EDTC 806: Research Methods in Education Technology Leadership

Quantitative Research: Using Adaptive Learning in Higher Education Mathematics

A Study of Students' Attitudes

March 9th 2018

Aminata E. Adewumi

New Jersey City University

Author Note

Aminata E. Bamba Adewumi, Department of Educational Technology, New Jersey City University

Correspondence concerning this article should be emailed to Aminata Bamba Adewumi at
edidi112@gmail.com

Chapter 1: Introduction

1. Introduction

Mathematics anxiety in the school system can be dreadful and unnerving for most students in any country; which can create a paralyze effect on students learning and understanding the subject (Alsup, 2005). Many students get frustrated when they are unable to solve their Mathematics assignments or understand the lessons. However, it is necessary that the twenty-first century generation of learners to obtain problem solving skills, logical thinking, and coaction skills to succeed in their professional work and most of these skills are obtained in the Science, Technology, Engineering, and Mathematics (STEM) class. Furthermore, most countries tried to ensure that students receive a good education by providing the most efficient and highly advanced technology in their classrooms. As twenty-first century students quickly advance to the era of technology, the traditional way of instructing is becoming more scarce as more students learn online (Angiello, 2010; Flores et al, 2015). Therefore, higher Education institutes tried to implement different technological tools, such as adaptive learning and its assessments, to help the students understand and learn about mathematics; to ease the process. Therefore, what is the students' attitudes toward using adaptive learning assessments in the Mathematics classroom?

According to Adam Newman and his teammates of the Education Growth Advisors, adaptive learning is defined as an innovative data driven approach that also utilizes computers as interactive teaching tools and remediation according to the specific needs of each learner (Waters, 2014). Adaptive learning gives extra time to all type of learning students to learn the class materials on their own pace (Chen *et al*, 2018; Zhang & Chang, 2016). In addition, it provides help for struggling students and help them practice at their own speed, time, or

location. Adaptive learning derives from data and a process of learning through technology or digital interaction that move around from individual to individual across time, cities, countries, or the world. It provides necessary tools and educational instruction to facilitate the lessons in the classroom or at home.

2. Statement of the Problem

Institutions spend a lot of money on different learning assessments so that students can study, practice, and teach the subject that seems hard and tricky for them. One of the STEM subject that students have a hard time with is Mathematics. According to García-Santillán, Rojas-Kramer, Moreno-García, & Ramos-Hernández (2017), "students generate anxiety when mathematics is associated with exams, mathematical problems to be solved, thinking about pre-test temporality, math books and listening to math topics" (García-Santillán et al, 2017). Therefore, to help with those mathematics anxiety, computer based learning assessments has been implemented in many schools to help improve the learning outcomes (Griff & Matter, 2013). Some learning assessments for adaptive learning are the following: learning management system (e.g. Blackboard, Canvas, Moodle), digital learning/homework program (e.g. MyLab from Pearson, Webassign Mastering from Cengage, Connect), Ebook (e.g. Pearson eText, Vitalsource), open educational resources, classroom response/clickers (e.g. TopHat, iClicker, Learning Catalytics), Online self-quizzing and study tools (e.g. quizlet, quizizz, kahoot, chegg study), Online tutoring site (e.g. khan academy, school online tutoring), and multimedia sites (e.g. Youtube, Google). This quantitative research study demonstrates the use of adaptive learning in Higher Education Mathematics classroom and determine the students' attitudes toward using the assessments.

3. Purpose

The purpose of this quantitative research is to determine the importance of using Adaptive Learning Assessments in Higher Education Mathematics classroom. In addition, the aim is to determine students' perspective toward using Adaptive Learning assessments presently used in the classroom to learn mathematics.

4. Research Questions

The study will be directed by the following research questions:

1. How many students think that using Adaptive learning assessments improved their learning outcome?

2. What percentage of students think that Adaptive learning help understand Mathematics?

3. How many students get extra help outside the class to improve in the mathematics classroom?

Chapter 2: Literature Review

1. Introduction

The use of technology in the classroom and in Science, Technology, Engineering, and Mathematics (STEM) fields play a crucial role in the developing function and building skills of twenty-first century students. However, students' anxiety toward those subjects does not allow them to further their education or get a degree. In most part, the majority of students choose other majors because of the fear outcome of taking a Mathematic class. This quantitative research study will determine the importance of using adaptive learning in the mathematics classroom and whether its assessments help students learning outcome. It will also examine students' perspective toward using adaptive learning assessments to make them understand mathematics. Therefore, it is essential to briefly examine the field of adaptive learning in mathematics classroom and its relevant literature. The literature review will also discuss the anxiety concerning Mathematics that displays on university students.

