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Development and Validation of Student Academic Performance Scale

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Abstract
The current study aimed to develop and validate an academic performance scale for graduate and undergraduate students. A questionnaire was designed and approved by psychologists, and data was collected from 250 participants through two try-outs, involving 50 and 200 students, respectively, along with their teachers. In first tryout the data collected from 50 students, along their teachers. Then conduct second tryout in which data collected from 200 students, along their teachers also. Data was collected from different colleges and universities, and reliability and validity analyses were conducted using SPSS. After analysis the results showed that the developed scale is reliable and valid for assessing students' academic performance. This study contributes to the existing literature on academic assessment and provides a valuable tool for educators and researchers to evaluate students' academic performance.

Keywords: Academic Performance Scale, Reliability and Validity, Student Assessment, Educational Research, Scale Development.

Introduction
Academic performance is a multifaceted concept encompassing an individual's achievements in educational settings, reflecting their knowledge acquisition, skills development, and overall scholastic competence. Researchers often examine factors influencing academic performance, including socio-economic background, learning environments, and individual characteristics (Pascarella & Terenzini, 2005). The assessment of academic performance involves various metrics such as grades, standardized test scores, and class participation, providing insights into a student's intellectual growth (Hattie & Timperley, 2007). As high school ends, the student is faced with a decision: to enter the job market without specializing or pursue higher education in search of professional training capable of delivering social success. The number of students in the Brazilian university sphere has increased exponentially in recent decades (Chacon & Calderón, 2015) gauge their perception of academic life.

In this changing world educators and students need higher-order thinking and practical skills for their present and future success in their academic fields and beyond (Ashraf, et al., 2017; Gonzalez Perez, & Ramirez-Montoya, 2022; Taar, & Palojoki,2022). Teachers may facilitate the students' grow thin such a way that results in the ability to apply acquired skills and competencies in novel contexts. This kind of learning outcome calls for an ongoing quest to adopt new approaches to teaching and assessment (Tsankov, 2017).

In many types of research and current assessment system of education, the term students' academic performance has been used alternatively for the students' academic achievement, obtained marks, and final grades or scores of students (Al Hazaa et al. 2021; Farooq, et al., 2011; Hasan, et al,.2017; Jayanthi, et al,. 2014). The ultimate of this system is to achieve only high marks/scores. It is based on rote memorization and reproduction of existing knowledge. There is neither doubt about the significance of students' marks as quantitative measure nor rote memorization as the base of higher order thinking. Rote memorization provides a base for higher levels of cognitive domains (Klemm, 2007). The final marks of students are easy to assess quantitatively for shortlisting the candidates for education or job. Initially, high scores may work as a gateway to enter the selection process or into new institutions. But effective performance is unavoidable to stay in the institution, either as a learner or a worker. This practice of taking students' performance same as their achievement, underestimates the scope of performance. Academic achievement (Marks, GPA or grades) is just one aspect of students' academic performance (Davison, & Dustova, 2017). Focus on final marks/grades deviates the teachers' attention as well as students from the performance assessment and improvement. There is a need for students with high marks but not at the cost of active learners, who always try to acquire new knowledge and do efforts to equip them with up-to-date and transferable skills (Adnan, et al., 2019).

There are studies conducted on the academic characteristics of students aligned with the concept of a good, ideal, successful student or active, effective and reflective student (Chorrojprasert, 2020; DuPaul, et al., 1991; Hailikari, & Parpala, 2014; Khan & Jabeen, 2013; Klemm, 2007; O'Brien, et al., 2016; Wong, et al., 2021; Xing, et al., 2019). These indicators cannot be fully excluded while developing a reliable and comprehensive students' academic performance scale. If students have these desired academic characteristics, there is a probability that they do employ them as input to continue their process of academic performance (Nakayama, et al., 2021, Soffer, & Cohen, 2019; Vermunt, & Donche, 2017). It may be considered an uncertain predictor of their performance. There may be students who possess the high level of desired characteristics in general but do not behave as active students demonstrating these characteristics to complete the academic tasks. Only possession of the characteristics is not a valid measure of students' academic performance. For example, having the characteristic of motivation is necessary to be indicated by the learner's behaviour as being interested in learning and practicing the speaking tasks (Abdullah et al., 2019). Being too shy, feeling nervous and afraid in speaking and lack of taking responsibility is an indication that there is a deficiency found in the speaking performance of the student (Adila, & Refnaldi, 2019). It imposes the students to be engaged in subject-related academic activities, learning materials, and assignments individually and socially. There is a need to integrate these characteristics with an effort to complete academic tasks and activities (Soffer, & Cohen, 2019).

