

RESEARCH PAPER

Evaluation of Students' Satisfaction towards Instructor using Factor Analysis

Mirza Anwar Zainuddin*, Lai Jun Jer, Muhamad Zulhelme Bakar,
Kumaresan Palanisamy, Zahayu Md Yusof

School of Quantitative Sciences, UUM College of Arts and Sciences, Universiti Utara Malaysia,
06010, Sintok, Kedah, Malaysia

*Corresponding author: mirza_anwar_zainu@ahsgs.uum.edu.my

Received: 28 August 2020; Accepted: 30 December 2020; Published: 8 August 2021

To cite this article (APA): Anwar Zainuddin, M., Lai Jun, J., Bakar, M. Z., Palanisamy, K., & Md Yusof, Z. (2021). Evaluation of Students' Satisfaction towards Instructor using Factor Analysis. *Journal of Science and Mathematics Letters*, 9(1), 36-45. <https://doi.org/10.37134/jsml.vol9.1.4.2021>

To link to this article: <https://doi.org/10.37134/jsml.vol9.1.4.2021>

Abstract

Student evaluation on instructors is used in almost every high institution throughout the world whether in university or even colleges. The objective of this paper is to examine the factors that contribute to the student's evaluation on instructors among undergraduate students at Northern University of Malaysia (UUM) by using factor analysis method. The respondents of this study were 153 undergraduate students at the School of Quantitative Science via convenience sampling and snowball sampling method. The questionnaire was distributed to the participants via Google Form regarding demographic information and evaluation of the instructor. The questionnaire evaluation of the instructor consisted of 31 questions in total and 153 responses were received. The factors were classified into dependent and independent variables to identify the significance of the variables. In this paper, the variables of Student Interest, Student-Instructor, Course Demands and Course Organization were grouped as independent factors while Instructor involvement as the dependent factor.

Keywords: Factor analysis; Independent factor; Dependent factor

Abstrak

Penilaian pelajar terhadap tenaga pengajar digunakan di hampir setiap institusi tinggi di seluruh dunia sama ada di universiti bahkan kolej. Objektif kertas ini adalah untuk mengkaji faktor-faktor yang menyumbang kepada penilaian pelajar terhadap tenaga pengajar di kalangan pelajar sarjana di Universiti Utara Malaysia (UUM) dengan menggunakan kaedah analisis faktor. Responden kajian ini adalah 153 pelajar sarjana di Pusat Pengajian Sains Kuantitatif melalui kaedah persampelan mudah dan bebola salji. Soal selidik telah diedarkan kepada peserta melalui *Google Form*, yang terdiri daripada maklumat demografi dan penilaian terhadap tenaga pengajar. Penilaian terhadap tenaga pengajar terdiri daripada 31 soalan secara keseluruhan dan sebanyak 153 respons diterima daripada borang soal selidik yang telah diedarkan. Faktor-faktor tersebut dikelaskan kepada pembolehubah bersandar dan pembolehubah bebas untuk mengenal pasti kepentingan setiap pembolehubah. Dalam kertas ini, pembolehubah minat pelajar, pelajar-pengajar, permintaan kursus dan organisasi kursus diletakkan di bawah faktor bebas manakala penglibatan pengajar sebagai faktor bergantung.

Kata kunci: Analisis faktor; Faktor bebas; Faktor bergantung

INTRODUCTION

The higher education system has undergone enormous unique changes that affect the models of student demographic, competitiveness and governance models, privatization, internationalization, service preference of students and service delivery operational approach. There are numerous reasons for the changes, which consists of globalization, the rapid increase in the pace of technological development, changes in the demands workforce and economic realities. The substantial expansion and student diversification intensifies the competition in national and international level among higher education providers, especially tertiary institutions are growing.

Modern innovations have reached the classroom, altering the essence of student- lecturer relationships. The government is therefore seeking transparency funds from the public to invest in higher education. This transformation encourages some universities to incorporate appraisal systems to enhance the quality of education in science. Such assessments establish a comprehensive basis for implementing programs that are aimed at enhancing the quality of teaching and courses for making important decisions on tenure and promotion at the faculty.

This study aimed to examine factors that contribute to the student's evaluation of instructors among undergraduate students in the UUM. Factor analysis is used to evaluate the reliability of the model since variables which are consistently moving together are needed.

