

Enhancing Academic Monitoring: Examining The Correlation Between The Results Of Progress Test And The Cumulative Grade Point Averages Of Nursing Students

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ABSTRACT

Introduction: Progress Tests (PTs) are a key tool in nursing education, designed to assess and track the students' advancement throughout the program. PTs may also be utilised to assess students' readiness for the licensure examination.

Aim: To evaluate the nursing students' performance improvement in the annual progress test and analyse its relationship with their cumulative grade point averages (CGPAs) in the same academic year.

Methods: A longitudinal observational study using a retrospective analysis is used. A convenient sampling method is used to fulfil the aim. Out of the 250 students who completed the nursing program from four cohorts, only 106 nursing graduates met the eligibility criteria.

Result: the Wilcoxon Signed-Rank Test found a significant difference in the students' PT scores between the third and fourth years ($z = -3.671, p = .000$) with a small negative effect size $r = -0.25213$. Despite a notable decrease in the students' PT median scores in the fourth year (Md = 49) compared to the third year (Md = 51), a substantial majority of students, 86 (81%), demonstrated improvement in their second PT. Moreover, there is a positive correlation between the CGPA of nursing students and their performance in progress tests in the same year [$r_s(104) = 0.548, p = < .00$] for the third year and [$r_s(104) = 0.519, p = < .001$] for the fourth year, both of which were statistically significant.

Conclusion: Progress exams are an effective means of consistently tracking a student's advancement in the programme. The CGPA serves as an indicator of the nursing student's performance in the progress test. Students with higher CGPA also performed better on the PT during the same academic year.

Keywords: progress test, cumulative GPA, student performance.

Introduction & background

Nursing students receive academic, clinical, and practical training to build the knowledge, skills, and competencies needed to provide high-quality patient care. Thus, evaluating student performance is essential for assessing education quality and improving the learning process, which benefits students and educators in pursuing academic excellence (Marquez et al., 2011; Kaliyaperumal et al., 2020). Evaluation is crucial for educational planning. It monitors knowledge acquisition and improves skills to help students learn meaningfully and build their competencies and capabilities (Ferreira & Weyh, 2018). Progress tests (PT) are one of the educational assessment and evaluation techniques that examine students' cognitive understanding while learning at regular intervals throughout the academic program (Willoughby et al., 1977). Maastricht University and the University of Missouri–Kansas City initially used the progress test as a quarterly profile

exam in the late 1970s. It was designed as a comprehensive testing method for program goals (Arnold & Willoughby, 1990). These examinations are given to students for many years and combined in a compensatory manner to determine academic year advancement (Schuwirth & van der Vleuten, 2012). The PT guides and assesses student learning and gives faculty comments on the curriculum's strengths and flaws (Arnold & Willoughby, 1990). It promotes learning and informs educational decisions by assessing students' performance against their current academic year through continuous evaluation to maintain education quality (Bollela et al., 2018).

Many studies have examined the Progress test (PT) and its effects on cognitive skills, mainly medical knowledge, in various healthcare disciplines. Rosa et al. (2017) and Reberti et al. (2020) used the progress test in a medical school course to measure improvements in undergraduate medical courses. They found that students' knowledge of the four progress tests increased significantly. Rosa stated that program directors might utilise the PT to build strategies to improve medical courses. Majeed et al. (2024) further note that progress testing is a consistent and relevant assessment of students' knowledge and clinical application. According to Görlich and Friederichs (2021), students continuously increase their knowledge, especially in the first and second years as they study basic medical knowledge and in the second and third years when they begin clinical work. Ali et al. (2018) examined progress testing in an undergraduate dental therapy and hygiene program. According to this study, the highest improvement in knowledge is frequently seen between the first and second years. Additionally, Rutgers et al. (2018) found that PT is beneficial, practicable, and sustainable in radiology residency training.

Finally, Pascon et al. (2018) examined nursing students' perceptions of progress test difficulty and their pros and cons. The study's findings indicate that students rated the test as easy demonstrated superior performance. In contrast, second-year students exhibited a higher achievement than their first-year counterparts. The participants recognized several strengths that contributed to their preparedness for competitive entrance examinations, including the comprehensive test material, the capacity to evaluate progress and performance, and the inclusion of multiple-choice questions. Conversely, the limitations that were observed encompassed the comprehensive nature of the examination, deficiencies in certain areas of knowledge, insufficiencies in sections' content and organisation, and insufficient duration of the test to ensure its completion.

