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Identifying the Learning Style of the University Students in Bangladesh: Evidence from a Cross-sectional Study

Nusrat Jahan Borna[1*], Farabe Khan Alif[1], Taslima Akter[1], Md. Moyazzem Hossain[1] and Nahid Salma[1]

[1]Department of Statistics and Data Science, Jahangirnagar University, Dhaka-1342, Bangladesh

Abstract

There has been much discussion about learning styles throughout the years, and many scholars have categorized them into different styles. This study aims to identify the learning style among undergraduate students of Jahangirnagar University, Bangladesh. At Jahangirnagar University in Dhaka, Bangladesh, across-sectional study was conducted among undergraduate students. The primary data were collected from 572 undergraduate students of Jahangirnagar University. This is the first study where the Learning style scale (LSS) was used and the reliability was checked by Cronbach Alpha coefficient (α =0.822). Factor analysis is used to minimize the dimension of the LSS questionnaire. Data were analyzed using the SPSS version 25.0 software. Findings revealed that the majority of students had a cumulative grade point average (CGPA) belongs 3.25-3.75, and only 8.6% of students scored between 3.75-4.00. Compared to 62% of female students, 38% of male students had CGPAs between 3.50 and 3.75. Surprisingly, 40.6% of the undergrads studied for no more than 7 hours per week, and 33.9% of the students studied for 8-14 hours per week. Moreover, 76% of students preferred the traditional physical i.e., offline examination system over online exams. After rotation, the first, second, third, fourth, fifth, and sixth factors account for 13.242, 10.521, 10.362, 8.937, 7.904, and 7.074% of the total variance, respectively. In factor 1, the item "I learn better when I watch an educational program" has the highest loading of 0.700. The factor loadings suggest that most of the items positively contribute to the learning style. The authors believed that the study findings would be helpful to the students to make a study plan for achieving good academic performance.

Keywords: Examination preference, Factor analysis, Gender, Learning style, Learning style scale (LSS), Undergraduate students.

Introduction

Learning is a procedure through which a persisting revolution happens in life[1]. Learning style is one of the most considerable aspects of learning [2]. Generally,

[*]Author for Correspondingemail: nusratjahanbornaju@gmail.com

learning styles deal with a person's adaptation of absorbing knowledge [3]. It basically attributes to the mode of direction that is most efficient for somebody [4]. More broadly, "learning styles are cognitive, affective, and physiological traits that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment" [5]. Learning styles vary from person to person due to differences in cognitive processing [6]. These differences may manifest itself in 'lifestyles' and even in personality types [7]. As per the Amended National Education Act 2002, it is distinctly stated in section 22 that "education shall be based on the principle that all learners are capable of learning and self-development, and the learners are regarded as the most important. The teang-learning approach should aim at enabling learners to develop themselves at their own pace and to achieve their full potential". Primitively, "learning styles" research was analogous to the theoretical realm of psychology. In recent decades, as these types of research advanced into other disciplines, enormously in the education sector, it started to impact teaching and learning habits [8] It is a common belief that for a prosperous higher education, learning styles are vital pillars. Authors have expressed that the idea of learning styles can be essential for instructors and learners. Understanding the distinction in learning styles gives educators a way to accommodate their teaching approaches with the preferences of their learners [9].

To meet the expanding application of knowledge-based economy, information, and communication technology, trainee-oriented acquirement is crucial [3]. To encourage students' compatibility with the advanced academics as well as to meet their preferred learning styles, it is paramount that lecturers amend and suit their coaching schemes and classify their efficiency [10]. The discrepancy between the learners and the teachers' way of schooling and a student's absorption technique seems to be a learning hindrance within the classroom [11]. Thus, it becomes obvious for an educator to analyze the learning style of learners to be able to utilize different methods of teaching that perfectly suit his pupils in his classroom [12]. A previous study highlighted that there was a significant difference in learning style preferences between genders [13]. Researchers pointed out that female students had more diverse style preferences than male students in Saudi Arabia [14]. Previous studies highlighted that the multimodal learning style was preferred by most of the students [15,16]. In comparison to high achievers who chose multimodal techniques, students with poor academic records picked unimodal styles. Gender, public/private sector, and academic record all have an impact on learning style preferences [17]. A significant relationship was observed between gender and single-modal learning styles [18]. Students from different disciplines used different learning styles [19]. A study highlighted that participant learning style was significantly associated with higher academic performance [20]. Online tutors can minimize their teaching burden by incorporating the option of asking each other for assistance because learners

