Relationship Among Credits, GPA, and Age on Business Education Praxis II Test Scores

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Abstract

In certain states, business education teacher candidates seeking teaching licensure must complete Praxis test requirements, such as the Praxis II. Praxis II tests are designed to gauge teaching competency and this study explored the effects of the variables of cumulative undergraduate hours earned, GPA, and age at time of test completion on the Praxis II test scores, including Fundamental Subjects: Content Knowledge and Business Education: Content Knowledge for both undergraduate and graduate students. Correlational tests using the Pearson Product Moment Correlation and multiple linear regression were performed. Strengths of each relationship did vary; however, results of the study concluded significant relationships among some of the variables. Some of the variables were predictive measures on the final scores of each Praxis II test. Some variables were significant predictors on the Praxis II Fundamental Subjects test, and some were significant predictors on the Business Education test and varied by type of student.

Keywords: Praxis II, business education, teacher preparation, correlational study, regression model

Each state has different criteria for determining the requirements for teacher candidates, also referred to as preservice teachers, seeking licensure, which may include field experiences, student teaching requirements, internships, and assessments (Goldhaber, 2019). Some of the assessments that preservice teachers must complete can include both traditional and performance-based tests such as Praxis tests and the edTPA. These types of assessments are meant to gauge competency across different metrics, such as content knowledge and instructional decision-making, before licensure will be issued (Goldhaber, 2019). In the state of Pennsylvania, preservice teachers must comply with certain requirements including licensure-based assessments, maintain a minimum undergraduate grade point average (G.P.A) and complete an approved post-secondary degree (Pennsylvania Department of Education, 2019). The required assessments include the Praxis series, with the Praxis II completed by both undergraduate and graduate students.

Previous studies have addressed certain variables that have been pivotal to the likelihood of contributing to passage rates such as high school GPA, ACT scores, SAT scores, and student ratings of teacher effectiveness (Blue, O'Grady, Toro, & Newell, 2002; Lawrence & Crehan, 2001; Mikitovics, & Crehan, 2002). For this study, the researchers chose to focus on the requirements of completing the Praxis II for both the Fundamental Subjects: Content Knowledge and Business Education: Content Knowledge (also referred to as Fundamental Subjects test and Business Education test) and their effects on three different variables. The three different variables included students' final cumulative undergraduate grade point average (GPA), cumulative undergraduate hours earned as indicated on their final college/university transcript, and age at the time of completing each Praxis II test.

Purpose of the Study

The purpose of this study was to determine if final GPA, cumulative undergraduate hours earned and age affect test scores on Praxis II. The researchers explored the strength of each relationship to determine if the variables could be significant predictors on the final test score of each Praxis II test.

Research Questions

Overall, three research questions guided the study:

RQ1: What is the strength of the relationship among the variables of cumulative undergraduate GPA, cumulative undergraduate credit hours earned, and age at the time of taking each Praxis II test on the scores of the Fundamental Subjects test and the Business Education test for under graduate business education students?

RQ2: What is the strength of the relationship among the variables of cumulative undergraduate GPA, cumulative undergraduate credit hours earned, and age at the time of taking each Praxis II test on the scores of the Fundamental Subjects test and the Business Education test for graduate business education students?

RQ3: How significant are the variables of cumulative undergraduate GPA, cumulative undergraduate hours earned, and age at the time of taking each test for predicting final scores on the Fundamental Subjects test and the Business Education test for both undergraduate and graduate business education students?

Review of Literature

A Brief History of the Role of Assessment in Teacher Education Preparation

A Nation at Risk (1983) was a seminal report that focused on the deficiencies of American teacher education preparation programs. *A Nation at Risk* documented the perceived diminished qualities of teacher education programs and the role of teacher accountability (Gardner, Larsen, Baker, Campbell, & Crosby, 1983). Other important legislation has impacted teacher quality at both the national and state levels, such as the 1998 reauthorization of the *Higher Education Act*, which mandates that teacher education programs communicate performance of test takers on licensure exams and requires an undergraduate GPA of 3.0 to enter the teaching profession (Gitomer & Qi, 2010). The Praxis tests still serve as important measures of teacher accountability through traditional assessments that are completed by teacher candidates seeking licensure in their respective content areas