LITERATURE REVIEW

For tertiary education, student teaching assessment is used at the end of the semester to help students understand abstract and practical aspects of knowledge (Hsu & Chiu, 2009). The evaluation by students enables students validate and can alert the instructor to make positive changes in his or her teaching and determine the satisfaction of students with the administrative process, the course, its content, and teaching process by the instructor (Al-Abbadi et al., 2009). It is mostly used to improve instructor teaching methods.

Wachtel (1998) concluded that the student's assessment was valid, reliable, and necessary for improving teaching effectiveness. However, Liaw and Goh (2003) argued that even if the student's evaluations are valid, the measures of the instructor evaluation could not be reliable. Feldman (1984) has correlates that the size of the classroom and student ratings have a consistent trend, where the smaller class size gets a better result. However, there are studies found that the classroom's size and student ratings have only weak or no significant relationship (Marsh, 1987).

Despite the reliability and validity issues being debatable in student evaluation, an essential component of the measure, student perception should not be neglected (Sojka et al., 2002). To ensure the qualities related to lecturers, students and the classes, the student assessment must include different dimensions. Hence, student evaluation must be conducted from multiple dimensions to assess all the feasible factors to increase its reliability and validity in assessment. Mintu-Wimsatt et al. (2006) stated that the student evaluations of teaching needed to be used with caution to avoid any misleading inferences.

Exploratory Factor Analysis (EFA)

Exploratory Factor Analysis is a statistical technique used to derive the set of uncorrelated variables (Cohen, 2005). By applying varimax rotation, an EFA was performed on the 31 items using SPSS version 26 (Zulkepli et al., 2017). Five criteria, namely, student interest, student-instructor, course

demand, course organization and instructor involvement were used to establish the pattern of structure for thirty-one items of student's evaluation of instructors.

Instructor Involvement

The factor instructor involvement showed the perceptions about the enthusiasm of the instructor, interest, and showing concern for the student's learning process (Paswan & Young, 2002). Ladyshevsky (2013) has found that instructor feedback, student self-motivation, degree of interaction, and instructor knowledge and facilitation were some of the factors related to student satisfaction significantly. Moreover, Fraser et al. (2010) also found that the flow of the learning process in the classroom could be directed by the interpersonal behavior of instructors. It is associated with the ability of instructors to establish a mood and gain student respect and cooperation.

Student Interest

The factor student interest could be interpreted as the student's perception of his or her input, and course outcome such as the feeling of being challenged intellectually and becoming more competent in the subject (Paswan & Young, 2002). It was also found that students who are more engaged in the processes of their education are prone to be active and cooperative learners (Pascarella & Terenzini, 2005). In addition, the combination of student motivation and interest formed great predictors of course effectiveness (Artino, 2007).

Student-Instructor

The factor of student-instructor explained the interaction of student and instructor, such as the opportunity to ask questions in class discussion and freedom in expressing of ideas (Paswan & Young, 2002). In the findings of Wright and Jenkins-Guarnieri (2012), one of the factors that impact perceptions of course effectiveness is the instructors expressiveness in the classroom. Moreover, the compatibility between instructor and student was significantly associated with student satisfaction (Hill & Epps, 2010). The student evaluation alone would not be sufficient to be taken as qualitative measurement to determine the teaching performance; by correlating the relationship between instructor's self assessment and student evaluation could reveal whether a gap existed between instructor's viewpoints and student understandings (Bosshardt & Watts, 2001). Similarly, it has been supported by Emery et al. (2003) findings where student assessment of teaching were focused should not be used alone to evaluate the efficacy of teaching, because students prefer to assess satisfaction rather than achievement in the learning process.

Course Demands

The factor of course demands employed the meaning of students' perception about the volume of the topics covered, pace of the coverage of syllabus, and the total time required to complete the assignments and understand the content of the course (Paswan & Young, 2002). According to Culver (2010), the requirement of time and effort for a course contributes to the engagement of students. If it were worthwhile for them to spend their time and effort, they would be more likely to engage in the class.

