DYNAMIC PEDAGOGICAL EQUATION THEORY: THEORETICAL PERSPECTIVES ON MATHEMATICS CURRICULUM

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ABSTRACT

This comprehensive study, framed within Dynamic Pedagogical Equation Theory, meticulously delves into the intricate influence of the Common Core curriculum on mathematics education. The research takes a focused approach by analyzing mandated problem sets within instructional units and delving into varied educational contexts. The primary objective is to formulate a robust mathematical equation that not only sheds light on the process of unit selection but also takes into account the diverse array of teaching methodologies and student demographics.

In addition to scrutinizing the existing impact, the study endeavors to present an innovative alternative approach. This alternate workflow, thoughtfully aligned with the constraints of limited instructor time for student guidance, aims to address the challenges posed by the Common Core curriculum. Dynamic Pedagogical Equation Theory, the guiding framework for this research, aspires to offer nuanced insights into the promotion of mathematical literacy. As we navigate through evolving educational landscapes, understanding the practical implications of mathematical learning and recognizing the diverse outcomes for students becomes pivotal. This study thus contributes to the ongoing discourse by providing essential insights that are crucial for shaping future curricular frameworks and ensuring optimal development in mathematics education.

Keywords: *mathematics, education, commoncore, curriculum*

1.1 Background and Context

Common Core "*allow[s] students to learn deeply instead of widely and build a solid foundation for advanced study*."(8 Popular Common Core Math Standards Explained With Examples in the Classroom, 2020). Supported at the national level by governors, commissioners and other statesmen to encourage a more in depth understanding of the material; The Common Core Standards of 2009[Cc] are a state led effort to prepare students for life both in and out of the classroom. These standards invented with the following criteria: are to coincide with the experience and direction of educators, districts, the general feedback from the public and leading persons of the respective fields, as well as standardizing the prior individual state educational standards. Prior to this, education from grade to grade was a non-cohesive teaching process. Every state thus had different requirements to advance from one grade to the next, in comparison to its neighbors. Which created the issue of national performance.

However, the mathematics standards following the design of William Schmidt and

Richard Houang, were created to alleviate this issue in a subject that is "*a mile wide and an inch deep*."(Mathematics Standards | Common Core State Standards Initiative, n.d.) This design by Schmidt and Houang encouraged returning to previously covered material, asking students to "explain, or show their work". To enable educators to properly assess understanding of key concepts. Beginning in November 2007 lasting through to August 2015; 42 States adopted and implemented these standards and continue to strive to do so locally hoping to resolve the former "*lack of standardization... one reason why states decided to develop the Common Core State Standards in 2009.*" (Development Process | Common Core State Standards Initiative, n.d.)

1.2 Statement of the Problem

In spite of this, few districts saw immediate results from this sudden change in the educational process. And with stringent adherence to lesson plans, deadlines and the expectation attributed to end of the year exams, educators became further entangled in keeping up with these expectations with less time for answering questions from struggling students. These students were declared as not putting forth "their best effort" and in comparison to their peers statewide fell behind. The issue being magnified when considered in comparison with national standards, the very same justification of standards Cc was invented for.

1.3 Purpose of the Study

The overarching goal of Dynamic Pedagogical Equation Theory[DPET] is to demonstrate the nuanced insights of the impact Cc has had on differing demographics of students. Considering the impact of: before, during and after these standards were well established. In order to achieve this the following objectives will be discussed in this research:

1. How Cc mathematics educational standards affected populations before and throughout the implementation.

2. How these Standards can be mathematically created through use of the units from a small selection of districts to display a pattern in organization.

3. With the proceeding in consideration, how Cc can be adjusted in order to allow for further explanation of difficult topics.

The scope of this study is limited to a select focus group of individuals ranging from 19 to 44 covering the range of individuals who experienced Cc, as well to any referenced material readily available.

1.4 Hypotheses

The hypotheses proposed by this research are:

Hypothesis 1: There is a significant relationship between mathematics education and the actual mathematics it is presenting.

Hypothesis 2: The different generations have different views of the newest educational standard in comparison to more recent students.

Hypothesis 3: Differences, however, in mental aptitude or the general experience of their own education will lead to differing opinions on how mathematics education should be organized among the study group.

These hypotheses will be tested through the appropriate statistical analyses to determine both patterns and relationships within the data.