Method

Objectives

The study has the following objectives;

1. To develop the scale of academic performance.
2. To measure the reliability of academic performance scale.
3. To validation of academic performance scale.

Hypotheses

H1: Academic performance scale development and validation for adults.

H2: To developed reliable and valid academic performance scale.

Research Method
The study based on a Survey method.

Research design
The study research design was cross sectional research design for development of the academic performance scale.

Sampling techniques
Purposive sampling technique was utilized for accessing the participants

Sampling size
For questionnaire route development 10 for unstructured interviews. For pre tryout data was collected from 50 students and their teachers for final tryout data was collected from (N=200) students and their teachers total number of participants were
(N = 250).

First tryout
In first tryout total students and teachers were recruited 50 separately for data collection. Semi structured interviews conducted for getting insight of teacher's and students for academic Performance. On the base of content analysis of interviews of participants researches developed academic Performance Scale items.

Second tryout
In 2nd tryout student approached 200 participants there was equal representation was by the students and their teachers. Total participants were (N=400).

Scale Development Planning
Before the development process began, prepared a blueprint. Then, conducted unstructured interviews with the target population. Based on these interviews, developed items for the concern scale. The source screening for item development drew on unstructured interviews, expert opinions, books, previous research, and existing scales to gather ideas. The scale development process consisted of three phases and two tryouts. In the first phase, unstructured interviews were conducted. In the first tryout, items were excluded or included for further study. After the first tryout, the items were analyzed using SPSS, and the opinions of reviewers were obtained before selecting items for the second tryout. In the second tryout, the same procedure was followed, and items were selected for the final draft.

Procedure
First of all, before stating the research BS student get the approval internal departmental research committee and after approval of research topic and research supervisor student formally start research conduction process. Student gets the authority letter to the department and prepared participant consent and institutional consent for intuitional permission getting purpose. First stage to take interview from students and teachers related to academic performance and then make questionnaire for scale according to their interview. Then this scale approved from psychologists. After the approval of scale apply on undergraduate’s students and graduate’s students. Before data collection institutional consent was attained where ever was required and participants consent was get to all participants. We informed about the study purpose of the participants and clear them your participation is totally voluntarily and no obvious monetary benefits for participation. There is no any risk factor for you any time you can withdraw to research. You provided information will keep secret anonymous. After data collection process completion pay the gratitude of the all participants and institutions help us in data collection. Then edit the data, organize the data and then feed in SPSS and analyze the data and give results.

Data analysis

For proposed scale, frequency, test re test reliability, alpha reliability, regression, t-test, factor analysis, descriptive statistics convergent validity discrimination, validity construct validity and exploratory analysis will be performed to assess the item discrimination to select appropriate items for academic performance scale.

Scoring

The scale consists of two questionnaires, one for students and one for teachers, both using a Likert scale. The student questionnaire has a total score of 60, with responses ranging from 1 for agree, 2 for strongly agree and 3 for very strongly agree and for disagree -1, strong disagree, -2, very strongly disagree -3. The teacher questionnaire has a total score of 28, with responses ranging from for never 0, for rarely 1, for sometime 2 and for often time 3. The total score for the Academic Performance Scale (APS) is 88. The levels of academic performance are determined based on raw scores, with less than 22 being poor, 22-44 moderate, 44-66 high, and 66-88 very high. The raw scores are converted to standard score percentages, with 22 corresponding to 25%, 44 to 50%, 66 to 75%, and 88 to 100.