themselves act as a teaching resource [21]. Even though the students appear to share a common interest, researchers indicate that different teaching approaches can be used for their students based on their learning styles [22]. However, in the context of Bangladesh, no study has been found that considers university students to identify their learning styles. In order to fill up this gap, the authors aimed to identify the learning style of university students. This study is hoped to generate evidence that will help the university students of Bangladesh to succeed in life.

Methodology

This study is based on the primary data collected from second through fourth-year undergraduate students of different faculties of Jahangirnagar University, Bangladesh from 10 May 2022 to 30 June 2022, as the data was collected in this time frame. For the data collection, a structured questionnaire was used which was pre-tested among 20 students before the final data collection, however, they were excluded from the actual study. A sample of 572 students was taken of which 258 (45.1%) were male and 314 (54.9%) were female pupils. The sample was taken by multistage stratified-cluster sampling. To learn more about multistage stratified cluster sampling the authors recommended reading the materials available in [23]. The faculties were treated as four different strata, which are, Science, Arts, Business, and Social Science. Then multi-stage cluster sampling was conducted on each of the strata using proportional allocation. To gather information, the authors performed a face-to-face interview. Participants were requested to voluntarily participate in the study before the data-gathering process began. They received guarantees of the privacy of both their personal information and identities. Following the approval of an informed consent form for study participation, data collection began. Luckily, the study has no non-response case. Statistical Package for Social Sciences (IBM SPSS, version 25.0) was used for the statistical analysis of the data. Descriptive statistics, frequencies, and percentages were calculated to summarize data. The authors used the learning style scale that is available in[24]and were examined using factor analysis.

Results

Reliability analysis was done to determine the items' overall or even internal dependability. For this purpose, Cronbach's Alpha was used to test the data's reliability and its value is 0.822 which is higher than the acceptable threshold of 0.70 [25,26] and a value range between 0 and 1, with a value close to 1 offering greater reliability [27]. Table 1 provides the percentage distributions of the background characteristics of the respondents. The study included 572 undergraduate students from different faculties of Jahangirnagar University, Bangladesh. Among them, there were 294 males and 314 females. Most of the respondents (54%) were from 3rd year,

and 27.4% and 18.5% of students were from 2nd and 4th years respectively. The majority of the pupils were between the ages of 20 and 25 years [Table 1].

Table 1. Percentage distributions of background characteristics of the respondents

Characteristics		**Number of Students**	**Percent**
Gender	Male	258	45.1
	Female	314	54.9
Faculty	Arts	89	15.6
	Science	273	47.7
	Social Science	118	20.6
	Business	92	16.7
Academic year	2nd Year	157	27.4
	3rd Year	309	54.0
	4th Year	106	18.5
Age (in years)	Less than 20	27	4.7
	20 - 22	322	56.3
	23 - 25	221	38.6
	More than 25	2	0.3
Result (CGPA)	Less than 3.00	29	5.1
	3.00 – 3.25	84	14.7
	3.25 – 3.50	203	35.5
	3.50 – 3.75	205	35.8
	3.75 – 4.00	51	8.9
Study Time (in hours per week)	7 or less	232	40.6
	8 - 14	194	33.9
	15 - 21	88	15.4
	22 or more	58	10.1
Satisfied with Results	Yes	244	42.7
	No	328	57.3
Accommodation Type	At Home	151	26.4
	Hall	421	73.6
Family System	Joint	128	22.4
	Nuclear/Single	444	77.6
Smoking Behaviours	Yes	71	12.4
	No	501	87.6
General Health Status	Good	384	67.1
	Moderate	173	30.2
	Sick	15	2.6

