching International	223	2015	2020
Innovative Higher Education	99	1996	2020
Interactive Learning Environments	1,043	1990	2020
International Journal of Artificial Intelligence in Education	283	2000	2020
International Journal of Doctoral Studies	63	2014	2020
International Journal of Educational Management	755	1987	2020
International Journal of Instruction	911	2013	2020

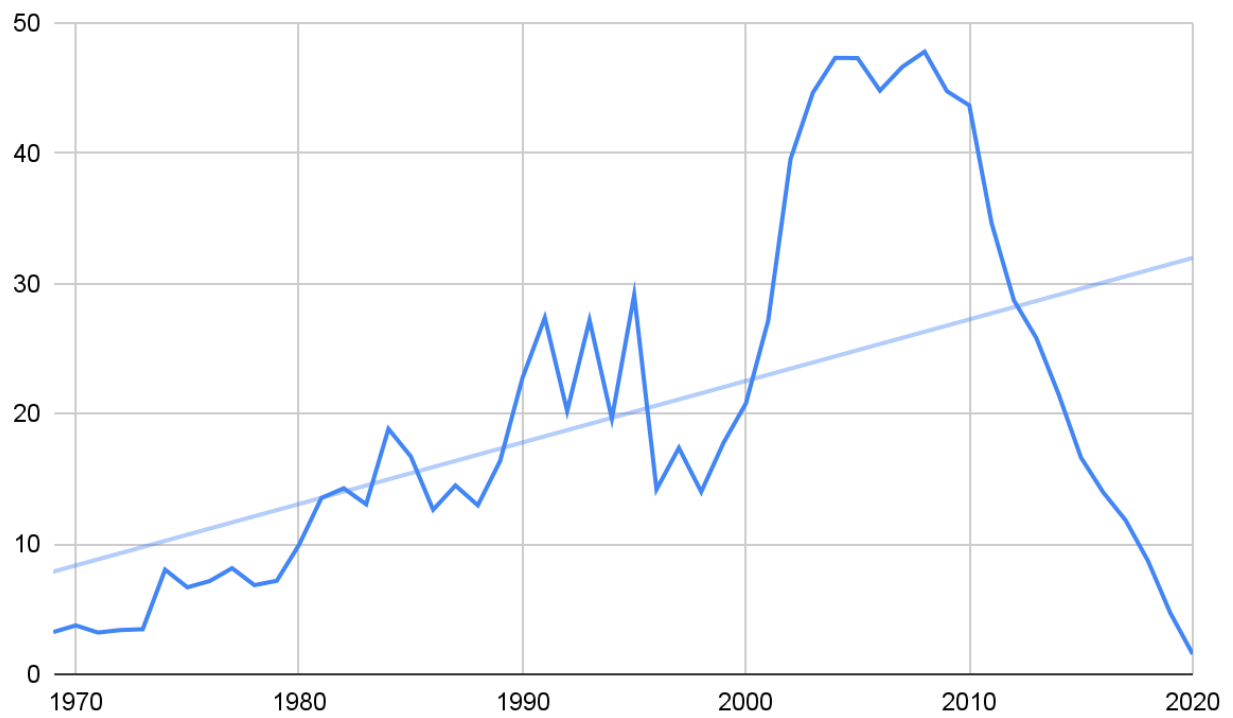
Journal Title	Number of Articles	Year Range	
		Minimum	Maximum
International Journal of Leadership in Education	344	2003	2020
Internet and Higher Education	540	2001	2020
Journal of College Student Development	142	2004	2020
Journal of College Student Retention: Research, Theory, & Practice	148	2010	2020
Journal of Computer Assisted Learning	953	1985	2020
Journal of Counseling & Development	415	1985	2020
Journal of Counseling Psychology	715	1975	2019
Journal of Diversity in Higher Education	129	2014	2020
Journal of Education Policy	421	1986	2020
Journal of Educational Administration	615	1969	2020
Journal of Educational Computing Research	490	2011	2020
Journal of Educational Psychology	497	1974	2020
Journal of Educational Research	1,864	1969	2020
Journal of Further and Higher Education	334	1977	2020
Journal of Higher Education Policy and Management	140	2009	2020
Journal of International Students	177	2015	2020
Journal of Mathematics Teacher Education	401	2005	2020
Journal of Psychoeducational Assessment	741	1983	2020
Journal of School Choice	203	2006	2020
Journal of School Psychology	213	1982	2020
Journal of Science Teacher Education	630	1989	2020
Journal of Studies in International Education	82	2004	2020
Journal of Teacher Education	908	1969	2020
Language Learning & Technology	361	2000	2020
Leadership and Policy in Schools	243	2014	2020
Learning and Individual Differences	751	2013	2020
Learning Disability Quarterly	252	1978	2020
Learning, Media and Technology	415	2005	2020
Management in Education	231	1987	2020
Phi Delta Kappan	695	1996	2020
Professional Development in Education	634	2009	2020
Psychology in the schools	736	1975	2020
Research in Higher Education	141	1974	2020
School Effectiveness and School Improvement	232	1990	2020