Established in 1987, the Praxis test series have served as a way to gauge and assess a teacher candidate's competence over key areas of teaching including content knowledge and pedagogical knowledge (Brown, Brown, & Brown, 2008; Jeffery, 2017; McCaslin & Parks, 2002). The Praxis tests have included three different, separate types of tests: Praxis I, Praxis II, and Praxis III (McCaslin & Parks, 2002). The Praxis I test assesses a candidate's knowledge of basic academic skills and is usually conducted before a candidate enters a preservice educational program. The Praxis II test assesses a candidate's knowledge of specific content knowledge and principles regarding teaching and learning, such as pedagogical decision-making. Lastly, the Praxis III has assessed a candidate's ability to perform as a competent teacher in the classroom, usually during the first year of teaching (McCaslin & Parks, 2002).

In order to achieve an effective assessment that can fully represent the knowledge and professionalism that a teacher candidate will need to possess, certain measurable variables should be included on the assessment. According to Wall, Johnson & Symonds (2012), some of the measurable variables should include content knowledge, professional acumen and dispositions, and ability to make sound pedagogical decisions. These variables define the role of professional teaching for future novice teachers. Most of these variables can be found on both the Praxis II tests of Fundamental Subjects test and the Business Education test when completed by preservice teachers for licensure requirements.

Praxis Scores and Measurable Academic Variables

Research studies that have defined and described a student's GPA focus on the role of GPA as a measure of academic accomplishments and aptitude. According to Casey & Childs (2011), GPA can be, "typically viewed as indicative of the ability to succeed in an educational setting" (p. 6) and is an integral part of how colleges/universities decide which students to admit to different programs, including teacher candidates completing teacher education programs. Several studies have addressed the role of students' GPA and how it influences the scores on Praxis tests, including the Praxis I and Praxis II. Results have been mixed when it comes to GPA being a significant predictor of test scores on content area Praxis tests. In a study by Thobega & Miller (2002), the researchers described the role of GPA and demographic data

on the agricultural education content area Praxis II test score. The researchers determined that GPA did not accurately predict scores on the Agricultural content area test, but they were able to determine that males scored higher than females on the test (Thobega & Miller, 2002.

A study conducted by NcNeal and Lawrence (2001) of program completers of a post-secondary program in New Jersey indicated that a student's GPA did not correlate with scores on the Praxis II. The researchers examined eight different mini-cases with students' GPA ranging from 2.80 to 3.75 (McNeal & Lawrence, 2001). In addition, the researchers concluded that overall GPA for a student, whether higher or lower, did not directly impact a student's ability to successfully pass the Praxis II test. The results of the study also reflected the findings of Riggs & Riggs (1991), in which the researchers discovered that GPA may not be an accurate predictor of teaching competence for emerging teachers. The researchers questioned the profound impact of teacher education programs and the continual usage of this type of indicator to gauge teacher effectiveness and competence (Riggs & Riggs, 1991).

A paucity of research studies have examined the actual impact of cumulative credit hours earned and results on a standardized licensing test such as the Praxis series. In a study conducted by Thobega (2006), the researcher examined the weight given between course content work and scores on the Praxis II test within the field of agricultural education. The researcher discovered that there were not equal weights between the variety and amount of course-work completed and the academic domains of the Praxis test specific to agricultural education.

Overview of Praxis II Tests in Business Education

According to the ETS, the Praxis II Business Education: Content Knowledge measures a candidate's knowledge across eight categories such as accounting, finance, marketing, information technology, as well as specific knowledge in business education (ETS, 2019a). This test is intended for those candidates who want to teach in a business setting. Candidates have 120 minutes to complete the test, and there are 120 questions on the test. Additionally, different levels of challenging questions are presented throughout the test, and candidates select an answer from four choices, using the A, B, C, D method (ETS, 2019a).

The Praxis II Fundamental Subjects: Content Knowledge test is similar in format and duration to the Business Education: Content Knowledge test. Students have 120 minutes to complete 120 multiple choice questions with four choices (ETS, 2019b). Candidates must answer questions in subjects including English Language Arts, Mathematics, Citizenship and Social Science, and Science (ETS, 2019c), with each category composing 25 percent of the test. Candidates may complete the test questions in any order that they choose, and students are not expected to be experts in any given subject area (i.e., mathematics) (ETS, 2019c).