2. Relevant studies and theories

In García-Santillán, Rojas-Kramer, Moreno-García, & Ramos-Hernández (2017) research, mathematics anxiety toward students is related with exams or quizzes, solving a math problem, math textbook, and listening to topics related to math (García-Santillán et al, 2017). The research reports that mathematics anxiety first happened with the observation of mathematics educators in the early 1950s; the term *Mathematics Anxiety* was introduced by Dreger and Aiken in 1957 (García-Santillán *et al*, 2017 p. 242, Dreger & Aiken, 1957). *Mathematics Anxiety* was then defined as "the presence of a syndrome of emotional reactions to arithmetic and mathematics" (García-Santillán *et al*, 2017 p.242, Dreger & Aiken, 1957 p.344). The purpose of García-Santillán *et al* (2017) study was to recognize the variables that determine the anxiety

towards mathematics in college students. As a result, García-Santillán *et al* (2017) determine two variables that explain the mathematics anxiety toward college students. One of the variable is the Richardson and Suinn (1972) scale of the *Pentadimentional Model of anxiety* which had the following factors of college students' anxiety towards mathematics: Anxiety during exam, toward numbers, for the exams, toward math textbook, and toward math activities (García-Santillán *et al*, 2017 p.247-249; Richardson & Suinn, 1972). The other variable is the Alexander Martray (1989) seven items scale (e.g. items 6, 7, 12, 13, 22, 23, and 25 respectively) of the 25 items that defines the anxiety: "being given homework assignments of many difficult problems that are due the next class meeting", "thinking about an upcoming math test a week before", "receiving your final math grade in the mail", "opening a math book and seeing a page full of problems", watching a teacher work on an algebraic equation on the blackboard", "signing up for a math course", and "walking into a math course" (García-Santillán *et al*, 2017, Alexander & Martray, 1989). Based on these variables, the educational reform has to change so that students' test performance can improve. Such educational reform that can be implemented is the adaptive learning assessments to enlarge learning outside the traditional classroom setting.

Studies have shown that using adaptive learning such as computer-assisted learning (CAL) or internet-based learning tools help enhance learning outcomes (Cooke *et al*, 2008; Lewis, 2003; Griff & Matter, 2013). Griff & Matter (2013) research study report, "software has been developed using computers as interactive teaching devices that tailor questions based on the students' performance. This approach has been called adaptive learning and it also referred to as computer-based learning, adaptive educational hypermedia, and intelligent tutoring" (Griff & Matter, 2013). According to Chen *et al*. (2018) and Zhang & Chang (2016), Adaptive learning

allows individual student to learn on his/her own pace, so that fast learners can move on to the next lecture without waiting for the entire class and slower learners have more time to understand the materials (Chen *et al*., 2018; Zhang & Chang, 2016). Furthermore, Chen *et al* (2018) study states that the appliance of an adaptive learning system is a recommendation approach that consecutively makes choices on what to acquire in the next step, based on the current information obtained from video lectures and practices. Based on the research, the difference between adaptive and traditional classroom learning (also called fixed learning) is that the learner's information (e.g. proficiency levels and learning speed) in adaptive learning can be saved and used to help select the following learning material. In addition, teachers are able to collect that information to predict the lesson as well as how to help the students who are struggling. Although fixed learning or traditional classroom learning is important and still useful, implementing online learning assessment to the curriculum or classroom activities can also benefits students (Angiello, 2010). According to Angiello (2010) findings and conclusions, instruction that combines both online and face-to-face interaction had a greater advantage relative than online only instruction and face-to-face only instruction; online learning can be boosted by giving learners control of their involvement with media and stimulating learner critical thinking (Angiello, 2010).