Characteristics		Number of Students	Percent
Difficulty in Learning Online	Yes	389	68.0
	No	183	32.0
Benefit of Online Classes over Offline Classes	Yes	308	53.8
	No	264	46.2
Learnt Easily	Offline	435	76.0
	Online	137	24.0
Preferred Examination pattern	Offline	435	76.0
	Online	137	24.0

In this study, students were selected from four faculties and most of the students (47.7%) were from the Science faculty and 20.6% of students were from Social Science whereas 16.7% and 15.6% of students were from the Business and Arts faculty respectively. Findings revealed that only 5.6% of the students had a CGPA below 3.00, 14.7% scored between 3.00-3.25, the majority of students had a CGPA belongs 3.25-3.75, and only 8.6% of pupils scored between 3.75-4.00. Surprisingly, 40.6% of the undergrads studied for no more than 7 hours per week, 33.9% of the students studied for 8-14 hours per week, and 15.4% of the respondents studied for 15-21 hours per week. Only 1 of 10 students studied more than 22 hours per week. However, 57.3% of students were dissatisfied with their results. Among the respondents, 26.4% resided at home while 73.6 % resided in the hall. Moreover, the majority of the pupils (77.6%) belonged to a nuclear family. Findings revealed that only 12.4% of the undergrads engaged in smoking, and students reported that 67.1% of the students had good health, 30.2% had a moderate health condition and 2.6% were sick. Also, 68% of students had problems learning in an online class. Although a large chunk of the respondents had issues, 53.8% of the students benefited from online classes over offline. Furthermore, 76% of students reported that they learned easily offline whereas, 76% of students preferred the traditional physical i.e., offline examination system over online exams [Table 1].

