TURKISH ASSIST: MEASURING UNIVERSITY STUDENTS' APPROACHES TO LEARNING STATISTICS

Ayse Aysin Bilgin[1], Sitki Gozlu[2]
[1]Department of Statistics, Macquarie University, Australia
[2]Bahcesehir University, Faculty of Engineering, Turkey
ayse.bilgin@mq.edu.au

Evidence-based decision making has become one of the most valuable tools for any profession with the ease of accessing vast amounts of data due to developments in computing and data storage facilities. This is especially important for future generations in management positions. Undoubtedly statistics play an important role in enabling managers to base their decisions on valid available evidence, but if students do not acquire the skills to understand and evaluate them during courses in statistics, their ability to utilise this evidence may be limited. In this study we investigated the learning approaches of students in statistics who are studying towards a management science or management engineering degree in six Turkish universities using Turkish Approaches and Study Skills Inventory for Students (TASSIST) which is translated from English to Turkish. This paper presents an exploratory factor analysis for the validation of Turkish ASSIST.

BACKGROUND

Evidence-based decision making is part of many managers' daily life, therefore many universities across the globe require their students to study at least one statistics unit during their Bachelor degrees in Management or related areas. Turkish universities are no exception to this trend. Studying statistics is not sufficient to enable future managers to make evidence-based decisions, as they need to understand and relate their learning in statistics to their other subject areas.

Marton & Säljö's (1976) demonstration that students tended to either focus on general meaning or specific words and phrases when attempting to learn a prose gave rise to the concept of learning approaches. The learning approaches framework now generally identifies three main approaches to learning: surface approach, strategic approach and deep approach.

The use of surface approaches within statistical study is detrimental to both the student and the field, as only deep approaches award the student with sufficient knowledge to progress and be capable of future statistical enquiry and evidence-based decision making. Although there are many studies exploring the learning approaches utilised by students in general (Zhang, 2000; Scouller, 1998; Salim 2006; Jakobi & Rusconi, 2009; Sumuncuoglu & Yildirim, 1999), there are very few concerning approaches to learning in statistics, and to the knowledge of the authors there have been none carried out in Turkish students.

This study is the Turkish arm of a larger multinational learning approaches in statistics study (Chiesi, Primi, Bilgin, Lopez, Fabrizio, & Gozlu, 2013, Gozlu, Bilgin & Gungor, 2013). The aim of the larger study is to identify and understand students' learning approaches in statistics, when they are studying towards a degree other than statistics, across countries and across continents. This information can be used to adjust and tailor our teaching to enable better learning experiences for the students.

We chose the Approaches and Study Skills Inventory for Students (ASSIST) (Entwistle, 1997) as the survey tool for the identification of the learning approaches used by students. Although ASSIST has been validated in a population of students in the United Kingdom by Entwistle, Tait & McCune (2000), for Norwegian populations by Diseth (2001) and in Egyptian population of students by Gadelrab (2011), this is the first time it has been translated into Turkish and validated for Turkish higher education.

METHOD

Survey Tool

The ASSIST (Tait, Entwistle & McCune, 1998) was developed to assess students' learning approaches, using a five-point Likert scale for 52 statements relevant to learning. It consists of

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three parts. Part A includes six statements to describe "what is learning?" in students' eyes. Part B is relevant to identifying students' learning approaches, it has 52 statements. Finally, Part C of the survey is used to identify student preferences for different types of courses and teaching, that support understanding (related to deep approach) or that transmit information (related to a surface approach) by using eight statements together with a question asking students how well they think they have been doing on their assessed work so far. The ASSIST is freely available (Centre for Research on Learning and Instruction, 1997), but it is only available in English.

The approaches to learning scales are divided into subscales and motives scales, as follows: deep approach (seeking meaning, relating ideas, use of evidence, interest in ideas), surface approach (lack of purpose, unrelated memorising, syllabus-boundness, fear of failure), and strategic approach (organised studying, time management, alertness to assessment demands, achieving, monitoring effectiveness).

The initial translation of ASSIST from English to Turkish was done by an academic whose native language is Turkish. She migrated to Australia with her family while she was very young, with reading and writing skills in Turkish acquired during her first two years of primary school in Turkey. This Turkish education was continued throughout her primary and secondary schooling in Sydney with attendance at Saturday Turkish language classes. Through this early and continued exposure to Turkish, her fluency can be considered as good as a native speaker. As well as having a Bachelor of Economics degree from the University of Sydney, she also holds a Graduate Diploma of Education and TESOL (Teaching English to Speakers of Other Languages) Certificate. When she agreed to translate the ASSIST, she was working as an English teacher at Macquarie University, mainly for students from Asia.