Some of the assessments of adaptive learning: Khan Academy is defined, "a free virtual classroom that offers classes divided into units of micro-lecture videos and interactive tasks, and aims at humanizing the classroom by using technology" (Zhang & Chang, 2016). MyMathLab from Pearson and WebAssign from Cengage are commonly used in the colleges or universities where the researcher will do the research. In the research study, Stewart (2012) reports that

schools did find attainment with Pearson Education's MyMathLab to close on the mathematics achievement gap between Black and White students (Stewart, 2012). According to the study which is title "The Effectiveness of Blended Instruction in Postsecondary General Education Mathematics Courses", the withdrawal rate disparities decreased with the use of the university's MyMathlab program, Memphis Mathematical Model (Stewart, 2012). Brawner (2000) also reports that using WebAssign, "a web-based homework delivery, collection, grading, and recording system" can help improve the instructing and learning development (Brawner, 2000). WebAssign as well as MyMathLab allow students to do their assignment and receive quick feedback. Brawner (2000) research information was based on interviewing twenty faculties at ten institutions in different disciplines who were mostly using WebAssign in the university. The study concluded that most of the faculties use the web-based process to create their own questions, guide students who are struggling, little worry about students cheating, students have more chance to submit test or homework assignment, students can self-pace by watching lectures videos, view examples or read PowerPoint lectures, get online tutor, and improve in class participation (Brawner, 2000).

3. Summary

Since studies have shown that using adaptive learning assessments can help enhance students' learning outcome, the researcher plans to use adaptive learning in the Mathematics classroom. In addition, studies also show that students do benefits from online learning because they are able to work at their own pace and watch lectures videos, view examples, or PowerPoint lectures when they missed class. In addition, students can practice on their own or get an online tutor or physical tutor to guide them on the materials they did not understand so that the anxiety can reduce.

Chapter 3: Methodology

1. Introduction

Quantitative research assembles information in numerical form which is place into groups or categories that is measured in different variables of units. The research study is about Adaptive Learning in Higher Education for Mathematics classroom will use quantitative research data in the form of graphs and tables by using numerical or statistical values to define the study. Furthermore, Creswell (2015) describes six characteristics of quantitative research that can guide this research study: identifying the research problem, reviewing the literature, generating the quantitative research question, data analysis, and data collection, and reporting and evaluating the research (Creswell, 2015, p.13-15). The research problem use in this study is described through an educational trend used in the twenty first century American school system; it also explaining the reason why this trend is being provided or occur in schools today. The literature in this quantitative research will play a big role in reviewing the questions that is being asked, justifying the research problem, and creating a need for the study. In addition, it will generate the purpose statements, research questions, and hypotheses that is precise and confined. The numerical data will be accumulated from students by creating questionnaires that is precise to the research; describing or analyzing results of students' comments using statistical analysis with a standard and unbiased approach. These six characteristics will guide the readers to have a better understanding of the topic at hand, Adaptive Learning. In addition, there are eight research designs when doing a research: experimental designs, correlational designs, survey designs, grounded theory designs, ethnographic designs, narrative research designs, mixed methods designs, and action research designs (Creswell, 2014 & 2015). The researcher selected

the survey design. As stated by Creswell (2014), a survey research "provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of that population" (Creswell, 2014, p. 12). In this study, the researcher is trying to determine whether students' attitudes toward using adaptive learning help their learning outcomes.

2. Research Design

Creswell (2015) defines survey research design, "procedures in quantitative research in which investigators administer a survey to a sample or to the entire population of people to describe the attitudes, opinions, behaviors, or characteristics of the population" (Creswell, 2015, p. 379). Creswell also states that a survey design is appropriate when the researcher seek to describe a trend, such as adaptive learning in higher education. It is also use to determine students' opinions about the materials they are using in the classroom to learn. Surveys give useful information to evaluate programs in schools (Creswell, 2015, p.379). Surveys have been used in education for many years; it early date was in 1817 when Marc Antoine Julian de Paris designed a thirty-four-page international survey of national education systems (Creswell, 2015).

There are two types of research surveys: cross sectional and longitudinal. The researcher of this study selected the cross sectional survey design. Creswell (2015) defines cross sectional survey design as when the researcher collects data at a point in time; which has the advantage of measuring current attitudes or practices (p.380). One type of cross-sectional designs is to *examine* current attitudes, beliefs, opinions, or practices (p. 380). Another type is to *compare* two or more educational groups in terms of attitudes, beliefs, opinions, or practices (p.381). Cross-sectional design can also *measure community needs* of educational services as "they relate to

programs, courses, school facilities projects, or involvement in the schools" (p.381). Another

cross sectional designs *evaluate* a program, which provides useful information to decision

makers (p.382). The last cross sectional design is a *large-scale assessment* of students or

teachers such as state wide study (p. 382). However, since this study is a short time consuming

study, the research will only be based on universities that is within the tristate. The Longitudinal

survey is not the best choice for this study because the data collected can last years and go over

time (p.382). This study instead will involve different students from current year.