Several studies in Saudi Arabia examine test applications and their impact on medical programs. Albekairy et al. (2021) assessed pharmacy colleges' unified progress test scores. The pharmacy students' knowledge and skills grow and maintain more than competence through the professional program. The data also showed no link between test mean scores and total CGPA. However, Albekairy et al.'s study (2023) on the Doctor of Pharmacy program across 16 colleges found a positive association between progress test scores and cumulative CGPA throughout the third and fourth professional years. However, they noted that specific programs negatively correlated, particularly in the first professional year. Alamro et al. (2022) also investigated the College of Medicine and found that PT can track student understanding as they proceed through their program. As students progressed in their programs, their grades increased.

The progress test of applied knowledge is employed more in medical and health sciences programs worldwide. A global study on the progress test approach supports its efficacy and usefulness as a medical program evaluation strategy. However, the progress test approach in Saudi nursing colleges has seldom been studied. Thus, this study evaluates nursing students' annual progress test performance and examines its relationship to their academic year cumulative Grade Point Average (GPA), calculated by summing the cumulative Grade Point Averages (CGPAs) the students earned across all semesters and courses during a given academic term. This study aimed to evaluate the nursing students' performance improvement in the annual progress test and analyse its relationship with their cumulative grade point averages (CGPAs) in the same academic year.

The research hypotheses:

1. The students' progress test scores in the fourth year improves compared to their scores in the third year.
2. There is a significant difference between students' progress test scores and their CGPA scores within the same academic year.
3. There is a correlation between the students' progress test scores and their cumulative CGPA in the same academic year.

Method

Study design:

This is a longitudinal observational study using a retrospective analysis of prospectively collected student assessment data. It was conducted at a private college in the eastern region of Saudi Arabia.

Sample:

Convenient data was extracted and analyzed retrospectively for 250 students who completed the nursing program between spring 2019/2020 and fall 2023/2024. The progress examination was administered twice per program at the end of the third and fourth years (levels 6 and 8). The students were provided with prior

notification of the test objective and the specific day and venue of the test. They were not required to engage in any pre-test preparation or studying. In response to a lack of student engagement in PT, two bonus marks were incorporated into a course at levels 6 and 8 with the intention of motivating students to participate in the test. The experts prepared the questions from the question bank, and were reviewed by reviewers. The progress test included 150 questions. The test encompassed inquiries pertaining to nursing courses from level 3 to level 4, including fundamental nursing, health assessment, adult nursing care, pediatric, maternity, psychiatric, community, administration, and critical care. The college's central examination unit autocorrected the exam and sent it to the program to analyze the data and use it to improve the program. The inclusion criteria involve any nursing student who had finished the bachelor's program and passed the progress test in years 3 (level 6) and 4 (level 8).

The exclusion criteria involve:

- Any student registered in another program other than nursing in the college.
- Any student who did not complete the two progress tests in the third and fourth years.

Following evaluating the nursing graduates' progress test database based on the predetermined inclusion criteria, the CGPAs for the selected participants were obtained from the college students' information system to address the research hypotheses.

Statistical analysis

The study used descriptive statistics to calculate the percentage of categorical variables and the mean and standard deviation for continuous variables. The data's normality was assessed to identify a suitable statistical test to analyze the significance between PT and CGPA. *P-value* < 0.05 is considered significant.

Ethical consideration

The college IRB committee granted ethical approval (Reference number: SR/RP/91). To ensure confidentiality, the names of the graduates were removed from the sheets, and a unique code was assigned. The gathered data was kept confidential and anonymous throughout all study phases.

Data Analysis

1. Sample description.

Out of 250 students who graduated from 8 cohorts between spring 2019 and autumn 2023, only 106 (42%) graduates from four cohorts passed the eligibility criterion by attending the two progress examinations at the end of the 3rd and 4th year, as shown in Table 1. The decline in attendance can be attributed to the lack of the mandatory requirement for students to attend the progress exam. Moreover, the coronavirus outbreak affected students' attendance for two consecutive years, specifically 20-21 and 21-22.

Table 1: Students frequency in each Cohort

	Frequency	Percent
Cohort Spring 19-20	19	17.9%
Cohort Fall 21-22	9	8.5%
Cohort Spring 22-23	60	56.6%
Cohort Fall 23-24	18	17.0%
Total	106	100.0

We standardized the comparison between the students' CGPA and their performance in the progress test by calculating all the scores as percentages. Table 2 shows varying levels of student achievement based on their CGPA score classification.