Following the initial translation, one of the authors read the translated survey and made necessary changes to enable better understanding by the Turkish students. Then the second author with the help of another academic from Turkey made further adjustments to the statements. After a few iterations, the Turkish ASSIST was piloted with one of the author's students before data collection started in six Turkish universities. The final version of Turkish ASSIST - Part B can be seen in the Appendix.

Statistical Analyses

Principal components method (PCA) was used in performing the exploratory factor analysis (EFA) with Varimax rotation. Learning approaches subscales loading high on their own approach with minimal cross-loadings will provide good discriminant validity of the factors, and thereby reinforce that the ASSIST subscales efficiently measure the individual learning approaches of the Turkish statistics students.

RESULTS

Participants and Context

We surveyed 458 (191 male and 266 female, one unknown) students in six Turkish universities, namely from Afyon Kocatepe University (AKU) (n=29), Hacettepe University (n=41), Karadeniz Technical University (KTU) (n=78), Istanbul Technical University (ITU) (n=84), Selcuk University (n=198), and Yildiz Technical University (YTU) (n=28) in 2012. The participants were aged between 18-36 years, with a mean age of 22.7 years, standard deviation [SD] of 1.5 years. There were seven international students in this sample and the education language was Turkish. They were studying toward a Bachelor of Management or similar related degrees and the unit of study was their first statistics unit which is usually compulsory as part of their degree. Participation in the study was voluntary.

Exploratory Factor Analysis of the Turkish ASSIST

The majority of the correlations between the thirteen subscales were greater than 0.3 except for the correlations between the surface approach subscales (lack of purpose and unrelated memorising) and those of the deep and strategic approaches. The surface approach subscales had weak correlations (less than 0.3 in magnitude) with both deep and strategic approaches subscales. The subscales of the deep and strategic approaches are positively correlated with each other, while

the subscales of the surface approach only had correlations above 0.3 in magnitude with other surface approach subscales but not with any of the subscales of the other two approaches.

The value of the determinant of the correlation matrix was 0.003. Kaiser-Meyer-Olkin measure of sampling adequacy for this data set was 0.879 (greater than threshold 0.5). Bartlett's test of sphericity returned a significant p-value of less than 0.001, which means that the off-diagonal entries in the correlation matrix were significantly greater than zero. Based on these findings, it was concluded that it was worthwhile to carry out the exploratory factor analysis.

The first four eigenvalues for this data set were 5.086, 2.106, 1.238 and 0.684, which would suggest the extraction of three factors, as only the first three are greater than one. The scree plot of eigenvalues versus the number of factors (Figure 1) shows that the first three factors would be enough to explain high proportion of the variance since an elbow appears to be after the third factor.

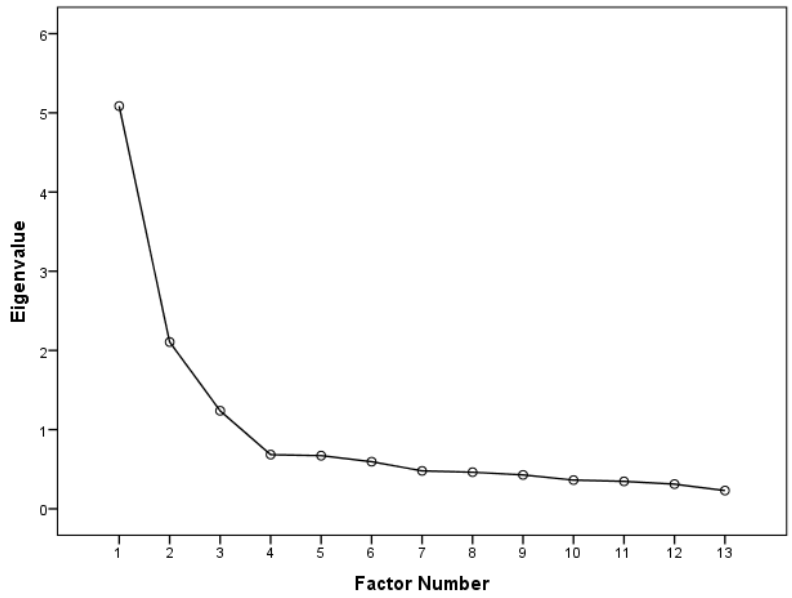

Figure 1: Scree plot of eigenvalues versus number of factors

The principal component approach explained nearly 65% of the variation with three factors extracted. The factor analysis distinctly separated the three learning approaches with most of the subscales with a positive loading of above 0.7 (Table 1). The two of the subscales with a loading of less than 0.7 were the related strategic approach ("alertness to assessment demands" and "monitoring effectiveness"), while both surface ("Syllabus-boundness") and deep ("Interest in ideas") approaches had one subscale each. The "monitoring effectiveness" appeared to have a fair degree of overlap between the strategic and deep approaches loading higher on the deep approach (Table above). This finding is not unique to the current research project but it was also observed for Norwegian (Diseth, 2001) and Australian cohorts (Gantner, 2013). In conclusion, the exploratory factor analysis appears to validate the ASSIST model by loading appropriately onto the correct component for all but a few of the subscales for the Turkish ASSIST.