There are two key characteristics of cross sectional survey design: sampling from a population

and collecting data through questionnaires or interviews (p. 383). This research study will collect

data through questionnaires because students view point is necessary to answer the above

questions: (1) how many students think that using Adaptive learning assessments improved their

learning outcome? (2) What percentage of students think that Adaptive learning help them to

understand Mathematics? (3) How many students get extra help outside the class to improve in

the mathematics classroom?

3. Population and Sample (Include how sampling will occur)

The population of this study are students from three universities located in New Jersey (Hudson

County Community College - HCCC and New Jersey City University - NJCU) and New York

(Borough Manhattan Community College - BMCC) which that use adaptive learning

assessments in their mathematics classroom. There are approximately 9,300 students at HCCC,

8,500 students at NJCU, and 22,500 students at BMCC. However, due to time the research will

only focus on the assign class within the present semester; which will have approximately 60

students from all three schools to fill out the survey as a sample size. A sample question of the

quantitative research survey is included in the appendix (Appendix A) of this report. The

research will distribute the survey to students in the current mathematics class to determine their

attitudes toward using adaptive learning in general.

4. Instrument

The researcher has created ten questionnaires based on quantitative research (see Appendix A).

This instrument was selected because students have a hard time filling out survey because of

their busy schedule. Therefore, the survey will be sent through an app (e.g. remind) that will

remind them about filling out the survey without any biased.

5. Procedures

Before distributing the survey for this study, the researcher will obtain permission from each

school internal review board. In addition, a letter and email will be sent to each school

department head (see Appendix B, C, D). Once approved, participants will be learned of their

rights as a research participants and may continue or withdraw from such research. The

researcher will only introduce the research at hand with no further requirement from the students.

After the sample has been designated, the researcher will administer the survey in Appendix A

through remind app which will allow participants to fill out the survey without losing any paper

work. The survey is designed on Survey Monkey; therefore, all data will be properly collected

without issue of writing students' comments wrongly. In addition, once the participants finish

filling out the questionnaires, data will be presented in tables and graphs format to answer the

above questions. For instance, the first question asks, "how many students think that using

Adaptive learning assessments improved their learning outcome?" a table and graph can be used

to determine the number of students who think adaptive learning assessments have benefited

them or improved their knowledge or grade. The second question, "what percentage of students think that Adaptive learning help them to understand Mathematics?" the percentage use from the table will determine the result of this questions based on the survey question 3, 4, and 5 in Appendix A (See Appendix A).   Finally, the third question, "how many students get extra help outside the class to improve in the mathematics classroom?" the survey question 9 will also help for this question. The remaining of the questions and the results of all data will help researcher analyze the data to determine the importance of using adaptive learning in the mathematics classroom.

References:

Alexander, L. & Martray, C. (1989). The development of an abbreviated version of the Mathematics anxiety rating scale. *Measurement and Evaluation in Counseling and Development*, 22, 143-150.

Alsup, J. (2005). A Comparison of Constructivist and Traditional Instruction in Mathematics. Educational Research Quarterly, 28(4), 3-17.

Angiello, R. (2010). Study Looks at Online Learning vs. Traditional Instruction. Education Digest, 76(2), 56-59.

Brawner, C. E. (2000). Practical tips for using Web-based assessment systems. *T H E Journal*, *28*(4), 38-39.

Chen, Y., Li, X., Liu, J., & Ying, Z. (2018). Recommendation System for Adaptive Learning. Applied Psychological Measurement, 42(1), 24-41. doi:10.1177/0146621617697959

Cooke, D., Levinson, A., Garside, S., Dupras, D., Erwin, P. & Montori, V. (2008). Internet-based learning in the health professions: a meta-analysis. *Journal of the American Medical Association, 300*, 1181-1196.

Creswell, J. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th edition). Los Angeles, CA: Sage.