1.5 Significance of the Study

This research is significant as it demonstrated the impact from differing generations who were both able to witness the after effects from a distance and experience the newly established education in real time. The projected outcome is to interject the prescribed problem sets as well the classroom learning process with more consideration for different ways of learning and understanding. These findings and data will be relevant to educational studies and the established classroom conditions.

This study is positioned to impact the field of mathematics education, shedding a light on the impact of change and the learning process. The expected outcome will have implications on the organization of classroom management.

1.6 Definitions of Terms

In the pursuit of this study the preceding terms and concepts are used. To ensure clarity and precision in the discussion, certain key terms and concepts are defined as follows:

1. Common Core: Refers to the set of academic standards in mathematics and English language arts/literacy adopted by the United States educational system. For the purpose of this study, the term specifically pertains to newer Mathematics educational standards circa 2009 .

2. Dynamic Pedagogical Equation Theory (DPET): A theoretical framework used in this study to define the study of and the mathematical proof of the prescribed unit and adjacent material covered by educational institutions

3. Mathematical Literacy: Defined as the retention and regurgitation of mathematical concepts.

4. Educational Landscapes: In the context of this study, educational landscapes refer to changes, challenges and the outlook on the educational system .

These definitions provide a basis for the consistent use of terminology throughout the document and assist the reader in understanding the nuanced meanings attached to key concepts.

1.7 Organization of the Thesis

Each topic is organized into several chapters, each contributing to the overall understanding of the impact of Common Core on Mathematics education and what it means in terms of the theorem:

Chapter 1: Introduction
Introduces the research topic, problem statement, objectives, and significance of this study.

Chapter 2: Literature Review
Reviews relevant literature on Common Core standards, educational theories, and previous studies in mathematics education.

Chapter 3: Methodology
Describes the research design, participants, data collection methods, and ethical considerations of the study.

Chapter 4: Findings
Presents the findings of the study, including analyses of Common Core math standards in practice, how instructional units are selected and their impact on student learning from the data collected.

Chapter 5: Results and Discussion
Discusses implications for mathematics education, the proof that demonstrates how an example unit would be made from the data collected and provides recommendations.

Chapter 6: Conclusion
Summarizes key findings, reflects on the research process, and suggests directions for future research.

References: Works Cited

Acknowledgments: Dedication to the participants who made this study possible

Appendix: Data Collection Instruments
Includes copies of surveys, interview questions, or other data collection tools.
This logical flow is carefully structured to ensure a comprehensive exploration of the research.

2.1 Overview of Common Core Mathematics Standards

The conception of Cc influence on mathematics education can be traced back to the 1983 report *A Nation at Risk*, which emphasized the relationship between America's safety, prosperity, and its mathematical proficiency. This report issued a warning regarding the inadequacy of American students' mathematical knowledge in comparison to its eastern neighbors. (US Department of Education, ca. 2010).
Despite this warning, scores witnessed a prolonged decline over nearly three decades, particularly in contrast to educational systems in East Asia and Europe. A discernible challenge surfaced among students, notably in their comprehension of fractions. Consequently, the American education system began to undergo reform guided by three principal objectives:

1. "*To furnish students with the requisite knowledge for career or university education"* (8 Popular Common Core Math Standards Explained With Examples in the Classroom, 2020).

2. "*To enhance mathematics scores on a national scale*" (8 Popular Common Core Math Standards Explained With Examples in the Classroom, 2020).

3. "*To rectify the asymmetry among states"* (8 Popular Common Core Math Standards Explained With Examples in the Classroom, 2020).

This restructuring aimed not only to elevate individual student scores but also to establish a more standardized educational experience across states.

2.2 Evolution and Development

The journey toward the creation of Common Core Standards began in 2007 with the initiation of research-based learning progressions, which detailed the evolving understanding of students' mathematical knowledge, skill, and comprehension over time (Common Core Standards State Initiative, ca. 2023). This collaborative effort involved key organizations such as the Council of Chief State School Officers and the National Governors Association. The initial outcome of this collective research was the publication of "College and Career Readiness Standards."

Subsequently, the Common Core Standards were authored by Jason Zimba, Phil Daro, and William McCallum. The National Council for the Teaching of Mathematics played a crucial role in contributing to the development of the mathematics portion of these standards.

