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Development And Validation of Students' Academic Performance Scale For Higher Secondary School Level

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Abstract: *The aim of this study was to develop and validate a comprehensive instrument to measure the holistic academic performance of higher secondary school-level students in Pakistan. Data were collected from 1035 higher secondary school level students enrolled in public sector colleges and higher secondary schools. Content validity was determined by eight national and international experts' opinions. The reliability coefficient was found ($\alpha=.74$) for the said scale. 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) and Confirmatory Factor Analysis (CFA). It resulted in two distinct sub-factors of Students' Individual Performance (SIP) and Students' Group Performance (SGP). 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.*

Key Words: Students' Academic Performance, Higher Secondary School Level, Individual Performance, Group Performance, Holistic Performance

Introduction

Students are to be equipped with more knowledge and skills in meeting 21st-century challenges. They are supposed to perform their assigned academic tasks related to reading, writing, listening and speaking proficiently. Their academic performance involves not only their individual performance but also their group performance. As social beings, they cannot live and survive without interaction, cooperation, communication and teamwork with

fellows and teachers within educational institutions. These are important indicators of students' group performance. Individual performance and group performance of the students are essential to be an ideal and successful student in the current learning century. These two distinguished dimensions comprehensively cover the desired characteristics and behaviours of students to complete their academic tasks successfully. It involves students' cognitive, affective, psychomotor, and social

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domains for the completion of academic tasks through listening, speaking, reading, and writing activities.

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' growth in 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).

There are different practices to assess the students' academic performance directly and indirectly. It includes students' academic achievement, academic characteristics of a good, active or ideal student, domains of students' academic performance, and completion of academic tasks (listening, speaking reading, writing and performance in other activities). The students' academic performance measurement may be divided into two components: (a) Taking the students' academic performance as a *product* and (b) Taking the students' academic performance as a *process*. Students' academic performance is taken as a "*product*" when teachers and researchers consider students' academic achievement scores as their academic performance. They focus only on students' test scores overlooking the formative assessment and holistic performance of the students. On the other hand, students' academic performance is taken as a "*process*" when teachers and researchers consider students' academic characteristics, domains of performance, and completion of academic tasks. Both of these approaches may be considered side by side for a holistic assessment of students' performance. It needs to keep track of the progress of students' performance.

These all said practices play a significant role to measure and improve the students' academic performance. Considering the single approach or practice restrict the scope for the holistic nature of students' academic performance. In the following section, some limitations are described created by the previous measures of students' academic performance.

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 practising 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 ([Soffer, & Cohen, 2019](#)). There is a need to integrate these characteristics with an effort to complete academic tasks and activities.

There are many studies conducted on the students' academic performance classifying it into domains: cognitive, affective, and psychomotor. Some of these researches considered four domains by adding the social domain of students' academic performance along with the cognitive, affective, and psychomotor domains ([Abun, et al., 2019](#); [Agustian, 2022](#); [Ahmad, et al., 2018](#); [Cleveland-Innes, & Campbell, 2012](#); [Gyurova, 2020](#); [Hamid, et al., 2012](#); [Herman et al., 2018](#); [Jureviciene, et al., 2012](#); [Kasilingam & Chinnavan, 2014](#); [Liu, & Read, 2020](#); [Mallillin, 2020](#); [Paroginog, et al., 2018](#); [Rovai, et al., 2009](#); [Topor, et al., 2010](#)). The element of focus is a cognitive domain indicator, being interested and willing is an affective domain indicator, movement and posture as a psychomotor domain indicator, and interaction is a social domain indicator. It is good to expand the scope of academic performance beyond the cognitive domain. It covers all domains of learning and accomplishments. It is beneficial to gauge all these domains on the same scale as there is interconnecting students' cognitive, affective, and psychomotor learning and experiences. But there is still a need to measure many desired characteristics instead of limiting them to very few aspects. There is also a need to study these characteristics collectively manifesting into academic tasks.

Bloom's Taxonomy is also followed to develop subject-specific instruments dividing students'

performance into three categories (cognitive, affective and psychomotor domains). This practice covers the three domains of students' learning indicating the standardized level of the taxonomy. Most researchers utilized it in the experimental research for practice and science subjects such as physics, chemistry, medical, sports, and fine arts ([Astra, & Henukh, 2021](#); [Enneking, et al., 2019](#); [Galloway, Malakpa, & Bretz, et al., 2016](#); [Mirzeoglu, 2014](#); [Suhendi, et al., 2018](#)). It is an effective way for in-depth measurement of students' academic performance in a single and practical subject. But the limitation of this measurement includes that it ignores the comprehensive measurement of students' academic performance in non-practical subjects. This is mostly used to develop the research tools for experimental studies which cannot be adopted effectively for descriptive and relationship studies.