Journal Title	Number of Articles	Year Range	
		Minimum	Maximum
School Leadership & Management	190	2002	2020
School Psychology International	621	1979	2020
School Psychology Quarterly	55	2019	2020
Social Psychology of Education	306	2001	2020
Studies in Higher Education	736	1976	2020
Teachers and Teaching	793	1995	2020
Teaching and Teacher Education	2,484	1985	2020
Teaching in Higher Education	1,036	2005	2020
Technology, Pedagogy and Education	468	2003	2020
TechTrends	431	2000	2020
TESOL Quarterly	877	1981	2020
The International Review of Research in Open and Distributed Learning	1,054	2000	2020
The Journal of Higher Education	81	2015	2020
The Review of Higher Education	50	2015	2020
The Turkish Online Journal of Educational Technology	1,643	2008	2017
Theory Into Practice	643	1980	2020

Our independent citation variables consisted of two variations of the citation count metric provided by Scopus: (a) raw citations and (b) citations per year. Raw citations represented the total number of times that an article had been cited in its entire lifespan. As one might expect, these counts were somewhat influenced by publication date because it takes time for articles to be read and cited in subsequent publications, meaning that articles published earlier in a given year might exhibit a citation advantage over articles published later in the same year (see Figure 1). For this reason, we also recoded raw citation counts as citations per year by multiplying the citation count by 365 and dividing this value by the number of days that had elapsed since the article had been published (see Figure 2). This recoding helped control for elapsed time but also revealed a general positive relationship between year published and citations per year, suggesting that more recent articles were being cited at a higher rate than their predecessors. Uncertain of which of these two metrics would be the most reliable for accounting for complexities of time, we constructed separate models for each to see if results converged to tell a similar story.