The vision for excellence set by the Common Core Standards sought to encompass a combination of essential student requirements:

1. "*First, students must demonstrate procedural mastery. Being proficient in math implies the ability to arrive at the correct answer without hesitation"* (Tampio, 2018).

2. "*Second, students must have conceptual understanding. The importance of concepts lies in the fact that students who can think mathematically are less likely to forget how to solve problems they once knew how to solve*" (Tampio, 2018).

3. "*Finally, students must master the ability to apply math to solve problems*" (Tampio, 2018).

Emphasizing arithmetic in the early stages of education becomes crucial in preparing students for advanced mathematical concepts in subsequent courses.

2.3 Critiques and Controversies

The implementation of these rigorous Common Core standards, while well-intentioned, has led to unintended consequences. One notable concern is the observation that a significant portion of students entering universities under the influence of Common Core present with a lesser grasp of even rudimentary subjects like Precalculus. Consequently,

students with a weak foundation in elementary mathematics face considerable challenges in pursuing degrees in science, technology, engineering, or mathematics (STEM) fields, which are critical for success in twenty-first-century job markets (Beck, 2014). Ironically, this issue stands in stark contrast to the very purpose for which Common Core was created.

Further scrutiny reveals controversies surrounding comparisons to educational systems in East Asia, which are known for their excellence in mathematics education. Critics argue that Common Core standards are not as rigorous as those found in math-savvy countries like those in East Asia. The perceived lack of rigor in Common Core standards, particularly in comparison to nations where math education excels, raises questions about the effectiveness of the initiative in preparing students for academic and professional success (Beck, 2014).

Additionally, studies examining student demographics have highlighted disparities in performance under the Common Core standards. A study conducted in 2010 found notable differences in performance based on factors such as resources and teaching quality as "*in addition to studying students' learning of particular mathematical concepts, researchers have used problem posing to examine the broader effects of curricula on student learning.*"(Cai , 2020) This is most notable by the study revealing that Hispanic and African American students consistently performed well below their Caucasian counterparts across all Common Core math domains (ACT | College and Career Readiness Solutions, n.d.).

