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RESEARCH PAPER

Academic Challenges: Development and Validation of an Instrument

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ABSTRACT

The study was conducted to elaborate the concept of academic challenges and to develop an instrument to measure the academic challenges faced by prospective teachers. The process of instrument development started with the elucidation of the concept and phenomenon. Literature was reviewed and four factors namely Assigned tasks, Focused learning, Presentation and communication skills, and achievement results were identified related to academic challenges An instrument comprising of 18 items related to these factors was developed and administered to a randomly selected sample of 130 prospective teachers for exploratory factor analysis and to a sample of 600 prospective teachers for confirmatory factor analysis. The researchers concluded that Academic Challenges refer to the task difficulty assigned to students; they encourage students to get certain goals and polish their skills. It is important for institutions to keep measuring and updating Academic Challenges to achieve effective academic outcomes.

KEYWORDS Academic Challenges, Teacher Education, Assigned Tasks, Focused Learning

Introduction

The process of teaching and learning at higher education level is designed for students to polish their intellectual abilities and to improve their overall personalities. It is usually designed while keeping in view the aims that society is seeking for. The aims and philosophy of society has deeper influence on system of education, including its aims and process. The process of teaching and learning keeps in view the truth that students are going to face practical life after completing their academic careers. Programmers are supposed to make their academia a challenging process, so that students might fit into practical life after getting their degrees. As far as, higher education is concerned, students are supposed to enter their practical life after completing their higher education; hence it should give a balance approach to students that they may adopt the field by utilizing their skills and knowledge they have acquired during their academic era.

To polish students' skills and enhance their learning experiences, it is necessary to put them in situations that can provide them opportunity to perform beyond their comfort zones. This type of training will help to bring best out of them while facing any situation during their personal and professional life. Unks, (1979) is of the view that academic skills and training are strongly connected with working capacity of an individual. "Academic challenges" is a term that is still in its developing stage.

A challenging atmosphere in institute is considered important to polish and enhance students' intellectual, personal and psychological skills. In short higher education

is supposed to depict their curricula as challenging, rigorous, so that they can meet national and international standards (Clair & Hackett, 2012).

Literature Review

Necessarily, to conceptualize "academic challenges" there is a need to find out the literal meaning of "challenge". Some people mistakenly confuse it with the word "problem". In its literal sense, a challenge is an invitation or a call to action. The complexity and breadth of challenges vary. "A call or invitation to an action" is how one defines a challenge. It conveys the idea of being forced to push oneself in order to succeed. Beghetto (2018) discussed challenges associated with academic assignments, stating that when students are asked to accomplish activities or assignments, they are being presented with challenges that might vary in difficulty from easy to difficult.

There are four basic features that all challenges share; the Problem; the task or query students will address, Process; the method by using query will be solved, Product; its demonstration to solve the problem and Criteria; standards for evaluating success. Hence challenge is an attempt to achieve some task, fulfill some assignment and being able to learn better. It's striving for excellence. Challenges in academics have the same concept. Academic challenges would refer to some task, assignment and mission that urge students to work hard for the fulfillment that specific task.

According to Hu and Ching (2012), the idea of an academic challenge originated with Weiner's attribution theory, which stated that one of the factors influencing a student's effort in an activity is academic motivation in relation to task difficulty, or the possibility of a challenge. Beghetto (2018) discussed challenges associated with academic assignments, stating that when students are asked to accomplish activities or assignments, they are being presented with challenges that might vary in difficulty from easy to difficult. Every challenge has four fundamental components: the problem, the process, the product, and the criteria as elaborated in table 1.

Table 1
Components of an Academic Challenge

Feature	Definition
Problem	The tasks, queries, assignments, projects or issue students will discourse or solve
Process	The strategy, techniques, or approach that pupils will employ to solve a task assignment
Product	The proposal, result, or example of how to resolve the issue
Criteria	The principles, guidelines, and benchmarks that determine success

There has been a little attempt to find out what actually academic challenges mean. To define academic challenges would help in measuring and making decisions regarding many tasks that are taken as challenge. At first Karen L. St. Clair; founding director of Emerson College's Center for Innovation in Teaching and Learning viewed this phrase as it was related to institutions' mission to enable students for better learning and promote excellent teaching. Karen started working on academic challenges; started with finding its proper definition, but unfortunately could not found any comprehensive definition of the phrase "academic challenges". Different researchers reported academic challenges differently; a demanding high achievement (Braxton, 1993); challenging students to strive for excellence (Unks, 1979); and engaging students in active learning. Lately, it is also noted as notions of acquiring critical thinking and high standards (Graham et. al, 2007). The National Survey of Student Engagement (NSSE, 2012), also included academic challenge

scale in it. It also focuses on higher order thinking and critical thinking skills. According to Hagel et al. (2012), the National Survey of Student Engagement (NSSE) included a dimension called "academic challenge." This scale measures how much students are challenged to learn via expectations and assessments.