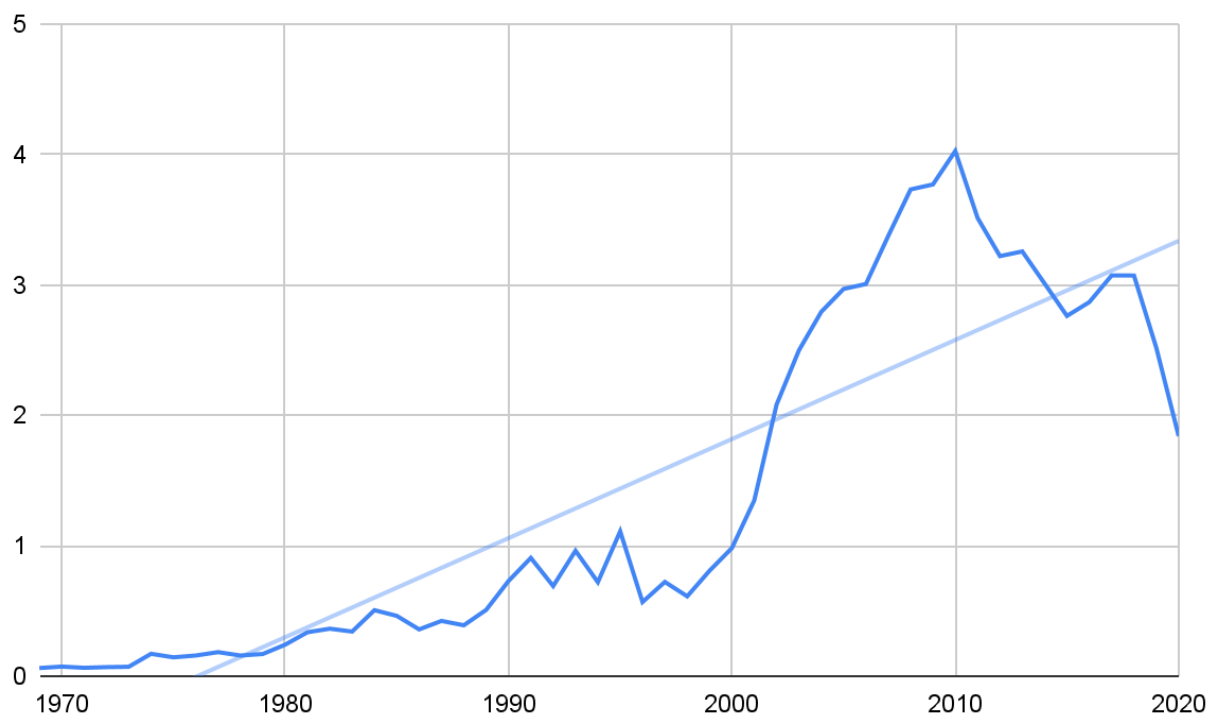
### Figure 1

*Average Article Raw Citations by Year Published ( $R^2 = 0.28$ )*



**Figure 2**

*Average Article Citations per Year by Year Published ( $R^2 = 0.78$ )*



Independent article features included the following six variables:

- Title Character Count: The number of characters (i.e., numbers, letters, or punctuation) in the article's title (see Table 2 for descriptives).
- Title Colon: Whether the title included a colon, thereby suggesting the presence of a subtitle (0 = no colon [n = 27,921] and 1 = colon present [n = 23,336]).
- Abstract Reading Difficulty: The Flesch-Kincaid Reading Ease score for the article's abstract (0 = very difficult to read and 100 = very easy to read; see Table 2 for descriptives).
- Abstract Reading Time: The predicted number of seconds needed for the average adult to read the abstract as calculated on a range from 150 words per minute for a Reading Ease score of 0 to 300 words per minute for a score of 100 (see Table 2 for descriptives).
- Abstract Word Count: The number of words in the abstract (see Table 2 for descriptives).
- Open Access: Whether the article was marked as released under an open access agreement (0 = non-open access [n = 44,663] and 1 = open access [n = 6,618]).