Students' performance is also considered a signal academic task; like students' listening performance, students' speaking performance, students' academic reading performance, students' academic writing performance, or students' other tasks performance. The research that has been conducted on linguistic perspectives combined listening, speaking, reading and writing performance ([Chen, & Zhang, 2020](#); [Hadah, et al., 2020](#); [Liao, et al., 2021](#); [Liu, 2022](#); [Rasheed, et al., 2022](#); [Rukthong, & Brunfaut, 2020](#); [Xu, 2021](#); [Zeng, 2022](#)). This practice is significant but there is a limitation that these studies did not keenly focus on adjectives which may be extracted from four domains; cognitive, affective, psychomotor and social. For the effective assessment of the students' performance indicating adverbs or adjectives may be stated. It would assist to understand that performance is quicker, accurate, better and so on ([Hamid, et al., 2012](#)).

Assessment of students' academic performance call for a rigorous tool to fulfil the requirement of validity, reliability and usability. It may assist to identify the learning outcome and its attained level ([Petra, et al., 2020](#)). Researchers and educationists may not neglect the holistic skills set while developing measures for students' academic performance ([Huerta, et al., 2021](#)).

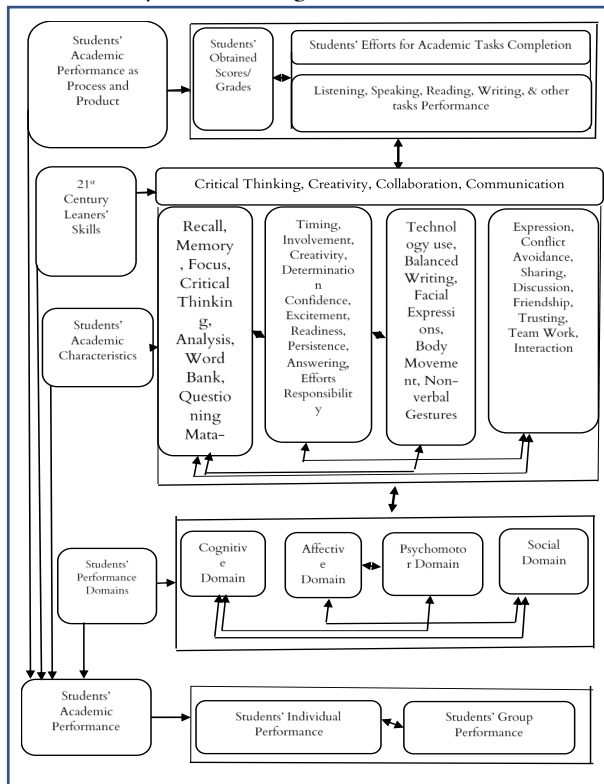
Students' academic performance may be categorised into two distinct dimensions

comprehensively: students' individual performance (SIP) and students' group performance (SGP). Students perform individually as well as in groups (Zhu, *et al.*, 2020). Students' individual performance indicates their intrapersonal characteristics. It involves individuals' characteristics like managing one's own emotions and behaviours to achieve learning goals, intellectual openness, flexibility, adaptability, resilience, curiosity for learning, self-regulation and metacognition. On the other hand, the performance of students in groups indicates their interpersonal characteristics. It is comprised of different characteristics such as expressing ideas, interpreting and responding to others' messages, teamwork, communication, listening others, leadership roles and empathy (Huerta, *et al.*, 2021). Students are needed to develop these types of performance and competence for self-management and handling relationships with others (Arifin *et al.*, 2012; Arifin, & Yusoff, 2016; Goleman, 1995).

In the education system, considering the attained numbers (marks) or letters (grades) by the students as an actual and only indicator of their holistic and scholastic attainment is not a valid measure (Schinske, & Tanner, 2014; Wong, 2020). Research indicates that the ultimate focus of the education system on students' grades is a key barrier to being more innovative (Schinske, & Tanner, 2014). It is a question mark for the effectiveness of students' academic performance measures. The review of relevant literature and research scales reveals that this gap is also present there regarding the availability of holistic research instruments for gauging students' academic performance. There is a need for developing new authentic and holistic measures (Kurniawati & Sukardiyono, 2018). Delimiting the scope of an operational definition for students' academic performance creates a gap in formative assessment effectiveness. There is a need to broaden the definition of students' academic performance to assist the teachers, learners and researchers to produce competent graduates.