Approximately 49% of the sample consisted of fourth-year students, while 44% were third-year graduates, all with CGPAs above 80%. The students' achievement on the progress test is somewhat low. The progress test covered topics from 13 essential courses in the nursing program, including pathophysiology, nutrition, pharmacology, nursing basics, health assessment, ethics, adult care, psychiatry, maternity, pediatric, critical care, leadership, and community. By the conclusion of the third year, students must answer a minimum of 70% of the questions. After completing all program courses, students are expected to answer all questions on the fourth-year progress test. According to Table 2, approximately half of the students scored above 50% on the progress exam (53.8% on the 3rd-year progress test and 51% on the 4th year).

Table 2: Frequency distribution of students based on their performance in third- and fourth-year CGPA and progress test.

	(49% and below) (2.45 and below) CGPA		(50-59%) (2.5-2.95) CGPA		(60-69%) (3- 3.45) CGPA		(70-79%) (3.5-3.95) CGPA		(80-89%) (4 - 4.45) CGPA		(90-100%) (4.5 - 5) CGPA	
	Frequency	%	F	%	F	%	F	%	F	%	F	%
*CGPA 3rd Y	5	6.6 %	18	17.0%	17	16.0 %	17	16.0 %	21	19.8 %	26	24.5 %
**CGPA 4th Y	15	14.2 %	20	18.9%	18	17.0 %	19	17.9 %	21	19.8 %	31	29.2 %
Progress Test 3rd Y	49	46.2 %	16	15.1%	18	17.0 %	17	16.0 %	6	5.7 %	0	0%
Progress Test 4th Y	52	49.1 %	18	17.0%	12	11.3 %	13	12.3 %	11	10.4 %	0	0%

*CGPA 3rd Y: Grade Point Average for third year; ** CGPA 4th Y: Grade Point Average for fourth year.

Table 3 indicates a slight decline in the students' median scores from year to year for the progress test results (PT 3rd Year Md = 51; PT 4th Year Md = 49); however, there is a minor improvement in the CGPA results (Md =76 for 3rd Year, and Md =79 for 4th Year).

Table 3: Descriptive data for students' CGPAs and progress test results in their third and fourth years.

	CGPA 3 rd Y	*PT 3 rd Y	CGPA 4 th Y	**PT 4 th Y
N	106	106	106	106
Mean	74.6	52.0	78.1	53.1
Median	76.0	51.0	79.0	49.0
SD	17.1	18.0	14.0	17.1
Range	67	69	47	70
Minimum	33	15	52	17
Maximum	100	84	99	87
25th Percentiles	60.1	35.0	66.9	39.0
75th Percentiles	89.7	69.0	90.9	67.3
Shapiro-Wilk W	0.950	0.942	0.936	0.935
Shapiro-Wilk p	< .001	< .001	< .001	< .001

* PT 3rd Y: third-year progress test; ** PT 4th Y: fourth-year progress test

Figure 1, displays the students' progress test scores and CGPA for two academic years. It reflects the significant disparity between the mean and median scores of the students' CGPA and the progress exam in the same year.

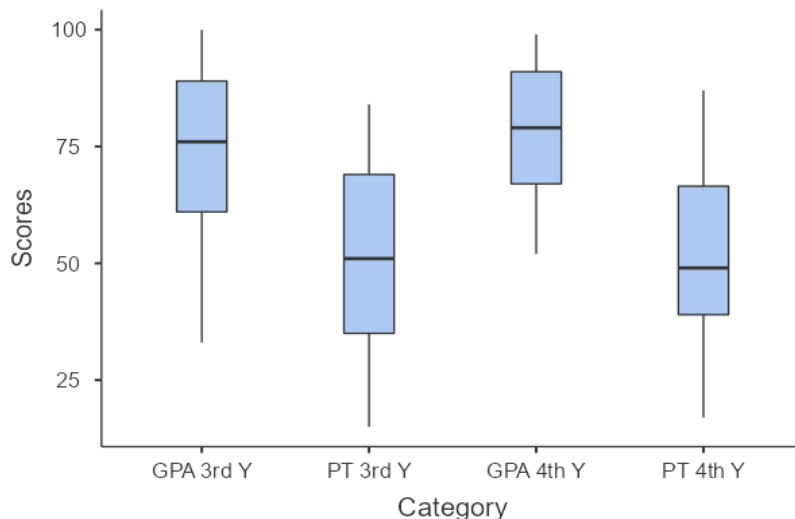


Figure 1: Box plot compared the students' progress test scores and their GPA for two academic years.

The Shapiro-Wilk test showed that the P values for all variables were less than .001 (Table 3), indicating that the data is not normally distributed as it falls below the significance level of 0.05. The Wilcoxon test will be utilized to compare variables.