**Table 2**

*Descriptives of Continuous Variables*

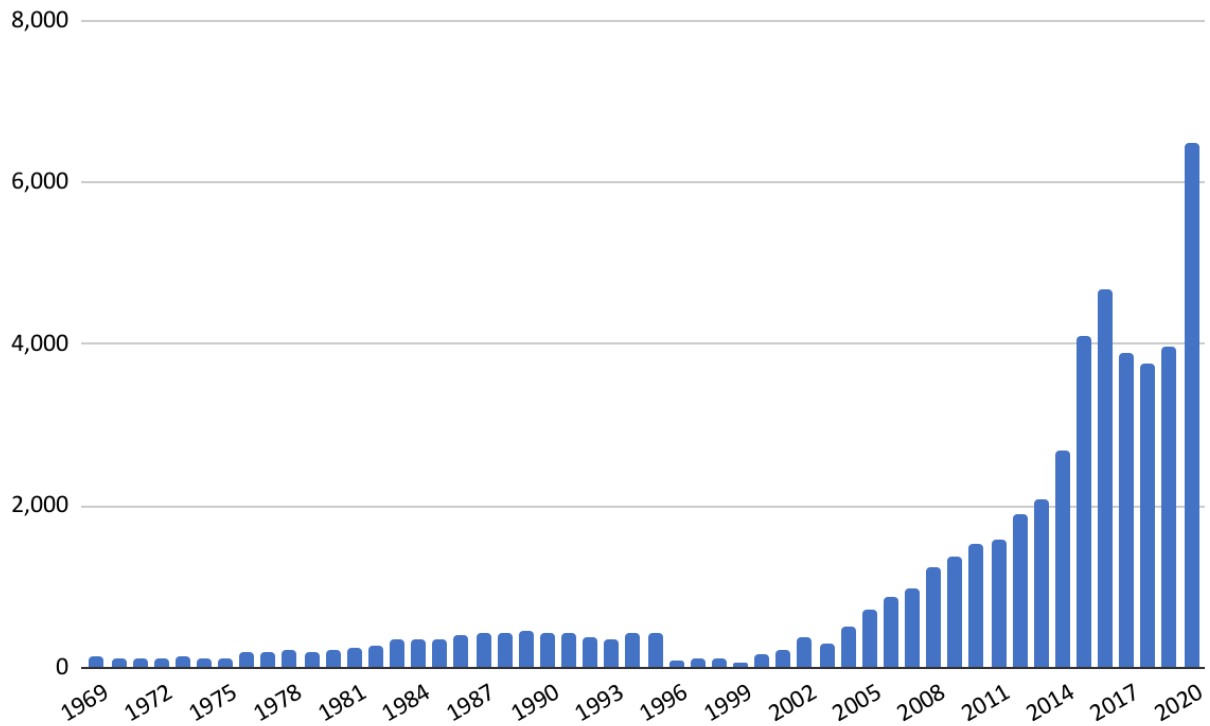
	Mean	SD	Min	Max
Title Character Count	92.107	30.990	6	255
Abstract Reading Ease	24.349	13.551	0	100
Abstract Reading Speed	52.755	20.434	1	459
Abstract Word Count	161.918	60.874	4	1,289

A year covariate was also included to better control for time-based effects on citation counts. Annual totals of articles revealed a general upward trend in article volume with a few notable exceptions between 1996 and 2003 (see Figure 3). The increase in article volume overall was likely due to more journals releasing online versions over time since the early 2000s (and thereby increasing the number of articles that could be published without the cost prohibitions of a paper-based medium), but it was unclear to us why a dip occurred in 1996. Nonetheless, we did not expect these variations in volume to impact results in a meaningful way but used year as a covariate to ensure that historical or other anomalies in the data would be accounted for. Furthermore, our models were constructed using M+ software, which preferred for these values to be normalized to small integers for greater ease in interpreting Betas and other values (e.g., 2012 = 2.012).

And finally, recognizing (a) that journals that have been publishing longer were being cited more on average than younger journals and (b) that journals that have been publishing longer had a lower percentage of open access articles, we also used the longevity of the journal as an additional covariate for our analysis. This further helped to control for journal characteristics outside the control of individual article authors that might be influencing citation counts, such as the perceived prestige of the journal in the field.

**Figure 3**

*Distribution of Included Articles by Year*



## Results

Results indicated overall significant (but weak) effects on both raw citations ( $R^2 = 0.022$ ,  $p < .01$ ; see Table 3) and citations per year ( $R^2 = 0.054$ ,  $p < .001$ ; see Table 4). For raw citations, the model showed that articles would be cited more if their authors (a) shortened the title, (b) made the abstract more technical, (c) lengthened the abstract, and (d) included a colon in the title. For citations per year, the model showed that articles would be cited more if their authors (a) made the abstract more technical and (b) included a colon in the title. Furthermore, the size of the dataset allowed us to detect significant effects that had relatively small effect sizes, so the fact that reading time and open access status did not affect either result is also noteworthy.