DISCUSSION AND CONCLUSION

The Turkish version of the ASSIST has been clearly validated in this cohort of Turkish students studying statistics. The subscales load approximately appropriately onto the three learning approaches, deep, strategic and surface (Table 1). There is a generally clear separation of these components. One subscale, "monitoring effectiveness" has some overlap between the strategic and deep approaches, loading more strongly on the deep approach. Diseth (2001) found that two subscales (one of them being "monitoring effectiveness") loaded inappropriately (similar to our findings) in a sample of Norwegian students while Bilgin, Primi, Chiesi, Lopez, Fabrizio, Quinn, Gantner, & Graham (2014)'s study documented similar results for an Australian cohort.

The results of this study align with the proposed constructs of three distinctive learning approaches, although we suggest that due to cross loadings on strategic and deep approaches, researchers should be cautious with their interpretations. With further analysis, it might be possible to reduce the number of statements presented to students to identify their learning approaches and this might eliminate the cross loadings of the subscales. We would like to encourage academics from Turkey to use *Turkish ASSIST* to identify their students' learning approaches in other discipline areas, and compare their findings to previous studies. The replication of this experiment by other researchers, and in other areas, will add to the validity of the Turkish ASSIST.

Table 1: Rotated factor loadings of the three-factor EFA model

Subscales	Component		
	1 (Deep)	2 (Strategic)	3 (Surface)
Organised studying.	.308	.792	-.020
Time management.	.169	.881	.017
Alertness to assessment demands.	.321	.625	.116
Achieving.	.278	.779	.053
Monitoring effectiveness.	.683	.437	.049
Lack of purpose.	-.081	-.144	.765
Unrelated memorising.	-.041	.082	.827
Syllabus-boundness.	.090	.307	.613
Fear of failure.	.239	-.012	.713
Seeking meaning.	.807	.252	-.008
Relating ideas.	.844	.102	.031
Use of evidence.	.807	.273	.091
Interest in ideas.	.622	.365	.093

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APPENDIX: PART B OF TURKISH ASSIST - DERS ÇALIŞMA YÖNTEMLERI

Anketin sıradaki bölümünde, yine diğer öğrencilerin yorumlarına dayanan ifadelere, katılma ya da katılmama durumunuzu belirtmeniz istenmektedir. İfadeleri değerlendirirken aklınıza gelen ilk yanıt işaretleyiniz. Yanıtınızı belirlerken, **özellikle ankette belirtmiş olduğunuz dersi** göz önünde bulundurunuz. Lütfen bütün soruları yanıtladığınızdan emin olunuz.
5=tamamen katılıyorum(√) 4=kısmen katılıyorum(√?) 2=kısmen katılmıyorum(x?) 1=kesinlikle katılmıyorum (x). Gerçekten gerek olmadıkça ya da siz veya dersiniz için geçersiz bir durum değilse 3=emin değilim(??)'i kullanmamaya çalışınız.

	√	√?	??	x?	x
1. Çalışmak için fırsat yaratabildiğimden işimle de kolaylık baş edebiliyorum.					
2. Ödevler üzerinde çalışırken, değerlendiren kişiyi en iyi nasıl etkileyeceğimi aklımda bulunduruyorum.					
3. Burada yaptığım şeye gerçekten değer mi diye sıklıkla kaygılanıyorum.					
4. Genellikle, öğrenmemiz gerekenin neyi ifade ettiğini, kendim için anlamaya çalışıyorum.					
5. En iyi şekilde kullanabilmek için ders çalışma zamanımı düzenliyorum.					
6. Öğrenmem gerekenlerin büyük kısmını, sadece ezberlemeye yoğunlaşmam gerektiğini gördüm.					
7. Anlamlılığından emin olmak için bitirdiğim işi dikkatlice tekrar kontrol ederim.					
8. Baş etmek durumunda olduğum materyaller arasında boğulduğumu sıklıkla hissediyorum.					
9. Elimdekilere dikkatlice bakıyorum ve ne çalıştığıma dair kendi çıkarımlarımda bulunmaya çalışıyorum.					
10. Benim için derslerde yapabileceğimin en iyisini yaptığımı hissetmek önemli.					
11. Başka konularda ya da başka derslerde karşılaştığım fikirleri mümkün olduğunca ilişkilendirmeye çalışıyorum.					