Creswell, J. (2015). *Educational Research: Planning, Conducting and Evaluating Quantitative and Qualitative Research* (5th Edition). Boston, MA: Pearson

Dreger, R., & Aiken, L. (1957). The identification of number anxiety in a college population. *Journal of Education Psychology*, 48, 344-351.

Flores, R., Koontz, E., Inan, F., & Alagic, M. (2015). Multiple representation instruction first versus traditional algorithmic instruction first: Impact in middle school mathematics classrooms. Educational Studies In Mathematics, 89(2), 267-281. doi:10.1007/s10649-015-9597-z

García-Santillán, A., Rojas-Kramer, C., Moreno-García, E., & Ramos-Hernández, J. (2017). *Mathematics Test, Numerical Task and Mathematics Course as Determinants of Anxiety toward Math on College Students*. European Journal Of Contemporary Education, 6(2), 240-253.

Griff, E. R., & Matter, S. F. (2013). Evaluation of an adaptive online learning system. British Journal Of Educational Technology, 44(1), 170-176. doi:10.1111/j.1467-8535.2012.01300.x

Lewis, M. (2003). Computer-assisted learning for teaching anatomy and physiology in subjects allied to medicine. *Medical Teacher, 25*, 204-206.

Means, B., Toyama, Y., Murphy, R., Bakia, M., and Jones, K. (2009). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies*. Washington, DC: U.S. Department of Education

Punch, K. (1998). Introduction to Social Research: Quantitative and Qualitative Approaches. London: Sage

Phillips, F. & Johnson, B. G. (2011). Online homework versus intelligent tutoring systems: pedagogical support for transaction analysis and recording. Issues in Accounting Education, 26, 87–97.

Richardson, F., & Suinn, R. (1972). The Mathematics Anxiety Rating Scale: Psychometric data. *Journal of Counseling Psychology*, 19, 551-554.

Stewart, P. (2012). Closing the Math Achievement Gap: Institutions Find Success with MyMathLab. *Diverse: Issues In Higher Education*, *29*(3), 12-13.

Waters, J. K. (2014). Adaptive learning: are we there yet? (Cover story). The Journal, 41(4), 12-16.

Zhang, S., and Chang, H. (2016). *From smart testing to smart learning: How testing technology can assist the new generation of education. International Journal of Smart Technology and Learning*, *1*, 67-92.

Appendix A

Survey: Quantitative Questionnaire on Survey Monkey:
https://www.surveymonkey.com/r/JH6VPWP

Title: Adaptive Learning in Higher Education

Purpose: The purpose of this Research evaluation is to determine the importance of using Adaptive Learning Assessments in Higher Education.

Definition: Adaptive learning, also known as adaptive teaching, is an educational method which uses computers as interactive teaching devices, and to orchestrate the allocation of human and mediated resources according to the unique needs of each learner.

 Adaptive Learning Assessments:
1. Learning Management System (e.g. Blackboard, Canvas, Moodle)
2. Digital Learning/Homework Program (e.g. MyLab,Webassign Mastering, Connect)
3. EBook (e.g. Pearson eText, Vitalsource, RedShelf)
4. Open Educational Resources (e.g. OpenStax)
5. Classroom Response/Clickers (e.g TopHat, iClicker, Learning Catalytics)
6. Plagiarism detection system (e.g. Turnitin)
7. Online self-quizzing and study tools (e.g. Quizlet, Quizizz, Kahoot, Chegg Study)
8. Online tutoring sites (e.g. Khan Academy, School Online Tutoring)
9. Multimedia sites (e.g. Youtube, Google)