Course Organization

The factor of course organization could be interpreted as students' ability to manage uncertainties, such as concepts related systematically and how the direction of the course was outlined (Paswan & Young, 2002). Cohen (2005) proposed five categories for the quality of classroom experience. Namely, interaction with professors, interaction with other students, interaction with course material, course quality which included the course organization and depth of content, and teaching quality.

METHODOLOGY

The Development of Instrument

In this study, 5 factors were identified. All the factors were based on the previous study from Paswan and Young (2002). To ensure the relatedness of the questions on this study is constructive, all of them were built based on the literature review to support its reliability and validity.

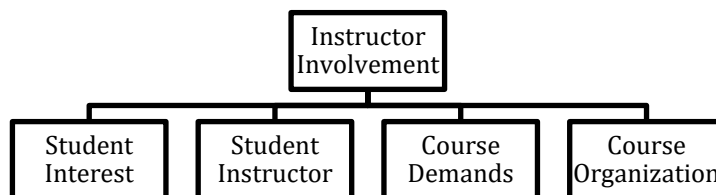


Figure 1. Five factors of instructor evaluation.

The Instrument

Our questionnaire has two sections, which are section A and section B. Section A consists of demographic information such as gender, course, race while section B consists of student evaluation of the instructor on Student Interest, Student Instructor, Course Demands, Course Organization, and Instructor Involvement. The feedback of the expert was obtained to validate the items. The reliability of the variables is then tested to confirm that the data are reliable for analysis. 20 respondents were chosen to conduct the pilot study. According to Saunders et al. (2009), the minimum number of 10 respondents is sufficient to conduct the pilot studies.

Data Collection

This study's focus is on undergraduate students of UUM in SQS which consists of three courses (Decision Science, Business Mathematics, and Industrial Statistics). This study was conducted by using a combination of two non-probability sampling, which are convenient sampling and snowball sampling in which the questionnaires were distributed to 274 respondents in the SQS via Google Form. It is impractical to estimate the sample size if the data collection is conducted using non-probability sampling. The time frame for the data collection was three months, starting from May to July 2020, and the total responses we obtained was 153.

The Survey Questionnaire

For the preliminary stage of the item construction, 31 items included in the questionnaire represent multiple aspects of instructor involvement. Factors and items were taken from the literature review and some of the items were modified to meet the UUM SQS students' understanding of their courses. The factors are Student Interest, Student-Instructor, Course Demands, Course Organization, Instructor Involvement. After the experts finished examining the 31 items, a few questions were reconstructed again for the students to understand. This study was conducted using the 7-scale semantic scale from strongly disagree to strongly agree.

RESULTS AND DISCUSSION

To verify the suitability of the data set for factor analysis, a Kaiser-Meyer-Olkin (KMO) test and Bartlett's Test of Sphericity were conducted. Table 1 indicates that the KMO with value of 0.931 is greater than 0.6 and Bartlett's Test of Sphericity shows a significant value less than 0.05.

Table 1. Results of KMO and Bartlett's Test.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.931	
Approx. Chi-Square	2719.833	
Bartlett's Test of Sphericity	Df	465
	Sig.	.000

Table 1 shows two tests that indicate the suitability of data for structure detection. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy is a statistic that indicates the proportion of variance in the variables that might be caused by underlying factors. Since the value of KMO obtained is 0.931, it indicates that the factor analysis may be useful with this data.

On the other hand, Bartlett's test of sphericity tests the hypothesis that correlation matrix is an identity matrix, which would indicate that the variables are unrelated and therefore unsuitable for structure detection. Based on Table 1, the value 0.000 of significance level is less than 0.05, which indicates that a factor analysis may be useful with this data.

To decide the number of factors to include in factor analysis, the eigenvalues are used. Selecting factors with eigenvalues of 1.00 or higher are important since it indicates how many factors should be retained. Based on Table 2, five factors were retained since the eigenvalues is higher than 1.

The scree plot in Figure 2 demonstrates that the first 5 columns indicated that the eigenvalue just above the next factor is almost flat until the last factor as the eigenvalue is decreasing. This indicates that 5 factors can be retained in this analysis.

Table 2. Total Variance Explained.