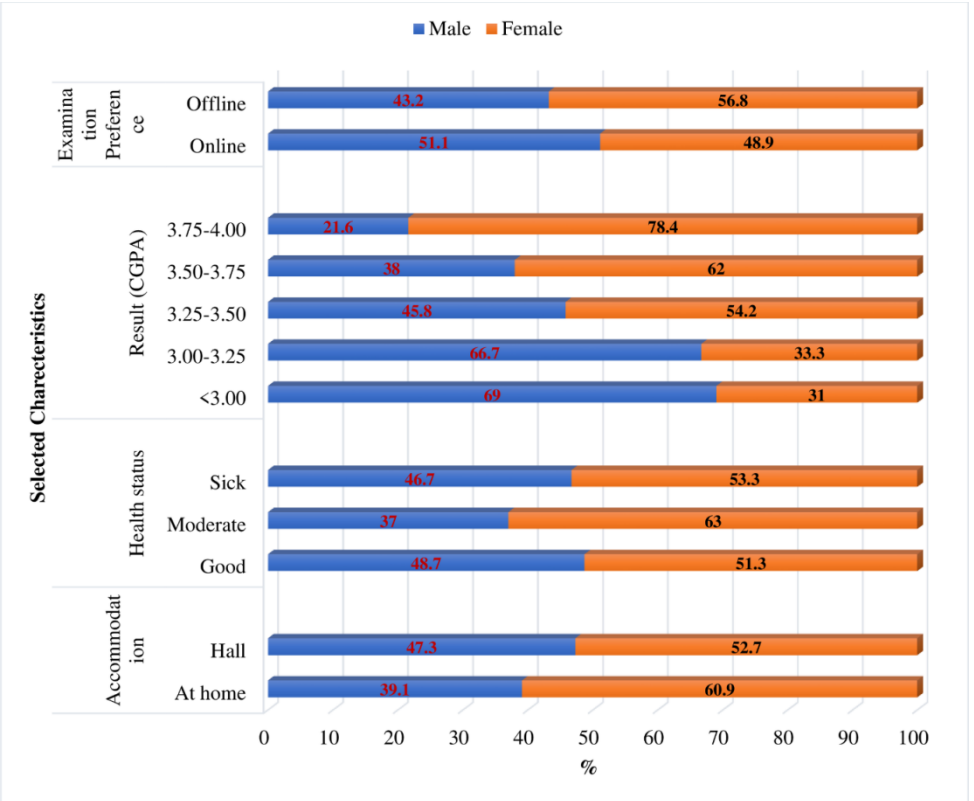

Figure 1. Selected background characteristics by sex of the respondents

Selected background characteristics by sex of the respondents are illustrated in Figure 1. The findings revealed that only 31% of female students had a CGPA below 3.00, whereas 69% of male students had a CGPA below 3.00. While just 33.3% of female students achieve a CGPA of 3.00 to 3.25, 66.7% of male students do. Compared to 62% of female students, 38% of male students had CGPAs between 3.50 and 3.75. In comparison to female students, only 21.6% of male students obtain CGPAs between 3.75 and 4.00. It is seen that male students had lower CGPAs in the case of below 3.25, however, female students had higher CGPAs in the case of over 3.50. Female students preferred more the offline examination system than their counterparts. Survey findings also depict that 48.7% of male students are found to be in good health, 37% are neither healthy nor sick and 46.7% are sick. On the other hand, there are 63.3% of female students are neither well nor ill, 51.3% are in good health, and 53.3% are sick. More female students resided at home than their counterparts [Figure 1].

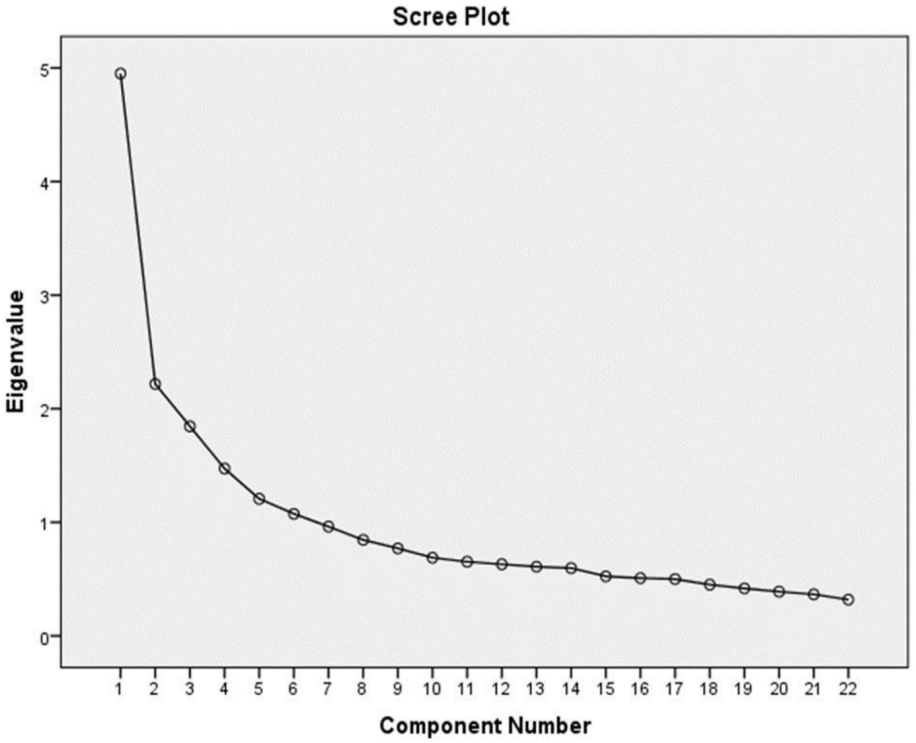

Figure 2. The scree plot for the items of the Learning Style Scale

The number of factors is determined by the scree plot and presented in Figure 2. Only those factors are retained whose eigenvalues are 1 or more. Here, the eigenvalues for the first six factors are greater than 1; hence, only six factors have been kept in this study. The scree plot, which is depicted in Figure 2, is created by displaying the components (along the X -axis) against their eigenvalues (along Y -axis). Only six elements have been kept for this study since this plot demonstrates that six factors have eigenvalues above elbow bent. The findings of the factor analysis are presented in Table 2. The authors used the VARIMAX rotation because it helps to reorient factors to produce a simpler structure where each variable has high loadings on only a few factors, making the factors easier to interpret in terms of the underlying constructs they represent. The first, second, third, fourth, fifth, and sixth factors account for 13.242, 10.521, 10.362, 8.937, 7.904, and 7.074% of the total variance, respectively. Thus, all these six factors together explain 58.04% of the total variance.