Theoretical Framework of the Study

Theoretical framework of the study was following.



Objective of the Study

The objective of this research was to develop and validated a scale based on a holistic academic performance approach for students at the higher secondary school level.

Students' Academic Performance Scale (SAPS) for Holistic Assessment

Transforming the conventional assessment system to a holistic assessment guarantees students' development and success. Teachers may consider the academic observable behaviours of the student (process measure) along with obtained scores (product measure) for their holistic performance. Revisiting the scope for the term of students' academic performance will be helpful for the teachers, students and educational researchers. Students' Academic Performance Scale (SAPS) will help the teachers to evaluate the students' academic performance holistically. They will be able to identify and monitor the objectives related to students' individual performance and their group performance during their teaching and formative assessment process. Teachers will be able to modify their class activities according to the performance needs of their students. As the design and implementation of formative assessment are dependent on how the teacher perceives the meaning and scope of formative assessment ([Yan, et al., 2021](#)).

Student Academic Performance Scale (SAPS) may be directly helpful to higher secondary school level students. Students' participation to improve their own performance is essential ([Wylie, & Lyon, 2020](#)). It may help them to self-regulate their academic behaviours as students may monitor their regular progress on given academic assignments ([Yan, 2020](#)). They may be a reflective student by measuring and identifying the weak areas of their academic performance by using this performance scale. It will direct them to work on their weak area of academic performance.

Educational researchers will be able to study students' academic performance comprehensively in their research. Researchers will be able to measure students' holistic academic performance instead of

considering their obtained scores only. It will result in holistic improvement of their subjects (students) for their individual and group performance related to academic assigned tasks through experimental research.

This study is delimited to measure Students' Individual Performance (SIP) and Students' Group Performance (SGP) with the reference to their academic tasks and activities inside or outside the educational institution. It did not aim at measuring students' performance related to non-academic individual or group tasks.

In this study, researchers used a deductive approach. It is based on a review of the relevant literature as well as an in-depth assessment of existing scales to develop the items and factors ([Hinkin, 1995](#); [Hyder, & Farooq, 2022](#)). It indicated that there is a need for a new measure of students' academic performance to be developed and validated aiming at their holistic assessment. It should be comprised of all types, characteristics, and domains of students' performance indicators to reduce the maximum limitations of previous measures. Primarily, 52 items were developed for the construct of students' academic performance. The response range for developed items was one to five for students, 1=Never, 2=rarely, 3=Sometimes, 4= Often, and 5= Always represent respectively.

The data for the development and validation of SAPS were collected from 1035 higher secondary school level male and female students. These students were enrolled in public sector colleges and higher secondary schools. A simple random sampling technique was used to select students from four districts of a province of Pakistan. Data were collected by visiting the educational institutions by the researchers after getting the permission of institutional heads. A minimum number of students as a sampling of the study may be 260 students. Literature indicates that the minimum number of respondents is five per item on the scale ([Lamm, et al., 2020](#)). Sampling adequacy for each variable is checked by applying the Kaiser-Meyer-Olkin value and Bartlett's test of sphericity to apply Confirmatory Factor Analysis ([Nyongesa, et al., 2020](#)). Both of these statistical measures assess the factorability of given data ([Shrestha, 2021](#)).

The researcher requested expert opinions from language teachers, higher secondary school teachers and researchers working in the area of students' academic performance to review the developed statements for the proposed scale. Face validity and content validity of the Students' Academic Performance Scale (SAPS) were ensured through the opinion of eight national and international experts. It included suggestions to decrease the length of sentences, change the difficult words and for removing the repeated words.

Validation of scale is a significant phase after developing the questionnaire to ensure valid results

(Yusoff, *et al.*, 2021). It requires three types of tests. It includes the test of dimensionality, test of reliability, and test of validity (Boateng, *et al.*, 2018). Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) was applied as these are common tools to ensure the validity and reliability of the newly developed scale. CFA is used to verify the factors discovered by EFA earlier. CFA results in a good fit most likely when the same data is being tested for creating and verifying the structure of scale (Gunawan, *et al.*, 2021). EFA is to determine the underlying structures as factors or latent variables. CFA is used to verify these structured factors whether fit (Knehta, *et al.*, 2019).