Component	Total Variance Explained								
	Initial Eigenvalues			Extracted Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	13.655	44.047	44.047	13.655	44.047	44.047	5.184	16.722	16.722
2	1.572	5.072	49.119	1.572	5.072	49.119	4.233	13.655	30.377
3	1.316	4.244	53.363	1.316	4.244	53.363	3.943	12.719	43.095
4	1.176	3.794	57.156	1.176	3.794	57.156	3.930	12.676	55.771
5	1.075	3.467	60.623	1.075	3.457	60.623	1.504	4.852	60.623
6	0.923	2.987	63.611						
7	0.869	2.803	66.413						
8	0.831	2.682	69.095						
9	0.779	2.513	71.608						
10	0.720	2.321	73.929						
11	0.712	2.297	76.226						
12	0.673	2.170	78.396						
13	0.604	1.949	80.345						
14	0.574	1.850	82.195						
15	0.509	1.644	83.839						
16	0.504	1.625	85.464						
17	0.451	1.454	86.918						
18	0.447	1.441	88.359						
19	0.428	1.380	89.739						
20	0.419	1.351	91.090						
21	0.354	1.142	92.232						
22	0.334	1.078	93.310						
23	0.316	1.020	94.330						
24	0.287	0.926	95.256						
25	0.265	0.854	96.110						
26	0.243	0.785	96.895						
27	0.231	0.747	97.641						
28	0.225	0.726	98.367						
29	0.196	0.632	98.999						
30	0.172	0.555	99.554						
31	0.138	0.446	100.000						

Extraction Method: Principal Component Analysis

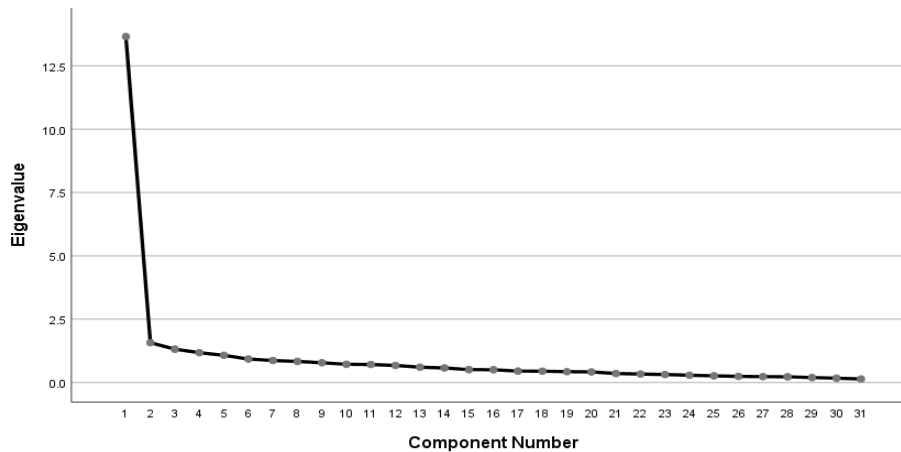


Figure 2. Scree plot.

Table 3. Rotated Component Matrix.

Rotated Component Matrix		
Component	Question	Factor Loading
1	F1Q1	0.504
	F1Q2	0.542
	F1Q3	0.499
2	F2Q1	0.651
	F2Q2	0.705
	F2Q3	0.548
	F2Q4	0.553
	F2Q5	0.600
3	F3Q1	0.606
	F3Q2	0.412
	F3Q3	0.495
	F3Q4	0.481
4	F4Q1	0.565
	F4Q2	0.753
	F4Q3	0.500
	F4Q3	0.595
	F4Q5	0.521
	F4Q6	0.608
	F4Q7	0.526
	F4Q8	0.381
	F4Q9	0.751
	F4Q10	0.547
	F4Q11	0.725
5	F5Q1	0.724
	F5Q2	-0.873
	F5Q3	0.649
	F5Q4	0.633
	F5Q5	0.770
	F5Q6	0.532
	F5Q7	0.769
	F5Q8	0.460

Based on the factor loadings in Table 3, 5 factors can be obtained from the factor rotation. Factor loadings of 0.30 or higher with a sample size of 100 respondents, can be considered significant, or noteworthy (Kline, 2014). Even smaller loadings could be considered noteworthy even with much larger samples. However, in language research, researchers typically take note of loadings of 0.30 or higher (Brown, 2009).