**Table 3**

*Article Feature Effects on Raw Citations*

	Estimate	S.E.	Est./S.E.	Two-Tailed $p$ Value
Model R-Square	0.022	0.008	2.624	0.009**
Title Character Count	-0.044	0.012	-3.71	0.000***
Title Colon	0.039	0.009	4.414	0.000***
Abstract Reading Ease	-0.117	0.02	-5.898	0.000***
Abstract Reading Time	-0.12	0.056	-2.15	0.032
Abstract Word Count	0.152	0.051	2.987	0.003**
Open Access	-0.023	0.018	-1.262	0.207
Year Covariate	-0.056	0.041	-1.373	0.17
Journal Longevity	0.075	0.039	1.926	0.054

**Table 4***Article Feature Effects on Citations per Year*

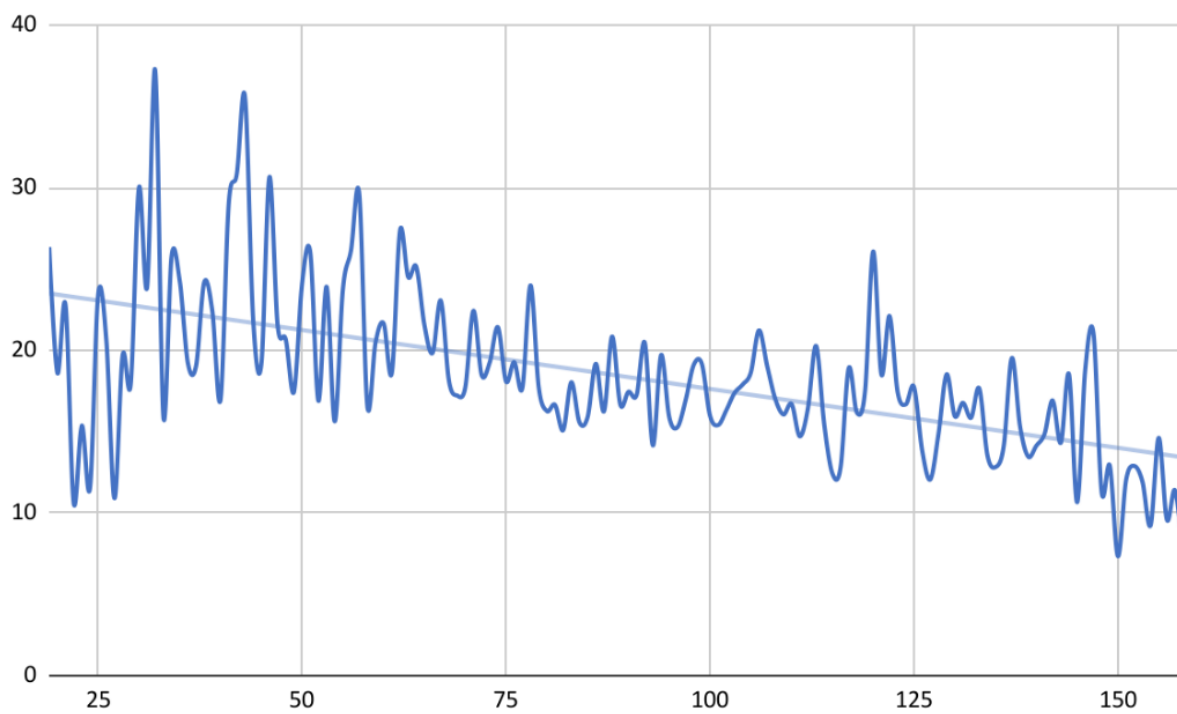
	Estimate	S.E.	Est./S.E.	Two-Tailed <i>p</i> Value
Model R-Square	0.054	0.013	4.079	0.000***
Title Character Count	-0.023	0.013	-1.802	0.071
Title Colon	0.045	0.008	5.813	0.000***
Abstract Reading Ease	-0.062	0.02	-3.026	0.002**
Abstract Reading Time	0.027	0.061	0.447	0.655
Abstract Word Count	0.03	0.056	0.54	0.589
Open Access	0.001	0.021	0.051	0.959
Year Covariate	0.175	0.024	7.375	0.000***
Journal Longevity	0.164	0.048	3.41	0.001**