1. Name of School:

2. What Mathematics Class are you taking this semester? (e.g. Basic Math, Basic Algebra, College Algebra,...)

3. The Adaptive Learning Assessment helps students learn: (Check Only One)

☐ Always

☐ Usually

☐ Not Usually

☐ Never

☐ Not Sure

4. Adaptive Learning helps students understand Mathematics better: (Check Only One)

☐ Always

☐ Usually

☐ Not Usually

☐ Never

☐ Not Sure

5. Adaptive Learning assessments help improve students' grade: (Check Only One)

☐ Always

☐ Usually

☐ Not Usually

☐ Never

☐ Not Sure

6. Amount of information expected to learn and complete using Adaptive Learning: (Check Only One)

☐ Too Much

☐ A Lot

☐ Just Right

☐ Not Enough

☐ Not Sure

7. ONLY the Class Lecture help improve the students grade: (Check Only One)

☐ Always

☐ Usually

☐ Not Usually

☐ Never

☐ Not Sure

8. BOTH the Class Lecture and Adaptive Learning Assessment help improve students grade? (Check Only One)

- ☐ Always
- ☐ Usually
- ☐ Not Usually
- ☐ Never
- ☐ Not Sure

9. Hours per week studying outside of class: (Check Only One)

- ☐ 0 - 1 hr/wk
- ☐ 2 - 3 hrs/wk
- ☐ 4 - 5 hrs/wk
- ☐ 6 - 7 hrs/wk
- ☐ 8 or More hrs/wk

10. What are the biggest benefits of using Adaptive Learning assessments? (Check all that apply)

- ☐ Offers a more personalized learning experience
- ☐ Gives students better understanding of struggling assignment
- ☐ Helps to bring real-world concepts to life
- ☐ Allows students to get more immediate feedback and instruction
- ☐ Allows students to practice until they achieve mastery
- ☐ Provides additional examples and applications as needed
- ☐ Provides students with video tutorials and explanations
- ☐ Allows students to learn, study, or complete assignments anytime, anywhere

Appendix B

Aminata E. Adewumi
406 Central Avenue,
East Orange NJ 07018

March 12th 2018

Chairperson of Mathematics, N599N
Borough of Manhattan Community College
The City University of New York
199 Chambers Street, New York, NY 10007
Phone: 212 220-XXX

Dear XXX,

My name is Professor Adewumi, I am a Mathematics Adjunct professor at Borough Manhattan Community College and also a Doctoral student in Educational Technology Leadership at New Jersey City University. I am recently doing a research on Adaptive Learning assessment in Higher Education. I would like the Department's permission and approval on the research surveys. The research required students from my remedial class to fill out the following two Survey questionnaires on Survey Monkey:

Survey 1: Qualitative Questionnaire on Survey Monkey:
https://www.surveymonkey.com/r/CTYRCWC

Survey 2: Quantitative Questionnaire on Survey Monkey:
https://www.surveymonkey.com/r/JH6VPWP

Purpose: The purpose of this research evaluation is to determine the importance of using Adaptive Learning Assessments in Higher Education in the Mathematics classroom. This research would benefits students in a way to help them improve on their assignments.

Definition: Adaptive learning, also known as adaptive teaching, is an educational method which uses computers as interactive teaching devices, and to orchestrate the allocation of human and mediated resources according to the unique needs of each learner.

 Adaptive Learning Assessments:
1. Learning Management System (e.g. Blackboard, Canvas, Moodle)
2. Digital Learning/Homework Program (e.g. MyLab,Webassign Mastering, Connect)
3. EBook (e.g. Pearson eText, Vitalsource, RedShelf)
4. Open Educational Resources (e.g. OpenStax)
5. Classroom Response/Clickers (e.g TopHat, iClicker, Learning Catalytics)

6. Plagiarism detection system (e.g. Turnitin)
7. Online self-quizzing and study tools (e.g. Quizlet, Quizizz, Kahoot, Chegg Study)
8. Online tutoring sites (e.g. Khan Academy, School Online Tutoring)
9. Multimedia sites (e.g. Youtube, Google)

If there is any question (s), please fill free to contact me at 201-294-1306 or Email me at
aadewumi@hccc.edu

Please Check One:

☐ Approve: (Print Name)_____ Sign:_____Date:_____

☐ Not Approve: (Print Name)_____ Sign:_____Date:_____

Best Regards,

Aminata Adewumi

Aminata E. Adewumi
Adjunct Professor

Appendix C

Aminata E. Adewumi

March 12th 2018

Chairperson of Mathematics, K506
New Jersey City University
2039 Kennedy Blvd, Jersey City, NJ 07305
Phone: 201-200-XXX

Dear XXXX,

My name is Professor Adewumi, I am a Mathematics Adjunct professor at New Jersey City University (NJCU) and also a Doctoral student in Educational Technology Leadership at NJCU. I am recently doing a research on Adaptive Learning assessment in Higher Education. I would like to have the Department's Approval on the research surveys. The research required students from my remedial class to fill out the following two Survey questionnaires on Survey Monkey:

Survey 1: Qualitative Questionnaire on Survey Monkey:
https://www.surveymonkey.com/r/CTYRCWC

Survey 2: Quantitative Questionnaire on Survey Monkey:
https://www.surveymonkey.com/r/JH6VPWP

Purpose: The purpose of this Research evaluation is to determine the importance of using Adaptive Learning Assessments in Higher Education and Mathematics classroom. This research would benefits students in a way to help them improve on their assignments.