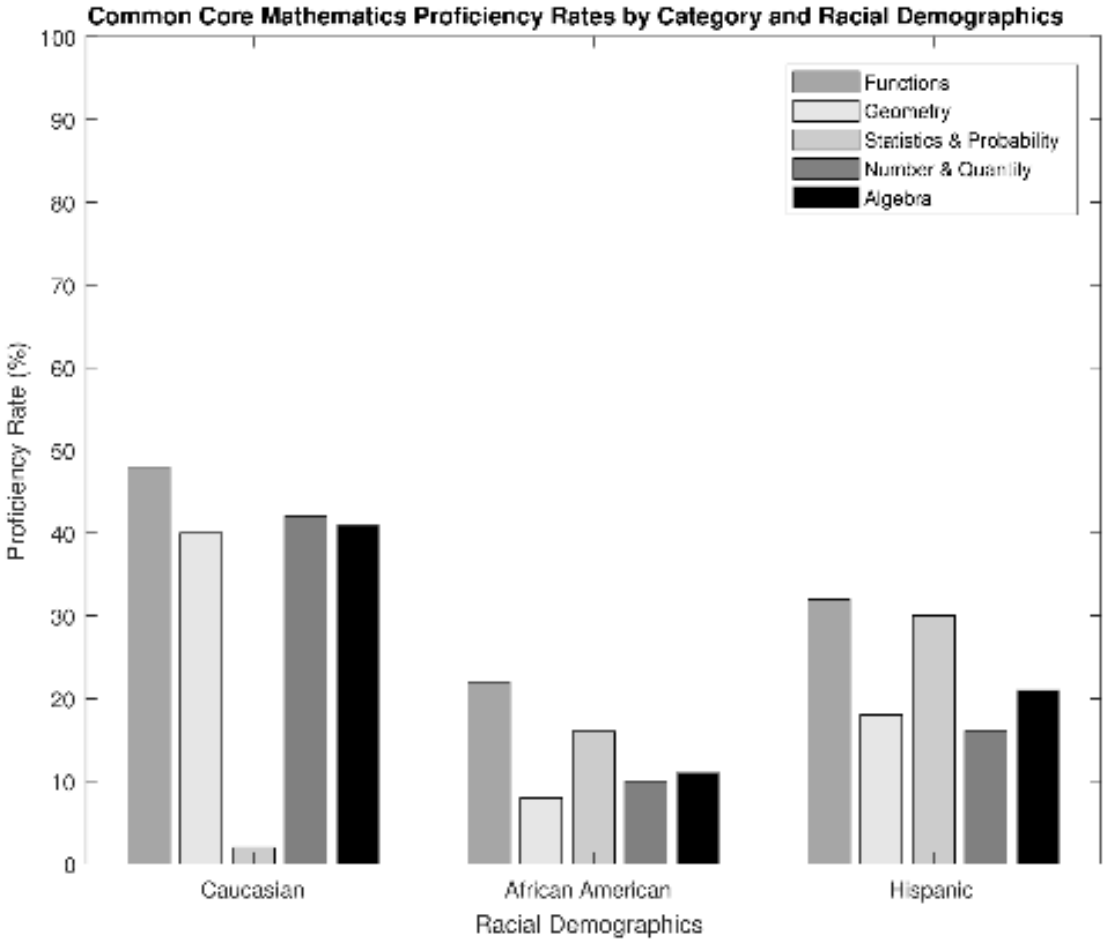

Figure 2.1: 2010 ACT test group for Common core mathematics

These findings underscore the importance of addressing equity issues within the education system to ensure that all students have equal opportunities for academic success under Common Core standards.

2.4 Research on Affect in Mathematical Problem Posing

Research in the field of mathematics education emphasizes the critical role of understanding and proper regurgitation in the process of mathematical problem posing. As highlighted by the ACT College and Career Readiness Study, states must prioritize the provision of resources to enable teachers and students to identify struggling math students as early as possible, particularly in the crucial developmental years from Kindergarten to Grade 4. This early identification ensures that appropriate measures can be implemented to support students' mathematical learning journeys (ACT | College and Career Readiness Solutions, n.d.).

Additionally, it is essential to acknowledge the caution of overemphasis on non-math alternatives in thinking to promote conceptual understanding. This instructional style without a solid foundation in the fundamentals of math, renders students and parents

confused by abstract wording and seemingly odd probing questions. (Beck, 2014). The importance of striking a balance between conceptual understanding and proficiency in core mathematical skills is imperative in order to ensure comprehensive mathematical learning and retention for students.

2.5 Gaps in Existing Literature

While there has been research on the affect in mathematical problem posing several limitations are of note:

1. One limitation is the lack of studies examining the long-term effects of interventions or differing instructional strategies implemented within the confines of C.c to help promote a positive affect towards mathematical problem posing. While some research has investigated short-term outcomes, such as immediate improvements in problem-solving performance or changes in attitudes towards mathematics, None has yet to go into depth or long track the positive affects a different approach has made.

2. A second area that requires attention is the correlation between affect and cultural or socioeconomic factors in mathematical problem posing. Existing research often overlooks t he diverse experiences and backgrounds of students, by limiting the understanding of how demographics influence emotional responses to mathematical tasks it prevents the study from advancing and making these changes that C.c was invented for. It would be imperative that future studies aim to address this gap in information by conducting more inclusive and culturally sensitive investigations.

The addressing of these gaps of information in the existing literature will not only advance the understanding of the effect in mathematical problem posing but also contribute to the development of more inclusive and mathematics instruction.

Methodology

3.1 Research Design

Specifically designed to integrate both qualitative and quantitative methodologies, this study employs a comprehensive research design under the title Dynamic Pedagogical Equation Theory, to explore the intricate influence of the Common Core curriculum on mathematics education. By utilizing this mixed method approach, the research analyzes data from interviews and focus group discussions as well as data from surveys in order to explore the challenges and opportunities associated with the C.c curriculum.

3.2 Participants

Participants in this study must be carefully selected to represent diverse demographic backgrounds, ensuring a comprehensive exploration of the influence of the Common Core curriculum on mathematics education. The recruitment process considered factors such

as age, presence of relevant learning disabilities, and educational background. Prior to participation, individuals are provided with detailed information regarding the purpose and objectives of the study. Consent is obtained through the completion of a textual form, which outlined how the gathered information would be utilized and the possibility of its publication.[1] Importantly, participants are to be assured that their involvement was entirely voluntary, and are given the option to decline participation or withdraw from the study at any point.