## Discussion

### Titles

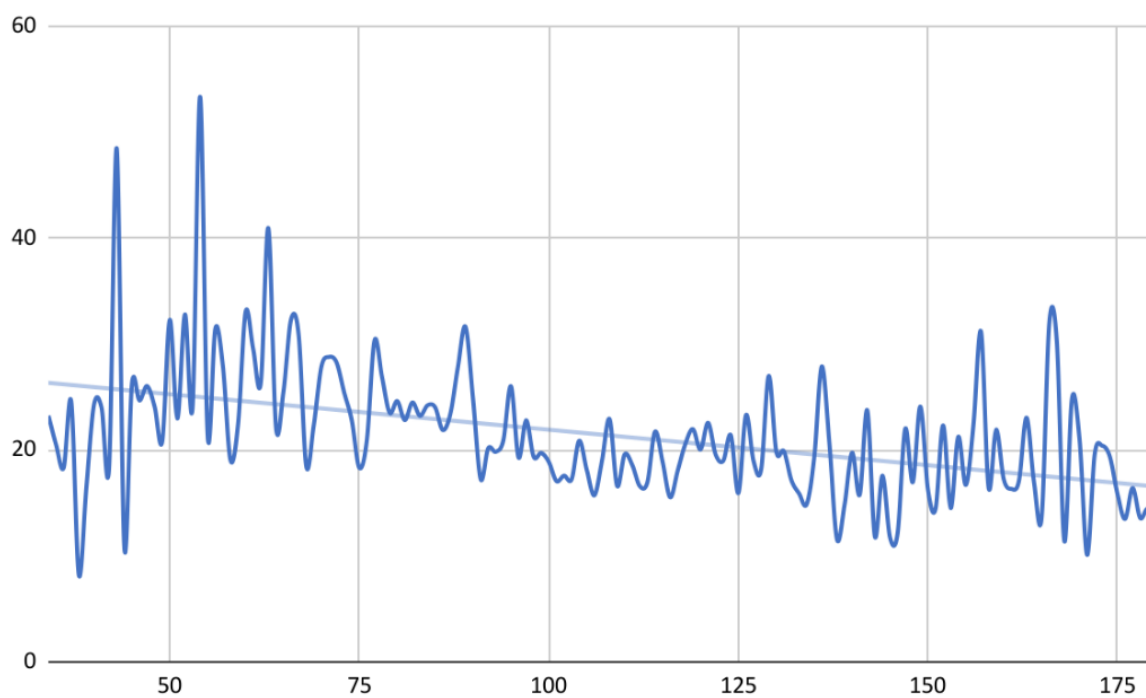
Shorter titles were more likely to be cited than longer titles, but the inclusion of a colon (typically used in longer titles) also had a positive effect. This suggests to us that when writing titles, subtitles can be useful for improving citations but that authors should practice parsimony in the length of both the title and the subtitle. For articles without a colon in the title, there seems to be a Goldilocks zone of between 30 and 50 characters or 5 to 9 words for optimal length (see Figure 4). For articles with a colon, the Goldilocks zone appears to be slightly higher, between 40 and 70 characters or 7 to 12 words (see Figure 5).

**Figure 4***Distribution of Average Citations by Title Length for Articles without Colons*



**Figure 5**

*Distribution of Average Citations by Title Length for Articles with Colons*



## Abstracts

Contrary to our assumption, reading ease had a negative effect on citations. This was surprising because we assumed that if an abstract was more readable and less esoteric that people would be more likely to cite it. The opposite result, however, suggests that more technical abstracts yield greater citations. This might be the result of greater specificity provided in abstracts, or it might be due to certain topics or methodologies that rely upon long words with many syllables being cited more often, such as studies that rely upon advanced statistical procedures like “hierarchical linear modeling.” It could also mean that articles are often cited based on the content of their abstracts and that leaner abstracts do not provide other authors with enough information to warrant a citation. We do not take this result to mean that authors should attempt to make their abstracts intentionally difficult to decipher, but it does suggest that including technical language and detail in abstracts might be beneficial. Couple this with the positive effect that abstract length had on raw citations and the lack of effect that reading time had on citations, and the takeaway seems to be that more detail in abstracts is a good thing.