Definition: Adaptive learning, also known as adaptive teaching, is an educational method which uses computers as interactive teaching devices, and to orchestrate the allocation of human and mediated resources according to the unique needs of each learner.

 Adaptive Learning Assessments:
1. Learning Management System (e.g. Blackboard, Canvas, Moodle)
2. Digital Learning/Homework Program (e.g. MyLab,Webassign Mastering, Connect)
3. EBook (e.g. Pearson eText, Vitalsource, RedShelf)
4. Open Educational Resources (e.g. OpenStax)
5. Classroom Response/Clickers (e.g TopHat, iClicker, Learning Catalytics)
6. Plagiarism detection system (e.g. Turnitin)
7. Online self-quizzing and study tools (e.g. Quizlet, Quizizz, Kahoot, Chegg Study)

8. Online tutoring sites (e.g. Khan Academy, School Online Tutoring)
9. Multimedia sites (e.g. Youtube, Google)

If there is any question (s), Please fill free to contact me at 201-294-1306 or Email me at aadewumi@hccc.edu

Please Check One:

☐ Approve: (Print Name)_____ Sign:_____Date:_____

☐ Not Approve: (Print Name)_____ Sign:_____Date:_____

Best Regards,

Aminata Adewumi

Aminata E. Adewumi
Adjunct Professor

Appendix D

Aminata E. Adewumi

March 12th 2018

President - HCCC Professional Association
NSF S-STEM Co-Principal Investigator/Coordinator
Professor of Mathematics, STEM Division
Hudson County Community College
263 Academy Street, Room 306 C, Jersey City, NJ 07306
Office: (201) 360 – XXX

Dear XXX,

My name is Professor Adewumi, I am a Mathematics Adjunct professor at Hudson County Community College and also a Doctoral student in Educational Technology Leadership at New Jersey City University. I am recently doing a research on Adaptive Learning assessment in Higher Education. I would like to have the Department's Approval on the research surveys. The research required students from my remedial class to fill out the following two Survey questionnaires on Survey Monkey:

Survey 1: Qualitative Questionnaire on Survey Monkey:
https://www.surveymonkey.com/r/CTYRCWC

Survey 2: Quantitative Questionnaire on Survey Monkey:
https://www.surveymonkey.com/r/JH6VPWP

Purpose: The purpose of this Research evaluation is to determine the importance of using Adaptive Learning Assessments in Higher Education and Mathematics classroom. This research would benefits students in a way to help them improve on their assignments.

Definition: Adaptive learning, also known as adaptive teaching, is an educational method which uses computers as interactive teaching devices, and to orchestrate the allocation of human and mediated resources according to the unique needs of each learner.

 Adaptive Learning Assessments:
1.	 Learning Management System (e.g. Blackboard, Canvas, Moodle)
2.	Digital Learning/Homework Program (e.g. MyLab,Webassign Mastering, Connect)
3.	EBook (e.g. Pearson eText, Vitalsource, RedShelf)
4.	Open Educational Resources (e.g. OpenStax)
5.	Classroom Response/Clickers (e.g TopHat, iClicker, Learning Catalytics)
6.	Plagiarism detection system (e.g. Turnitin)
7.	Online self-quizzing and study tools (e.g. Quizlet, Quizizz, Kahoot, Chegg Study)

8. Online tutoring sites (e.g. Khan Academy, School Online Tutoring)
9. Multimedia sites (e.g. Youtube, Google)

If there is any question (s), Please fill free to contact me at 201-294-1306 or Email me at aadewumi@hccc.edu

Please Check One:

☐ Approve: (Print Name)_____ Sign:_____Date:_____

☐ Not Approve: (Print Name)_____ Sign:_____Date:_____

Best Regards,

Aminata Adewumi

Aminata E. Adewumi
Adjunct Professor