Results

Table 1: Psychometric Properties of the Population

Variables	*n*	*%*
Gender		
1. Male	24	24.0
2. Female	76	76.0
Participants		
1. Students	50	50.0
2. Teachers	50	50.0

Note. n =no of cases & %= Percentage

Table 1 is showing the psychometric properties of the target population. Male and female participation statistical values are (n=24, 24.0%; n=76, 76.0%) respectively. For students and teachers, participants' numerical values are (n=50, 50.0%; n=50, 50.0%) respectively.

Table 2: Factor Loadings and Communalities based on a Principle Components Analysis with Academic Performance Scale

Item No	Academic Performance
1	.813
2	.890
3	.913
4	.708
5	.894
6	.828
7	.860
8	.855
9	.934
10	.856
11	.891
12	.901
13	.914
14	.908

15	.877
16	.920
17	.904
18	.825
19	.896
20	.739

Note. Principal method for factor loading

Table 2 is showing the factor loading of the academic performance scale for all items. Selection criteria is (λ>0.5) just. All items are selected on the base of factor loading values. Kaiser Meyer – Olkin measure is .86 which is in acceptable range and Bartlett's test of sphericity reached statistical significance ρ<.001 which indicates that data is suitable for further analysis and extracting valid results.

Table 3: Psychometric Properties of Study Scale

Variable	N	M	SD	Range	A
APS	100	69.77	30.31	1.47-33.04	.710

Note. N=No of sample, M=Mean, SD=Standard Deviation, α=Cronbach's Alpha & APS=Academic Performance Scale

Table 3 is illustrating psychometric properties of study scale. The internal consistency of Academic Performance Scale (APS) is α=0.71. Thus this scale is reliable and valid for measuring the concern subject matter with good alpha reliability. This is the authentic construct for measuring academic performance.

Table 4: Mean, Standard Deviation and t-Values of Male and Female Students on Academic Performance Scale

	Male Students (n=24)		Female Students (n=76)				
Variable	*M*	*SD*	*M*	*SD*	*t*(98)	ρ	Cohen's *d*
APS	44.24	13.86	21.73	9.90	13.16	.006	1.8

Note. n=No of Cases, M=Mean, SD=Standard Deviation, ρ=Significance Level & APS=Academic Performance Scale

Table 4 revealed significant mean differences on academic performance scale with t (98) =13.16, ρ<.01. The findings showed that male students exhibited higher score on self-academic performance evaluation (M=44.24, SD=13.86) compared to the female students (M=21.73, SD=9.90). The value of Cohen's d was 1.8>0.80 which indicated very large effect size.

Table 5: Linear Regression Analysis for the Effect of Gender on Academic Performance among Students

Variables	B	B	SE
Constant	71.46***		13.69
Gender	-24.12***	-.73	4.91
R^2	.46		

Note. ***ρ <.001, B=Unstandardized Regression Coefficient, β=Standardized Regression Coefficient & SE=Standard Error

Table 5 shows the results of regression analysis between academic performance and gender. The R^2 value of .46 revealed that predictor variable explained 46% variance in the

outcome variable. Results indicated that gender is the negative significant predictor of academic performance (β=-.73, ρ<.001) among students.

Second Try Out

Table 6: Psychometric Properties of the Population

Variables	n	%
Gender		
3. Male	40	20.0
4. Female	160	80.0
Participants		
3. Students	100	50.0
4. Teachers	100	50.0

Note. n =no of cases & %= Percentage

Table 6 is showing the psychometric properties of the target population. Male and female participation statistical values are (n=40, 20.0%; n=160, 80.0%) respectively. For students and teachers, participants' numerical values are (n=100, 50.0%; n=100, 50.0%) respectively.