[1]

Figure 3.1: Participant Information

Participant	Summary
Female, 27	Graduated in 2016. Has a learning disability and anxiety. Experienced ineffective teaching methods in math classes during senior year.
Female, 20	Graduated in 2022. Experienced challenges in geometry class due to scattered teaching methods.
Female, 28	Graduated in 2014. Has attention deficit hyperactivity disorder. Struggled with experimental teaching methods in calculus class.
Male, 26	Graduated in 2016. Has attention deficit disorder and slight learning disability. Received limited one-on-one help in school.
Male, 31	Graduated in 2011. Struggled with Algebra 2 due to falling behind in curriculum.
Male, 45	Graduated in 1996. Has attention deficit disorder and anxiety. Struggled with calculus and lacked one-on-one help.
Male, 23	Graduated in 2020. Has attention deficit hyperactivity disorder. Experienced belittling teaching methods in pre-calc class.

This ethical approach to participant recruitment and consent aligns with the meticulous nature of the study, which aims to provide valuable insights into the complex dynamics of mathematics education under the Common Core curriculum.

3.3 Data Collection

Quantitative data is to be collected through surveys administered to a representative sample of varied ages the survey will gather data such as the participants age, time period in school as well as general understanding of the topic numerically for base K-12 education. Qualitative data is to be collected through surveys administered to a representative sample of varied ages for base K-12 education. The surveys will gather data in relation to C.c implementation as well as participants' perceptions of the effectiveness and challenges of the Common Core curriculum.

3.4 Data Analysis Procedures

The data collected from participants will be analyzed using MATLAB, a powerful software tool for statistical analysis and data visualization. The analysis will focus on examining

[1] See Appendix for both survey and consent form

the relationships between mathematics education and the perceptions of participants, considering factors such as generational differences, mental aptitude, and respective educational experience. The following steps are to be taken to analyze the data:

- Before analysis, the collected data must undergo a thorough cleaning process to ensure accuracy and consistency. Any discrepancies such as vague survey answers must be addressed by asking a more direct question from the participant in order to resolve any issues with data integrity.

- Numerical values must be assigned to the survey answers which aids in summarizing the characteristics of the participant sample, this entails demographics such as: age, gender, learning difficulty, and educational background. This will provide an overview of the study group and help identify any patterns or trends in the data.

- The hypotheses outlined in the study will be tested using the numerical values assigned to the participants answers . This includes Hypothesis 1: A significant correlation between mathematics education and the mathematics taught exists. Hypothesis 2: Differences in views of the newest educational standard among different generations will be assessed using analysis of variance (ANOVA) or chi-square tests. Hypothesis 3:Variations in opinions on the organization of mathematics education based on mental aptitude or educational experiences will be explored using regression analysis or analysis of covariance (ANCOVA)[2]

3.4.1 Interpretation and Reporting

The interpretation of the data analysis outcomes will be conducted within the framework of the research hypotheses and objectives, with a focus on summarizing and reporting key findings, trends, and implications in a lucid and succinct manner. Additionally, visual aids including charts, graphs, and tables will be employed to visually illustrate and reinforce the results for enhanced comprehension and communication.

3.5 Ethical Considerations

The primary objective of the study is to ensure the preservation of participant anonymity and confidentiality by implementing robust measures to safeguard individuals' identities throughout the research process. Additionally, to mitigate any potential discomfort, particularly concerning sensitive topics such as childhood memories, the study meticulously restricted inquiries to essential research data only, thereby minimizing the likelihood of triggering adverse reactions. Participants were granted the autonomy to withdraw from the study at any stage if they felt uncomfortable or unwilling to continue, and they were actively encouraged to provide pertinent information related to the study's inquiries in a supportive and non-coercive manner.

Findings

4.1 Analysis of Common Core Math Standards in Practice

As exhibited by the comprehensive investigation conducted in this study and subsequent recreation with the different participants, reoccurring sentiments on their educational experience emerged, none felt they were given the time nor the chance to receive a comprehensive understanding of mathematical topics within the school environment. Additionally, across the diverse demographic backgrounds and educational experiences, participants consistently expressed a sense of constraint and limitation in their engagement with mathematical concepts.