2. Research Hypotheses and questions

According to Table 4, the Wilcoxon Signed-Rank Test found a significant difference in the students' PT scores between the third and fourth years ($z = -3.671, p = .000$) with a small negative effect size [$r = Z/\sqrt{N}$], $r = -0.25213$ [small effect size = $0.10 < 0.3$; moderate effect = $0.30 < 0.5$; large effect = ≥ 0.5]. Despite a notable decline in the median PT scores for the fourth year ($Md = 49$) compared to the third year ($Md = 51$), the mean rank for those who have negative ranks [$PT_4 < PT_3$] was 84.0 which is less than the mean rank for those who have positive rank [$PT_4 > PT_3$] (46.41). Additionally, the table displays that the majority of students, 86 (81%), demonstrated improvement in their second progress test ($PT_4 > PT_3$); consequently, the first hypothesis is supported.

Furthermore, table 4 shows that a significant difference exists between students' progress test scores and CGPA scores within the same academic year, which leads to accepting the second hypothesis. For the third academic year, the student's PT scores ($Md = 51$) were notably lower than their CGPA ($Md = 76$), $z = -8.228, p = .000$, showing a large negative effect size, $r = -0.5651$. Similarly, in the fourth year, the student's PT scores showed more decline ($Md = 49$) than their CGPA in the same year ($Md = 79$), $z = -8.636, p = .000$ with a large negative effect size, $r = -0.59312$. In both years, most students 96 (91%) had progress test scores lower than their CGPA.

Table 4: Wilcoxon signed rank test compared both the students' progress test scores between two academic years and their CGPA within the same academic year

		Ranks			Test Statistics	
		N	Mean Rank	Sum of Ranks	Z	Asymp. Sig. (2-tailed)
PT 4 rd Y – PT 3 rd Y	Negative Ranks	20 ^{a*}	84.00	1680.00	-3.671 ^{b*}	.000
	Positive Ranks	86 ^{b*}	46.41	3991.00		
	Ties	0 ^{c*}				
	Total	106				
PT 3 rd Y – CGPA 3 rd Y	Negative Ranks	96 ^{a**}	56.73	5446.00	-8.228 ^{b**}	.000
	Positive Ranks	10 ^{b**}	22.50	225.00		
	Ties	0 ^{c**}				
	Total	106				
PT 4 th Y – CGPA 4 th Y	Negative Ranks	96 ^{a***}	58.08	5575.50	-8.636 ^{b***}	.000
	Positive Ranks	10 ^{b***}	9.55	95.50		
	Ties	0 ^{c***}				
	Total	106				

*a. $PT_4 < PT_3$

* b. $PT_4 > PT_3$

*c. $PT_4 = PT_3$

**a. $PT_3 < CGPA_3$

** b. $PT_3 > CGPA_3$

**c. $PT_3 = CGPA_3$

***a. $PT_4 < CGPA_4$

*** b. $PT_4 > CGPA_4$

***c. $PT_4 = CGPA_4$

Spearman's rho test was chosen due to the non-normal distribution of the data. The positive moderate correlation between the students' progress test scores and their CGPAs is depicted in Table 5. It is noteworthy that students with higher CGPAs achieved higher scores on the progress test in the same academic year [$r_s(104) = 0.548, p = < .001$] for the third academic year and [$r_s(104) = 0.519, p = < .001$] for the fourth year, both of which were statistically significant. Additionally, there is a strong positive association between the students' progress test scores in the last academic year and their scores in the previous year [$r_s(104) = 0.838, p = < .001$]

Table 5: Correlation between students' progress test scores and their CGPA

		CGPA 3 rd Y	PT 3 rd Y	CGPA 4 th Y	PT 4 th Y
CGPA 3 rd Y	Spearman's rho	—			
	p-value	—			
PT 3 rd Y	Spearman's rho	0.548	—		
	p-value	< .001	—		
CGPA 4 th Y	Spearman's rho	0.944	0.565	—	
	p-value	< .001	< .001	—	

		CGPA 3 rd Y	PT 3 rd Y	CGPA 4 th Y	PT 4 th Y
PT 4 th Y	Spearman's rho	0.519	0.838	0.549	—
	p-value	< .001	< .001	< .001	—

Discussion

While the concept of the progress test is similar across different schools, the implementation may vary in content, the frequency of administration, and the grading system used. Based on the present study's findings, it can be inferred that the nursing students' attendance rate for the progress test was relatively low. This might be linked to the fact that students' participation in the PT was voluntary. This is consistent with the findings of Albekairy et al. (2021), who concluded that the attendance rate for the progress test varied from 59% to just over 97% among the 16 participating pharmacy colleges. Also, the study by de Freitas et al. (2022) revealed a notable increase in progress test adherence among medical students, with a rate of 84.9%. In contrast, students simultaneously engaged in work and studying demonstrated decreased levels of test adherence.