Table 1. Exploratory Factor Analysis for Distinct Dimensions of Students' Academic Performance Scale

S. No	Item No	Constructs	1 st Dimension Students' Individual Performance	2 nd Dimension Students' Group Performance
1	1	Classification of the Written Content (CWC)	.503	
2	2	Time Management for Reading & Writing Tasks (TRW)	.540	
3	3	Creation in Note Making (CNM)	.571	
4	4	Critical Thinking for Question (CTQ)	.593	
5	5	Application-based Answering (A-BA)	.526	
6	6	Word Bank for Writing (WBW)	.547	
7	8	Active Participation in Discussions (APD)	.539	
8	9	Determination for Writing Challenges (DWC)	.545	
9	14	Confidence during Aloud Reading (CAR)	.543	
10	17	Persistence for Reading Performance (PRP)	.566	
11	18	Readiness to Answer the Questions (RAQ)	.545	
12	19	Academic Use of the Internet (AUI)	.573	
13	25	Facial Expression during Speaking (FES)	.571	
14	33	Visual Expression in Writing (VEW)	.507	
15	34	Balanced Hand Writing (BHW)	.539	
16	36	The excitement of Learning (EoL)	.550	
17	38	Sharing of Learning Experiences (SLE)		.587
18	39	Efforts for Good Relationship (EGR)		.668
19	40	Help-Seeking Behavior (HSB)		.740
20	43	Communication for Solving Problems (CSP)		.706
21	45	Making Competent Friends (MCF)		.669

S. No	Item No	Constructs	1 st Dimension Students' Individual Performance	2 nd Dimension Students' Group Performance
22	47	Stay in touch for Study Purpose (SSP)		.701
23	49	Reviewing the Test Performance (RTP)		.587
24	51	Patience for Conflict Avoidance (PCA)		.529

Table 1 describes the Exploratory Factor Analysis (EFA) output for the Students' Academic Performance Scale. It indicates that out of 52 items, 24 items are retained after running the Explanatory Factor Analysis (EFA). In coefficient display format, absolute values less than .5 were removed. Items were divided into two sub-factors (sub-dimensions) related to students' academic performance. The first factor consisted of items; 1, 2, 3, 4, 5, 6, 8, 9, 14, 17, 18, 19, 25, 33, 34 and 36. The second factor

consisted of items; 38, 39, 40, 43, 45, 47, 49 and 51. Statements including 7, 10, 11, 12, 13, 15, 16, 20, 21, 22, 23, 24, 26, 27, 28, 29, 30, 31, 32, 35, 37, 41, 42, 44, 46, 48, 50, and 52 were removed by EFA using the cut point value of 0.5. Factor one is named as students' individual performance and factor two as students' group performance according to the concepts and categories of divided items through EFA to factor one and factor two. The theoretical framework of holistic student performance also supported this division of items.

Table 2. Bartlett's Test and Kaiser-Meyer-Olkin Measure of Sampling Adequacy for SAPS

Factors	Total	Kaiser-Meyer-Olkin	Bartlett's Test Sig.
Student's Academic Performance	24	.92	.000

Table 2 indicates that the KMO value for 24 items is .92. The KMO values between 0.8 to 1.0, 0.7 to 0.79, and 0.6 to 0.69 shows that sampling is adequate, middling and mediocre respectively. It is directed that there should be taken remedial action present regarding sampling when the KMO value is less than 0.6. KMO value of < 0.5 indicates that factor analysis of the present data would be not suitable (Shrestha, 2021). The good value for the

Kaiser-Meyer-Olkin and Bartlett's test of sphericity reaching statistical significance (P=.0000) proposes that data is suitable for factor analysis. The research data is considered extremely suitable to apply further tests and extract information when the KMO value is greater than 0.8 (Li, & Qin, 2022). This table indicates that data is well suitable for further analysis and extracting valid results.

Table 3. Reliability of Student Academic Performance Scale and its Sub-dimensions

S. No	Factors	Statement Nos.	Items	Total	Cronbach Alpha
1	Sub-dimension One	Students' Individual Performance	01-16	16	.80
2	Sub-dimension Two	Students' Group Performance	17-24	08	.84
3	Total Scale	Academic Performance Scale	01-24	24	.75

The calculated coefficient of reliability was found .80 and .84 for Student's Individual Performance (SIP) and Student's Group Performance (SGP) respectively (Table 3). The first sub-scale of the study included 16 statements and the second sub-scale of the study comprised eight statements. The calculated coefficient of reliability for the total Students' Academic Performance Scale (SAPS) was found .75. It consisted of a total of 24 statements.