## Open Access

Contrary to previous studies seeking to understand open access effects on citation counts, we did not detect an open access bump. At least two possible explanations exist for this discrepancy: time and context. Regarding time, many studies exploring the open access topic have restricted their analyses to relatively short timeframes, suggesting that there may be an initial open-access bump to citations but that this advantage might fade over time. In addition, the context of most studies in this realm has focused on the natural sciences, and it may be that education or the social sciences more broadly exhibit different citation patterns than other fields.

## Conclusion

Results from our analysis reveal that some education research article features have significant (though relatively small) effects on citation counts. Notably, articles are most likely to be cited if (a) their titles include a semi-colon-designated subtitle, (b) their titles are 7 to 12 words in length, (c) their abstracts are longer, and (d) their abstracts include technical language.





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# Appendices

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## About this Book

This book was written as a class project in IP&T 510: Introduction to Academic Writing at Brigham Young University. The course was taught by Dr. Royce Kimmons in Spring 2021. Dr. Kimmons provided trends data to students who then self-organized into teams and wrote synthetic histories for each subdiscipline. Submissions were then reviewed by external reviewers and thoroughly edited by Julie Irvine and Dr. Kimmons. The resulting book was then published in Fall 2021 under an open license.



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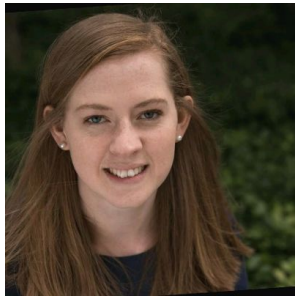
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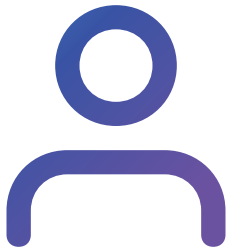
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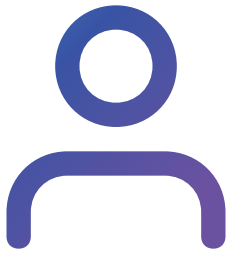
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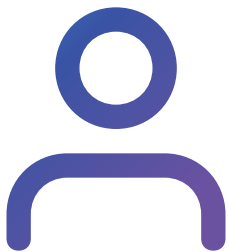
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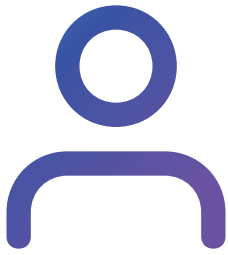
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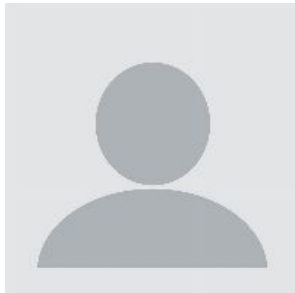
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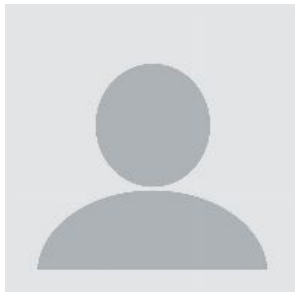
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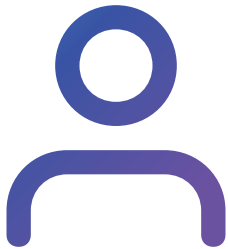
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# Journal List