Although defining academic challenges have not been attempted by many researchers but literature provide enough support (Beghetto, 2018; Braxton, 1993; Graham et. al, 2001; Hagel et.al, 2018; St. Clair & Hackett, 2012; Unks, 1979;) in establishing a point that academic challenges are the tasks, assignments, projects, and missions that can stimulate students' process of learning. Students work hard to fullfil these tasks and hence they enable themselves to meet these challenges. Meeting academic challenges can enable students to work in pressure and hard situation.

Methodology

The process of tool development for academic challenges comprised of several stages including a detailed and in depth review of the related literature, detailed discussions with the experts in the field of education and tool development, identification of major themes and factors related to academic challenges, development of items /questions related to these factors, validation and review of items by experts, modification and selection of items, field administration of the instrument , reliability analysis and factor analysis (exploratory and confirmatory) of data and selection of final factors and items for the instrument. Figure 1 presents the factors that emerged form literature review and discussions with the experts.

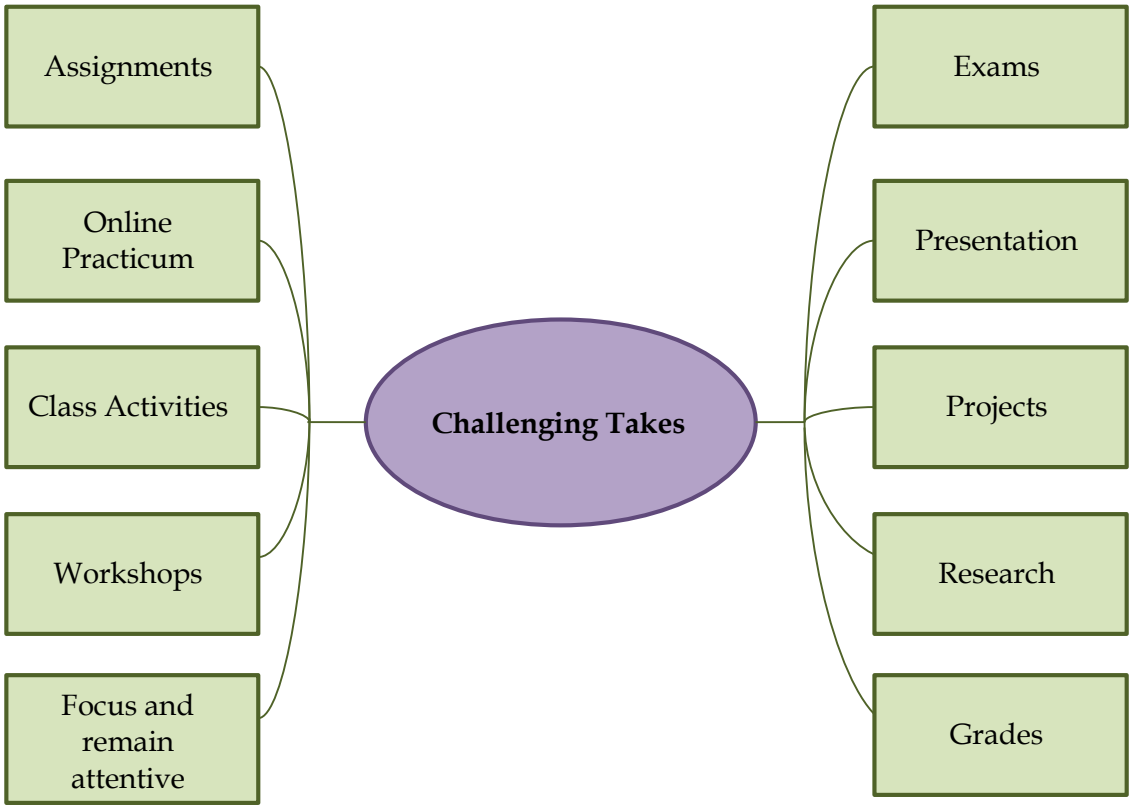

Figure 1 Challenging Tasks

After going through the literature and qualitative themes keenly, an outline for the tool of academic challenges was developed. The purpose of development of tool was to measure the extent of students' hard work to meet some specific tasks which are specified by literature. A set of questions was prepared. Initially the questionnaire consisted on 18

statements. It was validated by experts. Their suggestions were noted and questionnaire was improved accordingly. The questionnaire was prepared for pilot testing. Questionnaire was prepared specifically keeping in view the field of teacher education, but statements are general enough, which make this questionnaire usable for rest of the fields as well. For exploratory factor analysis questionnaire was administered to a randomly selected sample of 130 prospective teachers enrolled in BS Education from three public sector universities of Lahore. After initial exploratory factor analysis, a larger sample was selected for confirmatory factor analysis. The sample consisted of 600 prospective teachers enrolled in BS Education from seven public sector universities of the Punjab.