Reliability Analysis

The value of 0.45 - 0.60 for Cronbach's alpha coefficient indicated that the internal consistency is acceptable for all scores (Zalma et al., 2015). Moreover, the standard applied to evaluate reliability should not be 0.7 because higher interrelatedness was detected among items in the shorter scale with the lower alpha value (DiIorio, 2006).

Student Interest

Table 4. Cronbach's Alpha for student interest.

Reliability Statistics	
Cronbach's Alpha	N of Items
0.734	1

In the first factor, Student Interest is to analyze in their interest toward the subject taken, on how the instructor is delivered the input and the skill of the instructor to ensure the student's understanding. Based on Table 4, Cronbach's Alpha of 0.734 is achieved from the reliability test using SPSS. With Cronbach's Alpha greater than 0.6, Hence, this indicates that the questionnaires in this factor is reliable and the analysis can be applied.

Student-Instructor

Table 5. Cronbach's Alpha for student-instructor.

Reliability Statistics	
Cronbach's Alpha	N of Items
0.832	5

For the second factor, instructor readiness is being integrated within the questionnaires to analyze the instructor preparation toward student questions and feedback. Based on Table 5, Cronbach's Alpha of 0.832 is achieved. With Cronbach's Alpha greater than 0.6, Hence, this indicates that the questionnaires in this factor is reliable and the analysis can be applied.

Course Demands

Table 6. Cronbach's Alpha for course demands.

Reliability Statistics	
Cronbach's Alpha	N of Items
0.758	4

In the third Factor, the Course content, materials used, and course workload is being discussed to gain student opinion and feeling during their studying time and experiences. Based on Table 6, Cronbach's Alpha of 0.758 is achieved. With Cronbach's Alpha greater than 0.6, Hence, this indicates that the questionnaires in this factor is reliable and the analysis can be applied.

Course Organization

Table 7. Cronbach's Alpha for course organization.

Reliability Statistics	
Cronbach's Alpha	N of Items
0.896	11

Fourth factor is the most important factor being analyzed in this study. This is a very important input that discusses the organization strategy to ensure the course that was taken by the student is meaningful, achievable and relevant in current situation and environment, so that the student is able to manage their challenge in the future. Based on Table 7, Cronbach's Alpha of 0.896 is achieved. With Cronbach's Alpha greater than 0.6, Hence, this indicates that the questionnaires in this factor is reliable and the analysis can be applied.

Instructor Involvement

Table 8. Cronbach's Alpha for instructor involvement.

Reliability Statistics	
Cronbach's Alpha	N of Items
0.667	8

In the last factor, instructor professionalism and management skill are being measured. Based on Table 8, Cronbach's Alpha of 0.667 is achieved and just above the minimum of 0.600. Hence, this indicates that the questionnaires in this factor is reliable and can be used for the analysis. To improve the value of the Alpha, the right structure of question can be constructed in the future study.

Table 9. Cronbach's Alpha summary.

Number	Factor	Cronbach's Alpha (>0.60)
1	Student Interest	0.734
2	Student-Instructor	0.832
3	Course Demands	0.758
4	Course Organization	0.896
5	Instructor Involvement	0.667

Table 9 shows the summary of the values of Cronbach's Alpha for the five factors. Cronbach's Alpha for the five factors exceeded the minimum value of 0.6, which is considered as reliable for the internal consistency.

CONCLUSIONS

Five factors were found contributing to evaluation of instructor involvements for the undergraduate students in SQS. The 5 factors are student interest, student-instructor, course demands, course organization, and instructor involvement. Table 1 shows the value of KMO and Bartlett's Test with the value of 0.931 and 0.000 which indicates the value is reliable and significant. Since the value of Cronbach Alpha for the five factors are all larger than 0.6, so all the factors have high consistency and reliability.

This study will benefit lecturers from the findings as they can improve their way of teaching. In addition, this study will serve as a future reference for other researchers about related topics. Moreover, the higher education institutions may benefit from this study by improving the evaluation on instructors.