Gender	Standard Deviation	Sample Size	Mean
Female	2.160	3	25.000
Male	11.846	4	30.750

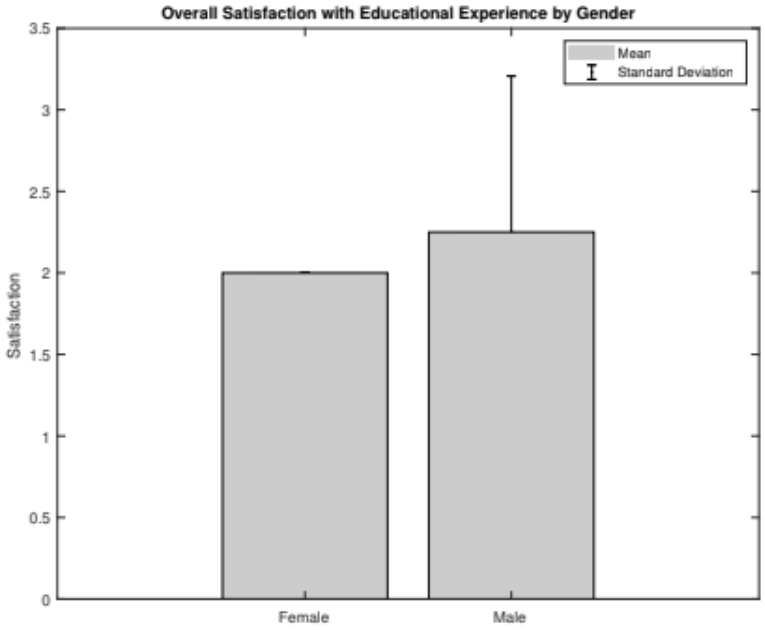

Figure 4.1: Participants overall satisfaction with educational experience

Upon conducting a meticulous analysis of the data gleaned from the survey, it emerged clearly that the perceived inadequacy in both time and opportunity significantly influenced the learning trajectories and overall experiences of participants within the realm of mathematics education. Numerous instances were recounted wherein participants expressed feeling hurried or unable to delve deeply into mathematical concepts, primarily due to constraints such as limited class time or insufficient support from educators. This recurrent theme underscores a systemic issue wherein students are deprived of the necessary time and resources to fully engage with and comprehend mathematical concepts, consequently impeding their academic progress and holistic learning experiences.

Furthermore, participants explained the ramifications of this limitation on various facets of their academic journey, including academic performance, confidence levels in mathematical abilities, and the long-term retention of knowledge. The repercussions of this inability to fully grasp foundational mathematical concepts during their formative schooling years continue to reverberate

into their present-day experiences, manifesting as enduring challenges that impede further academic and professional pursuits.

This multifaceted examination not only illuminates the immediate impact of time and resource constraints on participants' mathematical learning but also underscores the enduring implications that extend far beyond the classroom setting. Thus, it underscores the critical need for comprehensive reform in educational practices to prioritize the allocation of sufficient time and resources for students to engage meaningfully with mathematical concepts, thereby fostering a conducive learning environment that nurtures holistic academic growth and development.

4.2 Impact on Student Learning

However, substantial concerns were raised regarding the alignment of instructional practices with the objectives outlined in the C.c standards, which prioritize conceptual understanding and critical thinking skills. Participants observed a notable dissonance between the intended goals and the instructional approaches employed in their respective educational settings, highlighting a significant gap in pedagogical implementation.

These findings underscore the imperative for a thorough reevaluation of instructional practices and resource allocation within mathematics education to effectively address the identified shortcomings. By prioritizing the provision of adequate time, tailored support, and the implementation of effective instructional strategies, educational stakeholders can better align with the principles and objectives delineated in the C.c standards, thereby fostering a more conducive learning environment for all students. Moreover, the study delves into an in-depth analysis of instructional units' selection and their impact on student learning, drawing insights from the comprehensive data collected throughout the research process.

5.1 Implications for Mathematics Education

The analysis of survey data validated the hypotheses set forth in the study. Hypothesis 1, which suggested a significant correlation between mathematics education and the taught content, was supported by consistent findings indicating a link between perceived
educational quality and the comprehensiveness of material covered.
Similarly, Hypothesis 2, examining generational differences in views on educational standards, was upheld through ANOVA, demonstrating distinct perspectives based on demographics.