Through factor analysis Indicator reliability is evaluated through factor loading analysis. This explains degree of the indicators' consistency regarding what they intend to measure. Literature argued that at least 50 per cent of indicator variance of a measure should be explained by the latent variable (Henseler, et al., 2009). There are mainly two criteria, for reflective measures item loading (λ) values should be greater than 0.7 but 0.6 is also acceptable when existence of that factor didn't disturb the reliability or AVE of that variable. With a larger sample reliability and validity was checked through using Smart-PLS. To strengthen the instrument's convergent and discriminant validity was also checked. Convergent validity was determined through Average Variance Extracted (AVE). The reliability of all measures was examined through three criteria i.e. alpha values, rho_A, and composite reliability.

Results and Discussion

The instrument was pilot tested and administered to a sample 130 prospective teachers enrolled in BS Education program and an exploratory factor analysis was performed on this data. Later on the revised and final instrument was administer to 600 prospective teachers form seven public sector universities and a confirmatory factor analysis was performed. Results of data analysis are discussed below.

Exploratory Factor Analysis

Initially, it was made sure the data was suitable for factor analysis by performing following analysis.

KMO of Data

Hinton et al., (2004) sustain a p-value <0.05 approves significant relationship of variables, so i KMO of the data was checked.

Table 2
KMO and Bartlett's Test for Academic Challenges

KMO Estimation		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.8
Bartlett's Test of Sphericity	Approx. Chi-Square	765.2
	Df	1
	Sig.	.0

The above results (table 2) confirmed that the data was appropriate for factor analysis. Based on these findings, the p-value for the Bartlett's Test of Sphericity Approx. Chi-Square is 765.266, and the KMO was.862. Thus, the data satiated the factor analysis requirement.

Factor Loading

The rotated component matrix table was taken into consideration for factor and item adjustments while factor analysis was conducted. Five components were formed by a rotated component matrix. According to Field (2005) items which cross-load on different criteria are deemed weak and should be deleted. Items with values larger than.4 in several components were excluded.

Table 3
Rotated Component Matrix for Academic Challenges

Sr. No.	Statements	Component			
		1	2	3	4
AC3	Written Assignments need more concentration and hard work	.812			
AC2	I work on project that requires integrating different ideas.	.799			
AC5	I found my courses intellectually challenging.	.753			
AC4	During program we are tested through quizzes	.686			
AC1	My assignment enhance my critical thinking	.618			
AC8	**Students are given chance to self-evaluate their own work**	**.460**			**.476**
AC6	Subjects focusing profession are included in the program		.732		
AC7	Focus of my courses is on improving my subject knowledge		.731		
AC18	**My courses help me to be more confident about my choice of the program**	**.456**			**.433**
AC12	Courses about teaching methods are included in our program		.713		
AC10	I am confident about my good performance in final exams.		.667		
AC11	Courses provide us opportunity to know about assessment techniques		.553		
AC9	**Students are assigned Projects that give chance of application of knowledge**		**.441**		**.432**
AC15	I am motivated to take part in the class presentation and discussions			.827	
AC13	I present my assigned topic with confidence			.735	
AC14	As compare to my first presentation during class, now i feel easy to face the audience			.580	
AC16	I find it easy to communicate with my class fellows on the courses we have read				.834
AC17	**I present my assigned topic with a feeling of anxiety**	**.443**		**.455**	

Items AC1, AC2, AC3, AC4, and AC5 fit into a single factor, according to factor loadings. The questions' content pointed to "Assigned Tasks" as the theme. Factor two includes items AC6, AC7, AC10, AC11, and AC12. Since the information in these items seems to be related to the learning focus, this component is called "Focused learning."