Methodology

Procedures

The researchers implemented a correlational research design that included both correlation and regression analysis (Creswell, 2012; Stangor, 2011). This design was used in order to explain the relationship among the variables of cumulative undergraduate GPA, cumulative undergraduate credit hours earned, and age at the time of completing each Praxis II test on final scores of each test for both undergraduate and graduate students. To obtain the necessary data, two online databases and an Excel spreadsheet were queried to acquire information about students who completed licensure requirements in business education over a 10-year timespan (school years of Fall semester, 2009 through Spring semester, 2019). Once queried, three sources of information were made available to the researchers, including an Excel spreadsheet of undergraduate and graduate students who completed licensure requirements (as some students may have completed only degree requirements without licensure) and two secured online databases which contained transcripts of completed coursework. All information remained confidential and the study had full IRB approval.

The Excel spreadsheet contained demographic information (such as age) and overall scores on each Praxis II test. The online database system contained information including the undergraduate schools of all students who enrolled as graduate students in the Master of Education in Business Education program. A transcript analysis was conducted by the research-ers to obtain the necessary information to answer the research questions. Cumulative undergraduate credit hours earned and cumulative undergradu-ate GPA were derived from the college/university in which each graduate had his or her bachelor's degree conferred; transfer credit hours would have been included in the cumulative undergraduate hours as indicated by each transcript. Cumulative undergraduate GPA was derived from the same final transcript as the bachelor's degree was recorded. As

for the undergraduate students, data including cumulative GPA and cumulative undergraduate credit hours earned were derived using an online database specific to the university.

Data were analyzed using two methods, including the *Pearson Product Moment Correlation* and multiple linear regression, to determine if the variables were significant predictors of scores on each test (Creswell, 2012). Strengths of each relationship were calculated using the guidelines by Ratner (n.d.) and Creswell (2012): A value of 0.00 indicated no relationship; 0.01 - 0.30 indicated a weak relationship; 0.31 - 0.70 indicated a medium relationship; and 0.71 and higher indicated a strong relationship for both negative and positive values between -1 and +1.

Correlational tests were conducted on cumulative undergraduate GPA, cumulative credit hours earned, and age at the time of completing the test on the final scores for the Fundamental Subjects test and Business Education test for both undergraduate and graduate students. The researchers also explored and described the different relationships between undergraduate program completers and graduate program completers among selected variables and final scores on the Praxis II tests. Some data were missing; when analyzing the data as part of the research study, the missing data were included in aggregate form but not as part of the final analysis. Before performing each analysis, the alpha level was set *a priori* to 0.05 to determine significance.

Results and Discussion

Results of the study include the correlation coefficients using the *Pearson Product Moment Correlation* and multiple regression. Since the alpha level was set *a priori*, all results with a *p* value less than 0.5 are denoted below with three stars (***). Demographic data were also collected from the sources of data to describe the target sample, who completed Praxis tests as part of licensure requirements.

Overall, sixty undergraduate students and thirty-seven graduate students were included in the study who completed Praxis II licensure requirements. Undergraduate participants were likely to be 23 years old, have earned a cumulative GPA of 3.39, and completed a total of 140 semester hours. Graduate students were likely to be 30 years old, have earned a cumulative GPA of 3.13, and completed a total of 131 semester hours. The minimum, maximum, and average for each variable can be viewed in Table 1 below.

Table 1

Demographic Data of Undergraduate and Graduate Business Education Praxis II Completers