12. Dersten geçmek için gerekenden çok az daha fazla okuma eğilimliyim.					
13. Başka işler yaparken, genelde kendimi derslerdeki konular hakkında düşünürken buluyorum.					
14. Sınavlara gayet sistemli ve düzenli olarak çalıştığımı düşünüyorum.					
15. Gelecek sefer daha yüksek notlar alabilmek için, öğretmenlerin ödevlere yaptıkları yorumlara dikkat ediyorum.					
16. Burada bana ilginç veya gerekli gelen çok bir şey yok.					
17. Bir makale ya da kitap okuduğumda, yazarın tam olarak ne anlatmaya çalıştığını kendim için anlamaya çalışıyorum.					
18. Gerektiğinde oturup çalışabiliyorum.					
19. Çalıştıklarımın çoğu mantıklı gelmiyor; birbirlerinden alakasız parçalar gibiler.					
20. Çalışmaya iyi odaklanmak için bu dersten ne kazanmak istediğimi düşünüyorum.					
21. Yeni bir konu çalışırken, fikirlerin birbirleri ile nasıl uyduğunu kendi kafamda oturtmaya çalışıyorum.					
22. Bu işle doğru şekilde başa çıkabilecek miyim kaygısını sıklıkla duyuyorum.					
23. Sıklıkla kendimi, derslerde duyduğum ya da kitaplardan okuduğum şeyleri, kendi kendime sorgularken buluyorum.					
24. İyiye gittiğimi hissediyorum, bu da benim daha çok çalışmama yardımcı oluyor.					
25. Sadece dersten geçmem için gerekli olan bilgiyi öğrenmeye odaklanıyorum.					
26. Bazen, akademik konularda çalışmanın gayet ilgi çekici olabileceğini düşünüyorum.					
27. Öğretmenler tarafından önerilen okumaları takip etmekte gayet iyiyim.					
28. Ödevleri kimin değerlendireceğini ve ödevlerden beklentilerinin ne olduğunu aklımda bulunduruyorum.					
29. Geriye baktığımda, neden buraya gelmeye karar verdiğimi bazen merak ediyorum.					
30. Okurken, zaman zaman ara verip, ne öğrendiğimi derinlemesine düşünüyorum.					
31. Son dakikaya bırakmaktansa, dönem boyunca sürekli çalışıyorum.					
32. Derslerde neyin önemli olduğuna karar veremediğimden olabildiğince her şeyi not etmeye çalışıyorum.					
33. Kitaplardaki ya da makalelerdeki fikirler, çoğu zaman benim uzun uzun düşünmemi sağlıyorum.					
34. Bir sınav sorusuna ya da ödeve başlamadan önce, onu en iyi nasıl ele alabileceğimi düşünüyorum.					
35. İşlerin gerisinde kaldığımda, çoğunlukla paniklemiş görünürüm.					
36. Okurken, anlatılanlarla nasıl uyduğunu görebilmek için detayları dikkatlice inceliyorum.					
37. Ders çalışırken çok çaba harcıyorum, çünkü başarmaya kararlıyım.					
38. Çalışmamı, ödevler ve sınavlar için gerekli olan düzeye göre ayarlıyorum.					
39. Derslerde karşılaştığım bazı fikirleri gerçekten ilgi çekici buluyorum.					
40. Genellikle haftalık işlerimi kağıt üzerinde ya da kafamda önceden planlıyorum.					
41. Öğretmenlerin önemli buldukları noktalara genellikle dikkat ediyor ve o noktalara yoğunlaşıyorum.					
42. Bu derse aslında ilgim yok, ancak farklı nedenlerden dolayı almak zorundayım.					
43. Bir sorunu ya da ödevi ele almadan önce arkasında neyin yattığını anlamaya çalışıyorum.					
44. Genellikle gün içinde zamanımı iyi kullanıyorum.					
45. Hatırlamam gereken şeylere bir anlam vermekte genellikle güçlük çekiyorum.					
46. Bana çok bir şey katmasa da, kendi fikirlerim üzerinde düşünerek zaman geçirmeyi seviyorum.					
47. Bir işi bitirdiğimde, gerçekten gereksinimleri karşılayıp karşılamadığını kontrol ediyorum.					
48. Yapamayacağımı düşündüğüm işler yüzünden sıklıkla uykum kaçıyor.					
49. Bir tartışmayı takip edebilmek ya da arka plandaki nedenleri görmek benim için önemli.					
50. Kendi kendimi motive etmekte güçlük çekmiyorum.					
51. Raporlardan ya da diğer ödevlerden istenilenin açıkça söylenmesini seviyorum.					
52. Bazen akademik konulara takılıp kalıyorum ve çalışmaya devam etmek istiyorum.					