Table 4. Results of factor analysis

Items	**Loadings**					
Most of the time,	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
I learn better when I watch an educational program	0.700					
I learn better when someone represents information in a pictorial (e.g., picture, flowchart) way	0.663					
I learn better when I watch a demonstration	0.633					
I learn practical tasks better than theoretical ones	0.614					
I learn better when I am involved in a task	0.597					
I create a mental picture of what I hear	0.484					
I create a mental picture of what I hear		0.826				
I enjoy competing		0.803				
I compete to get the highest grade		0.775				
I create a mental picture of what I read			0.782			
I create a mental picture of what I study			0.764			
I create a mental picture of what I see			0.700			
I learn better when someone uses visual aids (e.g., whiteboard, power point) to represent a subject			0.469			
I remember specific details of subjects				0.746		
I remember the details of a subject				0.743		
I learn better when studying practical, job-related, subjects				0.507		

Items	Loadings	
I prefer to study alone	0.755	
I prefer to study with other students	-0.680	
I learn better when I study alone	0.576	
I learn better when I study with other students	-0.546	
I consider the details of a subject more than its whole		0.813
I focus more on the details of a subject		0.704

Based on the most effective methods for item retention, Table 4 demonstrates that 22 items are kept for the learning style scale with six latent factors. Factor 1 is loaded with 6 items, factor 2 has 3 items, factor 3 is loaded with 4 items, factor 4 with 3 items, factor 5 with 4 items, and finally factor 6 has 2 items. The six constructs that make up the 22 learning style criteria are factor 1 (better learning), factor 2 (competitive mentality), factor 3 (visualization), factor 4 (memory power), factor 5 (preferred of study), and factor 6 (topic details). The items are sorted from those with the highest loading from factor 1 and listed first as "I learn better when I watch an educational program" (loading of 0.700) and with the lowest loading from factor 1 and listed as "I create a mental picture of what I hear" (loading of 0.484). Following that the 3 items with the highest loading from factor 2 are listed in order of loading, starting with "I create a mental picture of what I hear", which has a loading of 0.826, and ending with item "I compete to get the highest grade" which has a loading of 0.775. Again, 4 items resulted in the maximum loading from factor 3 with loading 0.782 to item "I create a mental picture of what I read" and the lowest factor loading of 0.469 to item "I learn better when someone uses visual aids (e.g., whiteboard, power-point) to represent a subject". Moreover, factor 4 with 3 items results in the highest loading of 0.746 to item "I remember specific details of subjects" and the lowest loading with 0.507 to item "I learn better when studying practical, job-related, subjects". Furthermore, the maximum loading from factor 5 with the item "I prefer to study alone" (loading of 0.755) and the minimum loading from factor 5 with the item "I learn better when I study with other students" (loading of -0.546). Finally, there are 2 items in factor 6. The first one is "I consider the details of a subject more than its whole" which has a loading of 0.813 and the second one is "I focus more on the details of a subject" with a loading of 0.704.

Discussion

The authors aimed to identify undergraduate students' preferred learning styles and the associations between gender and various other factors. In this study, female respondents are 9.8% more than male counterparts. The number of female respondents was more because female students were more willing to participate in the survey for this study. Findings revealed that male students were 5.4% less residing in the hall compared to female students. This is due to a lack of room facilities in male dormitories. Among the other people, females reside at home at a significant 21.8% more than males. The reason behind this is probably female security issues. Female students tend to feel safer at home. Male students tend to be 6.6% less unwell than female students in terms of overall health. Contrarily, female students are 2.6% more likely to be in good health than male students. This might be a result of male students being slightly more exposed to pollution and female students staying at home in a healthier atmosphere.