Variable	Overall Amount
Participants	Undergraduate: 60 Graduate: 37
Age – Undergraduate students	Minimum/Maximum: 21/46 Avg. age: 23.32 (SD = 4.19)
Age – Graduate students	Minimum/Maximum: 22/56 Avg. age: 30.71 (SD = 9.58)
Fundamental Subjects: Content Knowledge overall scores undergraduate students	Minimum/Maximum: 153/195 Avg. score: 176.43 (SD = 10.87)
Fundamental Subjects: Content Knowledge overall scores graduate students	Minimum/Maximum: 148/197 Avg. score: 174.94 (SD = 13.72)
Business Education: Content Knowledge overall scores undergraduate students	Minimum/Maximum: 152/187 Avg. score: 168.42 (SD = 10.28)
Business Education: Content Knowledge overall scores graduate students	Minimum/Maximum: 151/193 Avg. score: 168.88 (SD = 12.70)
Grade Point Average (GPA) – Undergraduate students	Minimum/Maximum: 2.98/3.98 Avg. G.P.A: 3.49 (SD = 0.23)
Grade Point Average (GPA) – Undergraduate students	Minimum/Maximum: 2.35/3.96 Avg. G.P.A: 3.13 (SD = 0.49)
Cumulative Undergraduate hours earned – Undergraduate (UG) students	Minimum/Maximum: 120/175 Avg. UG hours earned: 140.23 (SD = 12.85)
Cumulative Undergraduate (UG) hours earned - Graduate students	Minimum/Maximum: 117/175 Avg. UG hours earned: 131.23 (SD = 9.58)

Notes: Cumulative undergraduate hours earned was based on the semester system. Also, undergraduate GPA was derived using a 4.0 scale for all students; Average is abbreviated "Avg."

RQ1: What is the strength of the relationship among the variables of cumulative undergraduate GPA, cumulative undergraduate credit hours earned, and age at the time of taking each Praxis II test on the scores of the Fundamental Subjects test and the Business Education test for undergraduate business education students?

Table 2 displays the results of the Pearson Product Moment correlation among the test scores and each variable. Overall, the results also indicated:

- There was a non-significant, weak, positive relationship between undergraduate GPA and score on the Praxis II Fundamental Subjects: Content Knowledge test, (r(60) = .21, p = .11).
- There was a non-significant, weak, positive relationship between undergraduate credit hours earned and score on the Praxis II Fundamental Subjects: Content Knowledge test, (r(60) = .15, p = .27).
- There was no relationship between age and score on the Praxis II Fundamental Subjects: Content Knowledge test, (r(60) = .001, p = .98).
- There was a non-significant, weak, positive relationship between GPA and score on the Praxis II Business Education: Content Knowledge test, (r(60) = .07, p = .61).
- There was a significant, medium, positive relationship between undergraduate credit hours earned and score on the Praxis II Business Education: Content Knowledge test, (r(60) = .47, p < .05).
- There was a significant, medium, positive relationship between age and score on the Praxis II Business Education: Content Knowledge test, (r(60) = .34, p < .05).

Table 2

Undergraduate BE Student Scores and Relationship Among Variables

	UG GPA	UG Cred. Hrs.	Age
FS Scores	.21	.27	.001
BE Scores	.61	.47**	.34**

**. Correlation is significant at the 0.05 level (2 tailed)

Note: "FS" Scores refers to the Praxis II: Fundamental Subjects: Content Knowledge

Note: "BE" Scores refers to the Praxis II: Business Education: Content Knowledge Note: "UG GPA refers to cumulative undergraduate GPA

Note: "UG Cred. Hrs." refers to cumulative undergraduate credit hours earned

RQ2: What is the strength of the relationship among the variables of cumulative undergraduate GPA, cumulative undergraduate credit hours earned, and age at the time of taking each Praxis II test on the scores of the Fundamental Subjects test and the Business Education test for graduate business education students?

Table 3 displays the results of the Pearson Product Moment correlation among the test scores and each variable. Overall, the results also indicated:

- There was a significant, medium, positive relationship between undergraduate GPA and score on the Fundamental Subjects test, (r(43) = .47, p < .05)
- There was a non-significant, weak, negative relationship between undergraduate credit hours earned and score on the Fundamental Subjects test, (r(43) = -.06, p = .73).
- There was a non-significant, weak, negative relationship between age and score on the Fundamental Subjects test, (r(43) = -.18, p = .25).
- There was a non-significant, weak, positive relationship between undergraduate credit hours earned and score on the Praxis II: Business Education test, (r(43) = .07, p = .61).
- There was a non-significant, weak, positive relationship between GPA and score on the Praxis II: Business Education test, (r(43) = .32, p = .15).
- There was a non-significant, weak, positive relationship between age and score on the Praxis II: Business Education test, (r(43) = .32, p = .15).
- There was no relationship between age and score on the Business Education test, (r(43) = .001, p = .99).