REFERENCES

- Al-Abbadi, I., Alkhateeb, F., Khanfar, N., Mujtaba, B., & Latif, D. (2009). Pharmacy students' perceptions of the teaching evaluation process in Jordan. *Education, Business and Society: Contemporary Middle Eastern Issues*.
- Artino, A. R. (2007). Motivational beliefs and perceptions of instructional quality: Predicting satisfaction with online training. *Journal of Computer Assisted Learning*, 24(3), 260-270.
- Bosshardt, W., & Watts, M. (2001). Comparing student and instructor evaluations of teaching. *The Journal of Economic Education*, 32(1), 3-17.
- Brown, J. D. (2009). Principal components analysis and exploratory factor analysis – Definitions, differences, and choices. *Statistics*, 13(1), 26-30.
- Cohen, E. H. (2005). Student evaluations of course and teacher: Factor analysis and SSA approaches. *Assessment & Evaluation in Higher Education*, 30(2), 123-136.
- Culver, S. (2010). Course Grades, Quality of Student Engagement, and Students' Evaluation of Instructor. *International Journal of Teaching and Learning in Higher Education*, 22(3), 331-336.
- Dilorio, C. K. (2006). *Measurement in health behavior: methods for research and evaluation (Vol. 1)*. John Wiley & Sons.
- Emery, C. R., Kramer, T. R., & Tian, R. G. (2003). Return to academic standards: A critique of student evaluations of teaching effectiveness. *Quality assurance in Education*.
- Feldman, K. A. (1984). Class size and college students' evaluations of teachers and courses: A closer look. *Research in Higher Education*, 21(1), 45-116.
- Fraser, B. J., Aldridge, J. M., & Soerjaningsih, W. (2010). Instructor-student interpersonal interaction and student outcomes at the university level in Indonesia. *The Open Education Journal*, 3(1).
- Hill, M. C., & Epps, K. K. (2010). The impact of physical classroom environment on student satisfaction and student evaluation of teaching in the university environment. *Academy of Educational Leadership Journal*, 14(4), 65.
- Hsu, J. L., & Chiu, H. Y. (2009). Perceived differences in teaching performance from viewpoints of lecturers and students. *International Journal of Educational Management*.
- Kline, P. (2014). *An easy guide to factor analysis*. Routledge.
- Ladyshevsky, R. (2013). Instructor presence in online courses and student satisfaction. *The International Journal for the Scholarship of Teaching and Learning*, 7(1), 1-23.
- Liaw, S., & Goh, K. (2003). Evidence and control of biases in student evaluations of teaching. *International Journal of Educational Management*.
- Marsh, H. W. (1987). Students' evaluations of university teaching: Research findings, methodological issues, and directions for future research. *International journal of educational research*, 11(3), 253-388.
- Mintu-Wimsatt, A., Ingram, K., Milward, M. A., & Russ, C. (2006). On different teaching delivery methods: What happens to instructor course evaluations?. *Marketing Education Review*, 16(3), 49-57.
- Pascarella, E. T., & Terenzini, P. T. (2005). *How college affects students. Vol. 2: A third decade of research*. San Francisco, CA: Jossey-Bass.
- Paswan, A. K., & Young, J. A. (2002). Student evaluation of instructor: A nomological investigation using structural equation modeling. *Journal of Marketing Education*, 24(3), 193-202.
- Saunders, M., Lewis, P., & Thornhill, A. (2009). *Research methods for business students*. Pearson education
- Sojka, J., Gupta, A. K., & Deeter-Schmelz, D. R. (2002). Student and faculty perceptions of student evaluations of teaching: A study of similarities and differences. *College Teaching*, 50(2), 44-49.
- Wachtel, H. (1998). Student evaluation of college teaching effectiveness: a brief review.
- Wright, S., & Jenkins-Guarnieri, M. (2012). Student evaluations of teaching: Combining the meta-analyses and demonstrating further evidence for effective use. *Assessment & Evaluation in Higher Education*, 37(6), 683-699.
- Zalma, A. R., Safiah, M. Y., Ajau, D., & Khairil Anuar, M. I. (2015). Reliability and validity of television food advertising questionnaire in Malaysia. *Health promotion international*, 30(3), 523-530.
- Zulkepli, M., Sipan, I., & Jibril, J. D. (2017). An exploratory factor analysis and reliability analysis for green affordable housing criteria instrument. *International Journal of Real Estate Studies*, 11(4), 9-21.