Thus, progress tests allow for the provision of detailed feedback on performance. Additionally, it is essential to consider the possible unintended consequences of implementing progress testing. If learners consider a progress test as trivial or too overwhelming to prepare for, it may discourage them from studying. Herrmann et al. (2020) found that non-participants in PT cited the reason for not taking the exam as insufficient time, lack of enthusiasm, or effort, and few forgot to take the test.

The finding reported that most nursing students improved on their second progress exam compared to the previous one. This finding matches the study of Alamro et al. (2023), who found that students' test scores increased with program level in every PT exam for medical students at Qassim College of Medicine (QCM) in Saudi Arabia. First-year students scored 3.0% to 7.9%, and fifth-year students 34.0% to 43.0%. Similarly, Albekairy et al. (2021 & 2023) investigated the students' overall outcomes. They reported that all 16 pharmacy colleges that participated in the study experienced a significant improvement in the percentage of students' PT scores as they progressed through the professional years of the program, indicating students' growth in knowledge retention and skill development. A systemic review by Green and Heales (2023) examined the basis for progress testing in medical education. They found that the progress test enables students to continually acquire knowledge that can be applied in their academic pursuits and professional careers rather than solely focusing on exam preparation. Studies have shown that progress tests enhance the retention and transfer of knowledge.

Controversely, Given, Hannigan, and McGrath (2016) used a retrospective results database analysis to prove the predictive validity of PT categories. They found that while the PT predicts student improvement, it does not support student growth over time. The current research data suggests that students retain knowledge better for courses completed in the same academic year as the progress test. However, there is a decline in retention over time, which indicates that the progress test is effective for testing knowledge in the short term but not for long-term retention.

The results also indicated that the student's PT scores were notably lower than their CGPA. This could be interpreted in light of the student's ability to retain the knowledge, as the progress test contains subjects from the entire curriculum, some of which may have been covered before or after the PT was administered. Curriculum design and content delivery; course structure and teaching may not reinforce learning and facilitate long-term knowledge retention; assessment alignment; mismatch between course content and progress test skills or knowledge; and test difficulty may contribute to this outcome. Comighud (2021) mentioned that the students ranked motivating practices, goal setting, and personalised learning as significant factors in memory retention, while they ranked the utilisation of teaching methodologies, learning activities, and educational tools and gadgets as extremely important.

The current research results indicated a strong positive correlation between the progress test scores and CGPA; the students with higher CGPA scores performed better on the progress test during the same academic year. In the same vein as the finding of the current study's outcomes, the College of Medicine at King Saud bin Abdulaziz University for Health Sciences (KSAU-HS) identified a positive correlation between progress test results and students' CGPAs by Al Alwan et al. (2011). Another study by Albekairy et al. (2023) revealed a positive correlation between the students' PT results and their CGPA.

Conclusion

The results conclude that progress tests are an effective means of consistently tracking a student's advancement in the program. The CGPA serves as an indicator of the nursing student's performance in the progress test. Students with higher CGPA also performed better on the PT during the same academic year.

This transformative approach seeks to enhance students' knowledge and retention of program concepts, enabling them to manage their forthcoming responsibilities effectively. Progress testing (PT) can effectively facilitate deep, meaningful, and continual learning in our learners if done thoughtfully and deliberately.

Recommendation & implication

The progress test approach seeks to enhance students' knowledge by monitoring retention of program concepts, enabling them to manage their forthcoming responsibilities effectively. Progress testing (PT) can effectively facilitate deep, meaningful, and continual learning in our learners if done thoughtfully and deliberately.

It is crucial to develop the curriculum and content in a manner that facilitates learning and enhances long-term knowledge retention. The alignment between the course topic and the abilities or knowledge assessed by the progress assessments should facilitate the student's ability to connect their knowledge throughout the exam.

To address the issue of poor attendance for PT, highlighting the importance of the progress exam at the beginning of the nursing program will assist students in assigning it similar importance to their regular assessments. In addition, incentive methods should be developed to motivate them to participate in the exam, such as providing bonus marks.

Limitation

This study's limitations included convenient sampling and a small sample size due to the low attendance rate at the progress test. The lack of comprehensive data regarding the specific questions for each course on the progress test and students' individual scores posed challenges in effectively tracking the students' advancement and retention of knowledge across the covered courses in the progress exam.

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