Table 3

Graduate BE Student Scores and Relationship Among Variables

	UG GPA	UG Cred. Hrs.	Age
FS Scores	.47**	-.06	-.18
BE Scores	.32	.07	.001

**. Correlation is significant at the 0.05 level (2 tailed)

Note: "FS" Scores refers to the Praxis II: Fundamental Subjects: Content Knowledge

Note: "BE" Scores refers to the Praxis II: Business Education: Content Knowledge Note: "UG GPA refers to cumulative undergraduate GPA

Note: "UG Cred. Hrs." refers to cumulative undergraduate credit hours earned

RQ3: How significant are the variables of cumulative undergraduate GPA, cumulative undergraduate hours earned, and age at the time of taking each test for predicting final scores on the Fundamental Subjects test and the Business Education test for both undergraduate and graduate business education students?

For the undergraduate students, multiple linear regression was conducted to see if undergraduate GPA, hours earned, and age could significantly predict scores on the Business Education Praxis for undergraduate students. Results indicated that there was a significant effect ($F(3, 39) = 5.19$, $p < .05$, $R2 = .29$) on Praxis II Business Education: Content Knowledge overall test scores.

For the graduate students, multiple linear regression was conducted to see if undergraduate GPA, cumulative undergraduate hours earned, and age could significantly predict scores on the Fundamental Subjects for undergraduate students. Results indicated that there was a non-significant effect ($F(3, 56) = 1.49$, $p = .23$, $R2 = .07$) on Fundamental Subjects: Content Knowledge overall test scores.

Limitations

Several limitations need to be acknowledged, which included a smaller sample size and some missing data. Student records were available over only a 10-year period via a database management system and an Excel spreadsheet. In addition, some of the records did contain missing data (such as a student having a recorded score for the Praxis II Fundamental Subjects test and not the Business Education test). However, the researchers were careful when performing the analysis and maintaining the integrity of missing data within each analysis.

Recommendations and Conclusions

Strength of the Relationships Among Each Variable and Results on each Praxis II Test for Undergraduate Students

Results of the study indicated the strength of relationships among the variables of cumulative undergraduate GPA, cumulative undergraduate credit hours earned, and age at the time of taking the test of each Praxis II test for undergraduate students. Most of the variables indicated a relationship that was positive and non-significant. Furthermore, there was no relationship found between age at the time of taking the test and final score on the Praxis II: Fundamental Subjects test. Results of the study coincide with a study conducted by Pae (2014) that also used GPA within individual coursework in calculating correlation coefficients for students completing a Learning Disability teacher education program and Praxis test. Pae (2014) found primarily weak to moderate correlations with GPA and scores on the Praxis II Learning Disability content area test.

There was, however, a significant, medium, positive relationship between cumulative undergraduate credit hours earned and age at the time of taking the test for undergraduate students on the Praxis II Business Education test. This relationship indicated that for undergraduate students, the more credit hours earned and being older correlated to a higher score on the Business Education test. This finding reflected a similar finding by Houck & Kitchel (2010) in which the researchers discovered a moderate correlation between content preparation and scores on the Praxis II for preservice agricultural teachers. The researchers used a similar methodology, including analyzing transcripts, to arrive at their conclusion between coursework and scores on the Praxis II. Furthermore, this finding also coincides with a study by Wenglinsky (2001) and the emphasis of teacher education programs on content knowledge preparation. Wenglinksy (2001) espoused the importance of focusing on content knowledge and not as much focus on professional knowledge. Our results coincided with the findings of Wenglinsky (2001), further emphasizing the importance of final grades in business education courses for undergraduate students.

The researchers recommend that business education program coordinators and advisors strongly communicate to young undergraduate students the importance of success in their business classes, as grades may impact their score on the Business Education Praxis. Historically, Pennsylvania implemented a policy of preservice teacher candidates maintaining at least a 3.0 GPA in order to obtain licensure to ensure higher-quality standards (Blue, O'Grady, Toro, & Newell, 2002). Results of the study reflect that undergraduate GPA is an important measure when it comes to teacher educator quality, and preservice teacher candidates must be aware of how important GPA can be for licensure decisions.