AC13, AC15, and AC14 are items that belong in factor three. A review of these items revealed information about the students' classroom communication skills. Thus, the term

"communication skills" refers to this issue. As factor four is approached, it becomes apparent that only item AC16, which is insufficient to form an independent factor, falls into this category. Therefore, Ho (pp. 232, 2006) states that it is up to the researchers' subjective judgment to combine components based on their substance in order for them to be significant. Therefore, this item will be combined based on its content. This item will be included in the factor "communication skills" because it contains the concept of "communication with class fellows."

More than one factor loaded items are AC 8, AC 9, AC 17, and AC 18. The cross value of these items is >.4. Ho (2006) recommended getting rid of every cross-loaded item. This produced "clean" factors and greatly facilitated the factors' interpretation. When there are few substantial cross loadings, this approach performs best. Additionally, Straub et al. (2004) stated that construct validity is present if there is no cross-loading of items above 0.40, a loading of at least 0.40, and the latent root criterion (eigenvalue) is equal to or greater than 1.

As a result of f exploratory actor analysis their factors i.e. Assigned Tasks, Focused Learning and Communication Skills were finalized for measuring academic challenges. The reliability of these factors and overall instrument was calculated by using Cronbach's Alpha, which is .892. An instrument is regarded as good if the reliability is .7 or higher. As measured by Assigned Tasks at .846, Focused Learning at .816, and Communication abilities at .653, factor vise reliability is likewise deemed acceptable. Academic achievement results were also part of academic challenges. It was added as open question while asking for "CGPA" of students.

The details of these factors along with their corresponding items and reliability values are provided in table 4.

Table 4
Factor Vise Reliability of Academic Challenges

Factors	No of Items	Reliability
Assigned Tasks	**05**	.846
1. My assignment enhance my critical thinking		.618
2. I work on project that requires integrating different ideas.		.799
3. Written Assignments need more concentration and hard work		.812
4. During program we are tested through quizzes		.686
5. I found my courses intellectually challenging.		.753
Focused Learning	**05**	.816
1. Subjects focusing profession are included in the program		.732
2. Focus of my courses is on improving my subject knowledge		.731
3. I am confident about my good performance in final exams.		.667
4. Courses provide us opportunity to know about assessment techniques		.553
5. Courses about teaching methods are included in our program		.713
Communication & Presentation Skills	**04**	.653
1. I present my assigned topic with confidence		.735
2. As compare to my first presentation during class, now i feel easy to face the audience		.580
3. I am motivated to take part in the class presentation and discussions		.827
4. I find it easy to communicate with my class fellows on the courses we have read		.834
Overall Reliability	**14**	.892

Table 4
Factor Vise Reliability of Academic Challenges

Factors	Reliability
Assigned Tasks (5 Items)	**.846**
1. My assignment enhance my critical thinking	.618
2. I work on project that requires integrating different ideas.	.799
3. Written Assignments need more concentration and hard work	.812
4. During program we are tested through quizzes	.686
5. I found my courses intellectually challenging.	.753
Focused Learning (5 Items)	**.816**
1. Subjects focusing profession are included in the program	.732
2. Focus of my courses is on improving my subject knowledge	.731
3. I am confident about my good performance in final exams.	.667
4. Courses provide us opportunity to know about assessment techniques	.553
5. Courses about teaching methods are included in our program	.713
Communication & Presentation Skills (4 Items)	**.653**
1. I present my assigned topic with confidence	.735
2. As compare to my first presentation during class, now i feel easy to face the audience	.580
3. I am motivated to take part in the class presentation and discussions	.827
4. I find it easy to communicate with my class fellows on the courses we have read	.834
Overall Reliability (14 Items)	**.892**

Confirmatory Factor Analysis

After pilot testing and exploratory factor analysis, the improved and final Academic Challenges Instrument was administered to a larger sample of 650 prospective teachers from seven public universities of Punjab to check reliability and validity of tool. After screening monotone response pattern and partially filled responses, a data of 600 respondents was considered for factor analysis. Convergent validity was determined by Average Variance Extracted (AVE).

Convergent Validity

Convergent validity determines how a construct compares the items evaluating the other constructs. It is determined through AVE, with a required value > 0.5. Table 5 presents a vivid picture of convergent validity through AVE.

Table 5
Average Variance Extracted of Reflective Constructs

Factors	Average Variance Extracted (AVE)
Assigned Task	0.58
Focused Learning	0.52
Communication & Presentation Skills	0.54
Achievement*	0.79

*Achievement results were a part of academic challenges which were included in the tool with larger sample. It was simply asked in form of "CGPA".

Reliability Statistics

The reliability of all measured factors was examined through three criteria i.e. alpha values, rho_A, and composite reliability. Table 6 shows reliability statistics of the developed instrument.