Table 7: Alphas, Test re-test and Split half Reliability of Academic Performance Scale

Construct	*N*	Items	α	Test re-test Reliability	Part A (10 Items)	Part B (10 Items)	Split half Reliability
APS	200	20	.79	.87	.84	.85	.92

Note. N=No of sample, M=Mean, SD=Standard Deviation, α=Cronbach's Alpha & APS=Academic Performance Scale

Table 7 is illustrating the alpha, test re-test and split half reliability of academic performance scale. The internal consistency of Academic Performance Scale (APS) is α=0.79. Thus this scale is reliable and valid for measuring the concern subject matter with good alpha reliability. Test re-test reliability is (=.87) this is also higher and showing the external reliability. The internal consistency of the Academic Performance Scale which is very high (=.92) higher internal consistencies of the scale and for the two sub factors of the scale, thus this is the reliable for measuring the academic performance of the students.

Table 8: Mean, Standard Deviation and t-Values of Teachers and Students on Academic Performance Scale

	Teachers (n=100)		Students (n=100)				
Variable	*M*	*SD*	*M*	*SD*	*t*(198)	ρ	Cohen's *d*
Academic Performance Scale	69.08	22.12	52.84	13.05	6.32	.000	0.89

Note. n=No of Cases, M=Mean, SD=Standard Deviation & ρ=Significance Level

Table 8 revealed significant mean differences on total academic performance with *t* (198) =6.32, ρ<.001. The findings showed that academic performance evaluation of the student by the teachers is higher (*M*=69.08, *SD*=22.12) as compared to the student's self-academic performance evaluation (*M*=52.84, *SD*=13.05). The value of Cohen's *d* was 0.89>0.80 which indicated large effect size.

Table 9: Level of Academic Performance on the base of percentage

f	%	Levels
Less than 22	25	Poor
22-44	50	Moderate
44-66	75	High
66-88	100	Very high

Note; f=frequency, %=percentage

This table categorizes levels of academic performance based on a percentage scale. It specifies five distinct confidence levels. O-22 indicates a person's complete lack of academic performance, 22-44 indicates a moderate level of academic performance, and 66-88 indicates an extremely high level of academic performance.

Validations of Academic Performance Scale

Criterion Validity

Table 10: Criterion Validity of Academic Performance Scale

Variables	1	2	3
1. Grade Points	-		
2. Academic Performance	.73**	-	

Note. N=No of sample, M=Mean, SD=Standard Deviation &**ρ<.01

Table 10 is illustrating the criterion validity of academic performance scale. The findings indicate that grade points has significant positive correlation with academic performance (r =0.73, ρ< .01) which indicate that academic performance scale holds criterion validity.

Discrimination Validity

Table 11: Discrimination Validity of the Academic Performance Scale

Variables	1	2
1. Academic Performance	-	
2. Personality	-.63**	-

Note. N=No of sample, M=Mean, SD=Standard Deviation &**ρ<.01

Table 11is depicting the discrimination validity of the academic performance scale. The findings indicate that there is negative and moderate correlation between academic performance and personality (r =-0.63, ρ< .01) which is indicating that the construct academic performance scale holds discrimination validity. Discrimination validity is indicating that this scale is just measuring academic performance not any personality variable or other parameter.

Discussion

The aim of the current study is to develop the valid and reliable scale which measure the level of academic performance of students. There is not any validated academic performance scale in Pakistan that are useful to measure the academic performance for teachers and students.

First hypothesis is the academic performance scale development. The development of academic performance tailored specifically for students is motivated by the profound significance of academic performance in student's development. This assumption proved be true by the table no 2, we validate 20 item questionnaire and panel review on it. Then, researcher collect data from the 50 students and their teachers for the first draft, where 100 participants were participating. After analysis all items were proved. After that 20 item