## Teaching and Teacher Education

**Table 1**

*Teaching and Teacher Education Journals Included in the Study*

Journal Title	ISSN(s)
Australian Journal of Teacher Education	1835-517X
Cogent Education	2331-186X, 2331-186X
English Language Teaching	1916-4742, 1916-4750
English Language Teaching Journal	1477-4526, 0951-0893
European Journal of Teacher Education	0261-9768, 1469-5928
International Journal of Instruction	1694609X, 13081470
Journal of Adolescent & Adult Literacy	1936-2706
Journal of Educational Research	0022-0671, 1940-0675
Journal of Mathematics Teacher Education	1573-1820, 1386-4416
Journal of Science Teacher Education	1046-560X, 1573-1847
Journal of Teacher Education	0022-4871, 1552-7816
Professional Development in Education	1941-5257, 1941-5265
Reading Research Quarterly	1936-2722
Teachers and Teaching	1354-0602, 1470-1278
Teaching and Teacher Education	0742-051X
Teaching in Higher Education	1356-2517, 1470-1294
Technology, Pedagogy and Education	1475-939X, 1747-5139
TESOL Quarterly	1545-7249

Journal Title	ISSN(s)
The Reading Teacher	1936-2714
Theory Into Practice	0040-5841, 1543-0421

## Educational Technology

**Table 2**

*Educational Technology Journals Included in the Study*

Journal Title	ISSN(s)
Australasian Journal of Educational Technology	14495554
British Journal of Educational Technology	14678535
Computer Assisted Language Learning	09588221
Computers & Education	03601315
Education and Information Technologies	
Educational Technology & Society	1436-4522, 1176-364
Educational Technology Research and Development	
IEEE Transactions on Learning Technologies	19391382
Interactive Learning Environments	1049-4820, 1744-5191
International Journal of Artificial Intelligence i...	15604306
Internet and Higher Education	10967516
Journal of Computer Assisted Learning	1365-2729
Journal of Educational Computing Research	15414140
Language Learning & Technology	10943501
Learning, Media and Technology	17439892
TechTrends	1559-7075, 8756-3894
The International Review of Research in Open and D...	14923831
The Turkish Online Journal of Educational Technolo...	13036521

## Educational Psychology

**Table 3**

*Educational Psychology and Counseling Journals Included in the Study*

Journal Title	ISSN(s)
Education and Urban Society	0013-1245, 1552-3535
Educational Administration Quarterly	0013-161X, 1552-3519
Educational Assessment, Evaluation and Accountabil...	1874-8600, 1874-8597
Educational Leadership	0013-1784
Educational Management Administration & Leadership	1741-1432, 1741-1440
Educational Policy	08959048, 15523896
Improving Schools	1365-4802, 1475-7583
International Journal of Educational Management	0951-354X
International Journal of Leadership in Education	1360-3124, 1464-5092
Journal of Education Policy	0268-0939, 1464-5106
Journal of Educational Administration	0957-8234
Journal of School Choice	1558-2159, 1558-2167
Journal of School Leadership	1052-6846
Leadership and Policy in Schools	1570-0763, 1744-5043
Management in Education	0892-0206, 1741-9883
Phi Delta Kappan	0031-7217, 1940-6487
Professional Development in Education	1941-5257, 1941-5265
School Effectiveness and School Improvement	0924-3453, 1744-5124
School Leadership & Management	1363-2434, 1364-2626
The Clearing House: A Journal of Educational Strat...	0009-8655, 1939-912X

## Higher Education

**Table 4**

*Higher Education Journals Included in the Study*

Journal Title	ISSN(s)
British Journal of Educational Psychology	0007-0998, 2044-8279
Contemporary Educational Psychology	0361-476X

Journal Title	ISSN(s)
Contemporary School Psychology	2161-1505, 2159-2020
Counselor Education and Supervision	1556-6978
Educational Psychologist	0046-1520, 1532-6985
Educational Psychology	0144-3410, 1469-5820
Educational Psychology Review	1040-726X, 1573-336X
Journal of Counseling & Development	1556-6676
Journal of Counseling Psychology	0022-0167, 1939-2168
Journal of Educational Psychology	0022-0663, 1939-2176
Journal of Psychoeducational Assessment	0734-2829, 1557-5144
Journal of School Psychology	0022-4405, 1873-3506
Learning and Individual Differences	1041-6080
Learning Disability Quarterly	0731-9487, 2168-376X
Psychology in the schools	1520-6807
School Psychology International	0143-0343, 1461-7374
School Psychology Quarterly	2578-4218
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