Table 6
Reliability Statistics

Factors	α	rho_A	Composite Reliability
Assigned Task	0.82	0.84	0.87
Focused Learning	0.74	0.82	0.80
Communication & Presentation Skills	0.73	0.80	0.82
Achievement	0.74	0.75	0.88

Composite reliability reflects the standardized loadings and measurements error for each item over the coefficient alpha; Shook et al. (2004) favored it. All three criteria are applied in this study to assess reliability. The findings showed that all constructs had Cronbach's and rho. A value greater than 0.60 and that the composite reliability value of all measures was sufficiently higher than that of the other two reliability measures. Thus, the findings indicate that the tool is sufficiently dependable or demonstrate the internal consistency of the measures to warrant additional testing.

Discussion

Academic challenges as a phenomenon have occurred gradually, from academic tasks, problems and some such synonymous words. As per literature it is found that academic challenges are usually the tasks and expectations that are thrown on the way of a student when he is enrolled in a course. Because generally these tasks polish the skills of students and let them learn how to handle the situations in real life.

Academic challenges offer the chance to improve a person's capacity for thought and learning. One will eventually attempt to become more involved in their academics when they are faced with challenges in their academic lives. When people face challenges from their institution in the form of coursework, they become more cognitively engaged in their study. While finishing a particular course task, McCormick and Whittington (2000) focused on the cognitive level of the problems they encountered in the classroom. They first noted a number of difficulties that are essentially the same as those encountered by a number of other studies. These intellectual challenges were grouped together as activities. Problem set, quizzes, midterm and final term, individual and group written reports, individual and group presentations, and laboratory tests.

The literature progressively establishes the occurrence of academic challenges. According to Hu and Ching (2012), Weiner's attribution theory is the source of the idea of an academic challenge that was referred to task difficulty and students' ability to handle the tasks and assignments during a program. Present research was an attempt to frame a tool to measure the academic challenges faced during the completion duration of a program. After getting into literature some key factors were identified and items were prepared accordingly.

Conclusion

In this study the researchers intended to develop and validate an instrument for Academic Challenges. An exploratory factor analysis of the instrument indicated that some of the items were not appropriate enough to add in the final instrument, as they don't meet the criteria. The criteria that is suggested by Straub et al. (2004), there is construct validity if there is no cross-loading of items above 0.40, a loading of at least 0.40, and the latent root criteria (eigenvalue) is equal to or above 1. Field (2005) also proposed that things that cross-load on different variables are deemed weak and are presumed to be deleted. Keeping in view the above mentioned criteria more than one factor loaded items were AC 8, AC 9, AC

17, and AC 18. These items were deleted and then the tool was again processed for reliability analysis. Reliability of this instrument was measured through Cronbach's Alpha that is .892.

The exploratory factor analysis suggested three major factors of academic challenges; Assigned tasks that covers the range of assignments, quizzes and worth of program by defining its toughness of tasks given to students; Focused learning covers skill improvement, knowledge enhancement and grip on the subjects; Communication skills covers areas of transferring students' knowledge and understanding in ways of presentations, discussions and elaboration. Achievement in form of CGPA was asked. That was taken as an independent question different from other items.

A confirmatory factor analysis was also performed to ensure the reliability and validity of the tool. A Sample of 600 prospective teachers was selected for confirmatory factor analysis. Convergent validity and reliability of instrument was determined. Convergent validity was determined through AVE, with a required value > 0.5. AVE suggested that all values were >0.5 (Table 5). Hence instrument proved to be valid even on larger sample. Reliability analysis was also performed that indicated values of all factors > 0.6, which clearly indicates reliability of the instrument (Table 6). After validation, final instrument consisted on 14 items, with an additional item of CGPA.

The results of instrument development highlighted certain conclusions that addressed the research questions of this study. At first literature review established the fact that academic challenges are quite different in term of problems. As the word challenge it is not synonymous to problem. Literature established that challenge is a proper process which prepares someone to get ready to face a hard task and in response individuals tries to input their full efforts to fulfill the task.

Secondly, if factors of the instrument to be looked at, they are assigned tasks, in form of assignments and quizzes; focused learning which help students to learn for a specific purpose and it ultimately results in achieving some specific aims; communication skills encompasses the ability of students to communicate properly in the form of presentations and discussions.

The phenomenon of Academic challenge needs to be monitored in educational institutes, to make program of study more effective. The instrument for Academic Challenges prescribes some indicators that need to be enhanced in any institute to get constructive results. Challenges can be refined to motivate students take active part in these challenges.

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