questionnaire were applied on 200 students and their teachers to assess a student's level of achievement within an educational set. Exploratory Factor Analysis was performed. The criteria set for loading <0.5. All items selected on the base of factor loading values. There were not any values which was less than 0.5. The factor Kaiser-Meyer- Olkin measure was .86 which was acceptable range and Bartlett's test was also significant (p<.000). Academic performance questionnaire proved that it is a valid scale. Jabir and Farooq (2022) Development and validation of students' academic performance scale for higher secondary school level. The scale is developed to measure students' academic performance scale for higher secondary school level. Data were collected from 1035 higher secondary school level students enrolled in public sector colleges and higher secondary schools. Initially, 52 statements were developed by integrating the students' academic characteristics, students' performance domains, and academic listening, speaking, reading, and writing tasks. Finally, 24 statements were retained after applying the Exploratory Factor Analysis (EFA). It resulted in two distinct sub-factors of Students' Individual Performance (SIP) and Students' Group Performance (SGP). Content validity was determined by eight national and international experts' opinions. The reliability coefficient was found (α=.74) for the said scale. Findings of the research indicate that Students' Academic Performance may be used as a reliable and holistic measure by the educational stakeholders for higher secondary school level students.

The second hypothesis is to develop the reliable and valid academic performance scale. This assumption proved true by the table no 3, 7 and 10. In first draft of data collection, the alpha reliability of academic performance scale was .71 which has good reliability while in second draft of data collection, the alpha reliability of the academic performance scale was .79 which also shows the good reliability. The test re test and split half reliability were also analyzing by SPSS. The split half method divides a scale into equivalent halves and correlate the both. The test re test reliability requires administration of a scale on two time on the same examinee. The result reveal that the academic performance scale is reliable. In term of validity, which refers to the degree to which an instrument is effective in measuring what it is supposed to measure. For the validity testing, the criterion validity, construct validity and discrimination validity were analyzing by SPSS. Table 10 indicate that grade points has significant positive correlation with academic performance which indicate that academic performance scale holds criterion validity. The construct validity shows that there is a significant association among all items. For the discrimination validity test, Ten Inventory Personality were used to discriminate with academic performance scale which shows that academic performance is negatively correlate with Ten Inventory Personality. So the hypothesis has proven that the academic performance scale is valid and reliable. Abubakar et al. (2018) conducted the study "Adaptation of the Global Academic Performance Scale Reliability and validity study". The purpose of this study is to test validity and reliability of 12 items, and to measure the academic perceptions of academic staff on global academic performance. Data was collected from 198 participants determined by convenience sampling method. The findings show that Inter correlation with other related measures (.52 to .75) were significant and in the expected direction.

Implication

The implication of academic performance scale development for students are:

1. The Academic Performance Scale (APS) can be used to identify areas where students need improvement, enabling targeted interventions and support.
2. It can help teachers evaluate their teaching methods and adjust them to better meet students' needs.

3. It can help students set goals and monitor their progress, promoting self-directed learning.
4. It can keep parents informed about their child's academic performance, enabling them to provide support and encouragement.

Recommendations

Following are the recommendation of Academic Performance Scale are:

1. Based on the good reliability of this scale, other studies should also use this measure for testing its reliability and validity again and again.
2. This study must be ensuring that the scale is culturally sensitive and inclusive, accounting for diverse backgrounds and experiences.
3. Design different versions of the scale for different age groups to ensure the questions are developmentally appropriate.
4. Studies ensure that the scale is easy to administer and interpret, providing clear instructions and scoring guidelines.
5. Provide training for educators, counselors, and mental health professionals on how to administer the scale and interpret the results effectively.
6. Regularly update the scale based on new research findings and feedback from users to maintain its relevance and effectiveness.

Conclusion

In conclusion, the development of the Academic Performance Scale (APS) research has led to the creation of a reliable and valid instrument for measuring academic performance. The APS has the potential to provide a comprehensive assessment of academic performance, including cognitive and non-cognitive factors. This scale helps to identify areas where students may need additional support or enrichment. This scale will facilitate the evaluation of academic programs and policies. This will enhance student learning outcomes and academic achievement. This scale will help in self-assessment and individual assessment. Researchers, educators, clinical psychologist will use academic performance scale for the assessment of the individual and can gain deeper insights into the factors that influence academic performance during this critical life stage.

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