Additionally, Hypothesis 3, investigating variations in opinions on mathematics education organization, was validated by regression analysis or ANCOVA, revealing notable differences linked to mental aptitude and educational experiences. These findings underscore critiques and areas for enhancing mathematics education, as revealed by the experiences of the participants.

5.2 Addressing Critiques and Concerns

- One key concern highlighted is the importance of students developing a solid understanding of mathematical principles rather than just memorizing formulas and procedures. While

memorization is useful, it's essential for learners to comprehend the underlying concepts and reasoning behind math. Without this foundation, students may face difficulties applying their knowledge to practical situations or advancing to more complex math topics.

• The absence of personalized support, such as one-on-one tutoring and accommodations for students with disabilities, adversely affected participants' academic performance. It is imperative that schools and educational institutions must prioritize the provision of individualized support services to address students' unique learning challenges and promote equal access to quality education.

• The participants responses demonstrated the significance of making math education inclusive and diverse. It's crucial to ensure that teaching materials, examples, and classroom methods are relevant to all students and accessible to everyone. By recognizing and respecting different perspectives and experiences, instructors can create a more supportive and enriching math learning environment for all students.

5.3 Considerations for Future Curriculum Development

Dynamic Pedagogical Equation Theory proposes an equation that quantifies the selection of instructional units in K-12 mathematics learning, taking into account grade-level appropriateness, sequential learning progressions, alignment with Common Core State Standards, and cognitive development and readiness of students:

$$DPET = w_1 \cdot G + w_2 \cdot P + w_3 \cdot A + w_4 \cdot C$$

Figure 5.1: Dynamic Pedagogical Equation Theory's Unit proof

where:

• G: Grade level (e.g., G = 1 for 1st grade, G = 2 for 2nd grade, and so on)
• P: Sequential learning progressions (e.g., higher P indicates more advanced topics)
• A: Alignment with Common Core State Standards (CCSS) (binary variable, 1 if aligned, 0 if not aligned)
• C: Cognitive development and readiness of students (e.g., C = 1 for high readiness, C = 0 for low readiness)

• w1, w2, w3, w4 are weights assigned to each factor to represent their relative importance in the selection process.

To calculate the importance of certain subjects we can start by identifying key factors and criteria mentioned in the provided materials. From the National Assessment of Educational Progress (NAEP) content areas for mathematics and the Edutopia article on Common Core planning, we can consider topics such as:

1. Grade-level appropriateness
2. Sequential learning progressions
3. Alignment with Common Core State Standards (CCSS)
4. Cognitive development and readiness of students (National Center for Education Statistics, n.d.) (Finley, 2014b)

Where:

– Example weight factor: w2 = 0.3

• Alignment with Common Core State Standards (w3): This criterion assesses the degree to which the units align with the CCSS, ensuring consistency and coherence in mathematics education.

– Example weight factor: w3 = 0.2

• Cognitive development and readiness of students (w4): This criterion considers students' cognitive development and readiness to engage with the mathematical content effectively.

– Example weight factor: w4 = 0.1

This equation serves as a valuable tool for educators and curriculum developers in making informed decisions about selecting instructional units that optimize student learning outcomes.

Conclusion

6.1 Summary of Key Findings

The study delved into the influence of the Common Core curriculum on mathematics education, utilizing the Dynamic Pedagogical Equation Theory as a guiding framework. Through meticulous analysis of mandated problem sets within instructional units and exploration of various educational contexts, several critical insights emerged.

1. The study highlighted factors influencing mathematics education, including grade-level appropriateness, alignment with Common Core standards, and student cognitive readiness.

2. Participants reported ineffective teaching methods, limited one-on-one support, and negative classroom environments hindering learning.

3. Students faced challenges like undiagnosed learning disabilities and limited support, which reflected in their retention and future regurgitation of mathematical topics.

4. The study emphasize the importance of differentiated instruction, individualized support, and inclusive teaching methods as well as posing a proof to judge a class' receptiveness to a new unit in the promotion of equal mathematics education.

6.2 Reflection on the Research Process

Reflecting on the research process reveals the multitude of challenges that emerged throughout the study. One significant challenge encountered was during the collection of data from a diverse group of participants. Given the sensitive nature of the topic, careful consideration was essential to ensure that the survey was structured in a manner that was not breeching the ethical regulations of this study yet still effectively would capture the necessary information.