Consistency or reliability value has ranged from not acceptable to excellent (0 to 1) in literature. The value being closer to 1 indicates more internal consistency of the variables. A value less than 0.5 is not acceptable, greater than 0.5 is poor, greater than 0.6 is questionable, and greater than 0.7 is acceptable. Its value greater than 0.8 is termed good while a value greater than 0.9 is considered excellent (Al-Rubaish, et al., 2011; Akande, et al., 2020;

Rodrigues, *et al.*, 2021; Tapsir, *et al.*, 2018). These results indicate that both sub-dimensions; students' individual performance and students' group performance are good and the total Students' Academic Performance Scale is acceptable to measure the higher secondary school level student' academic performance.

Table 4. Loading Confirmatory Factor Analysis for Students' Academic Performance Sub-dimensions

S. No	Statement	Factor Loading
Sub-dimension One: Students' Individual Performance		
1	I can discriminate between minor information and major idea of the content.	.50
2	I complete my reading and writing tasks daily.	.50
3	I make notes for my subjects in an innovative way	.53
4	I ask the teachers different questions for teaching chapter	.54
5	I attempt application-based questions during class tests.	.58
6	I am able to write the central idea of the content in my own words.	.52
7	I ignore the distractive thoughts to focus on discussions.	.50
8	I am not scared by lengthy assignments.	.48
9	I am confident to enjoy aloud reading in class.	.51
10	I redouble the effort If I get low remarks about my reading performance	.50
11	I remain relaxed during oral and written class tests.	.51
12	I download audio and videos from the internet related to my subjects.	.47
13	I keep a smiling face during a discussion with my teachers and peers.	.52
14	I draw tables and figures to improve visual expression during writing.	.54
15	I maintain neat handwriting throughout the paper.	.47
16	I am excited to learn something new every day.	.47
Sub-dimension Two: Students' Group Performance		
17	I share my learning experiences with my friends and teachers	.52
18	I put effort to maintain good relations with my class fellows and teachers.	.61
19	I seek help from my fellows to get a better understanding of the lessons.	.72
20	I communicate with teachers to solve my learning difficulties.	.66
21	I make motivated friends in class to improve my performance.	.63
22	I contact my class fellows for study discussion through mobile.	.63
23	I discuss my test performance with my subject fellows.	.50
24	I communicate patiently with my classmates while they are angry	.45

Table 4 shows the loading results of Students' Academic Performance Sub-dimensions through applying the Confirmatory Factor Analysis (CFA). The average factor loading conducting CFA in the

present study was .45. There is no hard and fast rule for factor loading as acceptable strength depends upon the theoretical assumed relationship of items and factors. The item may have lower factor loading

due to being at a theoretical distance from its factor but still is considered as essential part of that factor. Researcher may include low factor loading item on theoretical argument (Knekta, et al., 2019).

According to the literature, average factor loading may be ranging to .32 or from .40 to .70. or .90 (Knekta, et al., 2019; Tabachnik et al., 2021).