The academic performance of female students is significantly better than male students. This might be because male candidates tend to be less attentive in class and female students try to put more effort into academic purposes. Male students might be under the more financial burden of their respective families which causes them to divert their path from academics to part-time jobs and job-related studies. A previous study showed that different learning styles between the genders were notable [28]. However, another study pointed out that there is no distinction between male and female preferences for learning styles [29]. Interestingly, female students' choices for learning styles were more varied than those of male students. Researchers highlighted that the evaluation of the learning styles literature identified a specific kind of proof that they considered to be a necessary condition for approving the implementation of a learning-style assessment in a classroom [30]. They haven't been able to locate any proof that blatantly satisfies this requirement, as previously mentioned. Another interesting discovery was the absence of a correlation between preferred learning style and academic achievement, despite the results being close to significance [31]. Moreover, the preferred examination pattern chosen by females is offline and males are online. This might be because the female student body tends to face more technical issues and lack of face-to-face interaction which they do not prefer compared to their male counterparts. The relationship between learning style and academic performance is complex and not fully understood, and there is ongoing debate among researchers about the validity and usefulness of learning style theories. It is important to note that there are many other factors that can impact academic performance, such as motivation, prior knowledge and skills, and the difficulty of the material being studied. Therefore, it is necessary to conduct more research on a wider scale on how learning style choices affect academic success.

Conclusion

The majority of students had CGPAs between 3.25 and 3.75, with females outperforming than male counterparts in terms of performance. Additionally, relative to their efforts, more than half of the sophomores are dissatisfied with their results. The majority of students favored offline testing patterns, which is usually expected, however,they even prefer learning in offline mode because it is more convenient. Findings also depict that the self-reported health condition is "good" among the students who lived in the university residence hall than their counterparts. The factor loadings suggest that most of the items positively contribute to the learning style. The authors believed that the study findings would be helpful to the students to make a study plan for achieving good academic performance.

Competing interests

The authors declare that they have no competing interests.

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Consent for publication

Participants were requested to voluntarily participate in the study before the data-gathering process began. They received guarantees of the privacy of both their personal information and identities. Following the approval of an informed consent form for study participation, data collection began. The participants provide their consent to publish the findings without identifiable information.

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Appendix

Questionnaires:

Identifying the Learning Style of the University Students in Bangladesh

Please put the tick mark or write down the answer (PART-A). Please answer all questions.

1. Sex of respondent: 1. Male 2. Female
2. Age of respondent (in years):……
3. Faculty: 1. Science 2. Arts 3. Social Science 4. Business 5. Others
4. Year: 1. 1st year 2. 2nd year 3. 3rd year 4. 4th year 5. Masters
5. Result (GPA/CGPA): ……..
6. Are you satisfied with your result? 1.Yes 2.No
7. Type of accommodation: 1. Hall 2. At home
8. Family system: 1. Nuclear 2. Joint
9. Smoking behaviors: 1. No 2. Yes
10. General health status: 1. Good 2. Moderate 3. Sick
11. Weekly study times(in hours):……..
12. Facing difficulty in learning through online: 1. Yes 2. No
13. Facing difficulty in classes offline: 1. Yes 2. No
14. Any benefit of online classes over offline classes: 1.Yes 2. No
15. When is learning easy? 1. Online 2. Offline
16. Which examination pattern do you prefer the most? 1.Online 2.Offline

Question related to Topic (PART-B)

Statement	Strongly agree (1)	Moderately agree (2)	Agree a little (3)	Disagree a little (4)	Moderately disagree (5)	Strongly disagree (6)
Most of the time, I…						
prefer to study alone						
enjoy competing						
create a mental picture of what I study						
prefer to study with other students						
compete to get the highest grade						
create a mental picture of what I see						
learn better when someone represents information in a pictorial (e.g., picture, flowchart) way						
learn practical tasks better than theoretical ones						
earn better when I study with other students						
compete with other students						
create a mental picture of what I read						
learn better when someone uses visual aids (e.g., whiteboard, power point) to represent a subject						
learn better when I am involved in a task						
focus more on the details of a subject						
consider the details of a subject more than its whole						

Statement	Strongly agree (1)	Moderately agree (2)	Agree a little (3)	Disagree a little (4)	Moderately disagree (5)	Strongly disagree (6)
learn better when I watch an educational program						
learn better when I watch a demonstration						
create a mental picture of what I hear						
remember the details of a subject						
learn better when I study alone						
remember specific details of subjects						
learn better when studying practical, job-related, subjects						

Thank you for your valuable information