Strength of the Relationships Among Each Variable and Results on Each Praxis II Test for Graduate Students

Results of the study also indicated the strength of relationships among the variables of cumulative undergraduate credit hours earned, cumulative undergraduate G.P.A, and age at the time of taking the test of each Praxis II test for graduate students. Much like results for the undergraduate students, most

variables indicated a weak, positive, non-significant relationship among each variable and overall score on the Praxis II tests for graduate students.

There was a non-significant, weak, negative relationship between cumulative undergraduate credit hours earned and score on the Praxis II Fundamental Subjects test. This relationship indicated that the more cumulative undergraduate credit hours earned, the lower a graduate student scored on the Praxis II Fundamental Subjects test. Also, there was a non-significant, weak, negative relationship between age and score on the Fundamental Subjects test, indicating that the older the graduate student was at the time of taking the test, the lower the candidate scored on the test. There was no relationship between age and score on the Praxis II Business Education test.

There was a significant, medium, positive relationship between undergraduate GPA and score on the Fundamental Subjects test indicating that a higher undergraduate GPA was correlated to a higher final score on the Praxis II Fundamental Subjects test for graduate students. This finding does not corroborate an earlier finding from 1991 by Riggs & Riggs, who posited that GPA is not necessarily a strong indicator of teacher performance. Riggs & Riggs (1991) also determined that teacher quality should include measures other than GPA, and standardized test scores to truly assess a teacher's ability to perform as a competent teacher. While earning a higher undergraduate GPA did have a positive correlation with overall scores on the Fundamental Subjects test score, this relationship may not truly paint an accurate picture of how competent a teacher candidate is for teaching. Other measures, such as a performance-based assessment and teaching observations by faculty members, may be better measures to indicate levels of competency among each teacher candidate.

The researchers recommend that program coordinators and advisors encourage graduate students to use study materials or take additional courses to better prepare for the Fundamental Subjects test. Create supplemental materials especially for graduate students with a lower undergraduate GPA and younger undergraduate students, or even an additional course for graduate students, to prepare for the test before attempting it. The Fundamental Subjects test assesses students on basic college material (ETS, 2019c), and graduate students may not have taken a college course since their undergraduate years.

Variables That Could Significantly Predict Overall Scores on Each Praxis II Test and How Undergraduate and Graduate Students Differed Among Each Variable

Undergraduate and graduate students differed on the strengths of the relationships between variables (including significance) and also which variables could predict final scores on each Praxis II test. Results reflected the conceptual framework in differentiating between undergraduate and graduate students among key variables and overall scores on each Praxis II test. The conceptual framework provided a foundation for determining strengths of relationships among the variables and to serve as significant predictors on overall Praxis II tests for undergraduate and graduate students

For undergraduate students, cumulative undergraduate hours earned, cumulative undergraduate G.P.A, and age at the time of completing the test could significantly predict the final score on the Business Education test score. For graduate students, the researchers concluded that cumulative undergraduate hours earned, cumulative undergraduate GPA, and age at the time of taking the test could significantly predict their overall score on the Fundamental Subjects test. This model should be used by program coordinators to assist undergraduate and graduate students in preparing for each test. The model can be used to predict how each type of student will perform on each test using these three key variables. Since the Praxis series are high-stakes tests, program advisors can purchase and obtain study materials for those students who may need them more than other students to ensure that they are fully prepared to complete each Praxis II test.

Program coordinators and advisors should be made aware of the importance of meeting with students regularly to increase the chances of finishing all requirements in a timely manner (Mu & Fosnacht, 2019; Uddin & Johnson, 2019). Program coordinators and advisors can play an active role in making sure that students are meeting GPA requirements and are on-track with grades throughout the entire duration of a teacher education program. Additionally, program coordinators and advisors can use this model in data-driven decision-making as a gauge for student progress as it relates to GPA and age to prepare for important licensure tests as they are meeting with students on a regular basis.

Recommendations for Future Research

Some areas for future research include using qualitative methodology and exploring the effects of the selected variables from this study with final scores on a performance-based assessment. This study used only quantitative methodology and raw numbers on selected variables on Praxis II test scores. Utilizing qualitative methodology, such as analyzing study materials for each test or even structured and semi-structured interviews, could allow for follow up to explore how participants are preparing for each test. For future studies, researchers could explore the relationship and predictive measures of each variable from this study on the final score or scores on the edTPA or even each sub-section of the edTPA, including planning, instruction, and assessment.

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