Table 5. Model Fit for Students' Academic Performance Scale

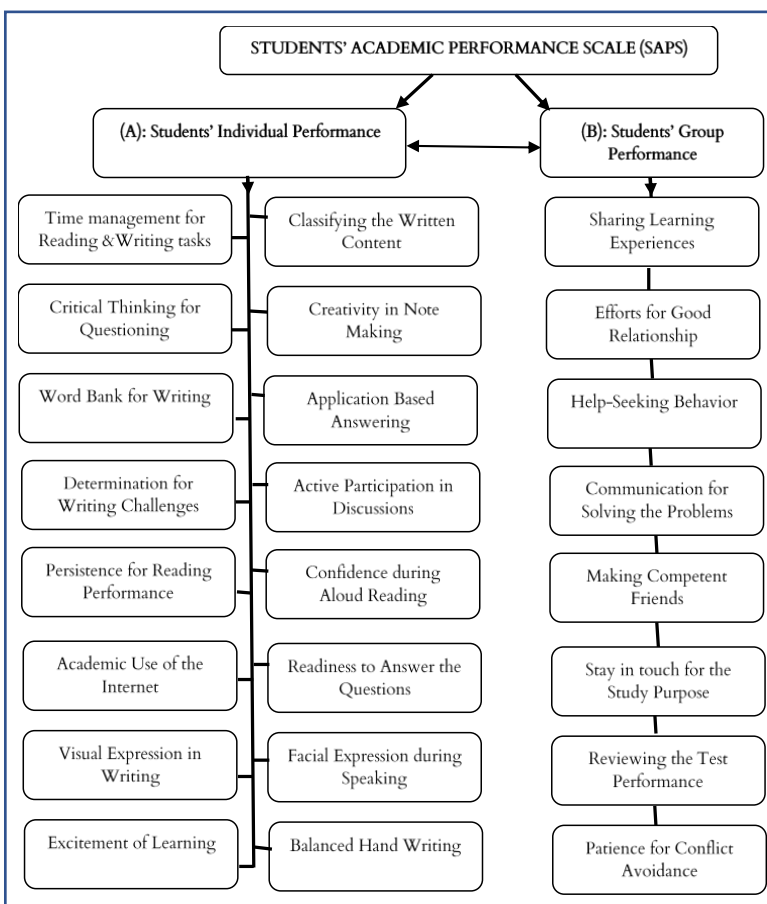
Indicators	RMSEA	NFI	RFI	TLI	CFI	CMIN/DF
Values	.03	.90	.90	.92	.93	2.372

Table 5 shows the output values of AMOS. Finally, there are values .03, .90, .90, .92, .93, and 2.37 for RMSEA, NFI, RFI, TLI, CFI, and CMIN/DF respectively consisting two factors and 24 items. Acceptable values are if RMSEA is equal to or less than 0.08, CFI and TLI are equal to or more than

0.90. It indicates excellent when RMSEA is equal to or less than 0.06, CFI and TLI are equal to or more than 0.95 (Kenta, et al., 2019; Nyongesa, et al., 2020; Rodrigues, et al., 2021; Tabachnik et al., 2021).

Conceptual Framework of the Study

Conceptual framework of the study was following



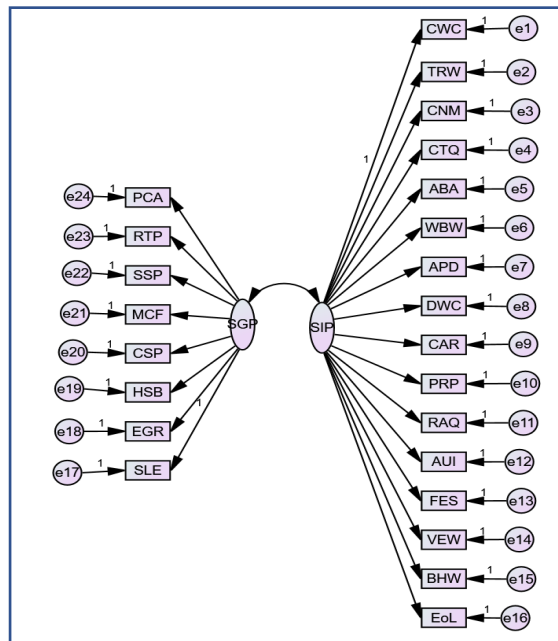


Figure 1: Confirmatory Factor Analysis for Students' Individual Performance and Students' Group Performance

The full form of abbreviations of this diagram (Figure 1) is given in Table 1. It is concluded by the extracted values through Exploratory Factor Analysis and Confirmatory Factor Analysis that SAPS is a valid and reliable scale to measure students' academic performance holistically and effectively. It may assist the researchers, educators and learners effectively to understand the framework of students' holistic performance.

Conclusion

It is concluded that the students' academic performance is not limited to students' achieved scores only. It is recommended that students' academic performance may be considered as a process as well as a product. Teachers and students may observe students' academic performance as a process through the integration of students' cognitive, affective, psychomotor and social

performance in the completion of the academic listening, speaking, reading, and writing tasks. Broadly, teachers may observe the students' *Individual Performance* and *Group Performance* during the teaching-learning process. SAPS is recommended to measure the students' academic performance holistically at the higher secondary school level.

Future Calls

Experimental research may be conducted for gauging higher secondary school level students' academic performance in the light of the holistic form of students' academic performance. Quantitative and qualitative research may be conducted to define students' academic performance according to the nature of their studies: Technical education, Science education, Special education or ICT.

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