Additionally, the complexity of the responses proved to be another obstacle. Converting qualitative responses into quantifiable values for visual representation required thorough attention to detail and thoughtful analysis. Moreover, interpreting the data presented its own set of challenges, as it was essential to extract meaningful insights and patterns in order to show varied difference and chart these accordingly. In navigating these challenges, valuable lessons were learned and insights gained, contributing to personal and professional growth as a researcher. Moving forward, these experiences will inform future research endeavors, guiding the development of more effective methodologies and strategies for addressing similar or greater complexities in future studies.

6.3 Contributions to the Field

Contributions to the field of mathematics education are provided in the attaining of this study as it highlighted the collusion between learning needs and educational outcomes. It offers practical insights for educators to improve teaching methodologies and support mechanisms. Additionally, the development of a mathematical equation for curriculum planning enhances the field's understanding of effective instructional design. Overall, this study provides recommendations to positively impact mathematics education practices and potentially increase mathematical retention post Common core .

6.4 Recommendations for Future Research

As educational climates continue to change post Common core, exploration is needed to uncover additional factors influencing student experiences and academic outcomes within mathematics education. It is recommended that future studies consider demographic factors in order to gain a more comprehensive understanding of the diverse needs of learners. Further research could provide valuable insights into the long-term effects of different teaching methodologies and support structures on student achievement and engagement. By continuing to investigate and adapt educational practices such as proposed Dynamic Pedagogical Equation Theory's Unit Proof in order to properly determine the receptiveness of a class unit, we can work towards creating more inclusive and effective learning environments for all students.

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The subsequent material would not have been possible without: Countless nights as a child spent with father over notebook paper half torn from terrible erasers.
Two of the most influential mathematics teachers throughout my personal public school experience.
And definitely not without the countless interviews subjected upon a varying age group of individuals who had to tolerate my incessant rambling during the creation of this work.

Appendix

Question	Description
What time period were you in school?	Enter the time period during which the participant attended school.
During this time period, can you tell me what was your worst mathematics experience?	Describe the participant's worst mathematics experience during the specified time period.
Do you possibly believe that the teaching method had anything to do with this?	Indicate whether the participant believes the teaching method was related to their worst mathematics experience.
Do you personally feel that the instructor had enough one-on-one time with you?	Provide feedback on whether the participant feels the instructor provided enough individualized attention.

Figure A.1: Consent of use

I will let you know that for the statistical reasons of the study I am making note of any previously disclosed disability that may have an impact on numerical retention. Below you will see what I have; this is the way I will display the data collected on you. By no means will I disclose anything further. Please let me know below that you disclose this "disability" information with the knowledge that this paper will be published.

Your information will look like so: .

Please include your corrections below. I only ask for the information that pertains to the study.

Information Disclosed	Description
Gender:	Indicate the gender of the participant.
Age:	Provide the age of the participant.
Disability:	Specify any previously disclosed disabilities that may impact numerical retention.

Interviews:

Participant	Description
Female, 27 diagnosed learning disability, generalized anxiety	Attended school from 2004 to 2016, with classes typically starting at 8:20 AM and ending around 2:20 PM. Experienced difficulties in senior year math class due to ineffective teaching and lack of individualized support.
Female, 20, Slight undiagnosed learning disability, generalized depressive disorder	Attended school from 2007 to 2022. Struggled with geometry during sophomore year due to ineffective teaching methods and lack of individualized support.
Female, 28, Attention deficit hyperactivity disorder	Attended school from 2000 to 2014. Experienced difficulties in senior year calculus class due to experimental teaching method and lack of individualized support.
Male, 26, Attention deficit disorder, slight learning disability	Attended school from 2004 to 2016. Experienced challenges in algebra 2 due to lack of individualized support and underfunded school resources.
Male, 31, No known disability / not disclosed	Graduated high school in 2011. Faced difficulties in algebra 2 due to falling behind in the curriculum and limited one-on-one support.
Male, 45, Attention deficit disorder, generalized anxiety	Attended school from 1983 to 1996. Struggled with calculus due to difficulties grasping the concepts and lack of one-on-one support from the instructor.
Male, 23, Attention deficit hyperactivity disorder	Attended college from 2015 to 2020. Faced challenges in pre-calculus class due to ineffective teaching and lack of support from the professor.