Procedia - Social and Behavioral Sciences 00 (2014) 000–000

EPFL – How People Learn

Testing Factorial and Predictive Validity of Entwistle's ASSIST Test for Approaches to Learning

Isabelle Pitteloud [a], Enrico Restivo [a], Alessandro Slamitz [a], Fabio Stradelli [a]

[a] *École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland*

Abstract

The aim of this study is to determine the validity and reliability of Entwistle's Approaches and Study Skills Inventory for Students Test translated into Italian. The following paper provides evidences in support of a positive answer. The participants are 180 native Italian students and the test has been completely distributed online to all the participants. For our study, we chose to work with the short version of the ASSIST test because of its easier way to be spread and completed. To verify the factor validity, the data has been processed through a maximum likelihood factor analysis, using the Rotation Method "Oblimin with Kaiser Normalization". As a consequence, our study suggests ASSIST results should be a valid research tool for the assessment of approaches to learning.

Keywords: Approaches to Learning, ASSIST, Learning Enviroment, Evaluation, Learning Styles.

1. Introduction

The aim of the project is to verify the validity and reliability of Entwistle's Approaches and Study Skills Inventory for Students Test translated into Italian.

2. Literature review

Most of the literature agrees on the fact that people can either study thoroughly interiorizing the topic, building complex patterns with other subjects and feeling a spontaneous motivation (this is the so-called deep approach) or just fulfill the tasks required, trying to do the least possible in order to succeed in the exam (surface approach).

Entwistle's aim in (Entwistle et al. 1997) was to test the approach to learning of a student, which could be either a deep or a surface approach. This was achieved through a now famous test, the Approaches and Study Skills Inventory for Students Test (ASSIST).

In addition to these first two features, data suggested the existence of a third type of learning approach. A strategic approach to learning had already been identified in Ramsden's work (1979). This kind of approach involves a different kind of effort, aiming at maximizing only the results instead of deeply learning and understanding as with a deep approach.

Because of the differences in the language construction embodied in the approaches to learning, the validity and reliability of ASSIST might result language biased and therefore depend on the language in which it is written. Translations of ASSIST have been performed and their validity has been verified for several languages, namely Norwegian (Diseth et al. 2001), lower-register English (Speth et al. 2007) and Portuguese (Valadas et al. 2010). The results obtained in all the mentioned cases are positive, and it seems that the test preserves its factorial validity even after the translations. A confirmation of reliability and factorial validity is important as it would facilitate international research for future tests.

ASSIST is not the only existing valid model to test approaches to learning. Another valid and broadly used test is Biggs' Study Process Questionnaire (SPC) (Biggs et al. 1987). Biggs' test found similar results to Entwistle's, pointing out the existence of deep, surface and strategic approaches to learning. Similarly as for ASSIST, the validity of SPC's translations has been checked. In some cases the results are not positive, for example for the French version. However, it seems that it shows better psychometric properties rather than most other tests. We are therefore inclined to believe that its structural validity will hold even after a proper translation. If this is the case, our inquiry may reveal as a new useful instrument for Italian teachers, researchers and whoever might be interested in using it. We would like to highlight that currently a validated Italian version of such a test is, as far as we know, not available.

3. Methods

The object of our analysis was based on one of the most highly regarded and used models to evaluate learning approaches, the so-called Entwistle's Approaches and Study Skills Inventory for Students Test (ASSIST). For this study, we decided to consider the short version of the test, provided and validated by Entwistle himself in (Entwistle et al. 1997). We chose to work with the short version of the ASSIST test since we did not have particularly efficient means to spread the survey and we believed that we would more easily obtain a sufficiently large population sample with the short version.

3.1. Participants

All the participants of the population sample for this study were native Italian speakers. A total of 180 responses were collected. As the questionnaire was created in a such way that every question needed to be answered in order to validate the questionnaire, no data cleaning was required and thus all of the data in the 180 responses was used.

3.2. *Materials*

The translated version of the short ASSIST test was posted and administrated to each of the participants. The participants' answers were then organized in an Excel spreadsheet and the data analysis was carried out with the software R.

3.3. *Design*

The questionnaire was translated into Italian by mothertongues. A particular effort was made in trying to be as faithful and literal as possible to the blueprint, in order not to introduce any bias and actually verify the original features of Entwistle's test.

Each question offered the following five possible alternatives:

- 1 = in disaccordo (disagree)
- 2 = parzialmente in disaccordo (disagree somewhat)
- 3 = non so (unsure)
- 4 = parzialmente d'accordo (agree somewhat)
- 5 = d'accordo (agree)

Answer 3 was explicitly discouraged at the beginning of the test. At the end of the questionnaire, the participants were given the opportunity to obtain feedback on their results.

3.4. *Procedure*

After putting in place the online short version of the Italian ASSIST, data were collected, imported into excel and then into R in order to analyse them. In order to assess the internal consistency of the items in measuring the same construct, the Cronbach's alpha was measured, both normally for each scale (deep, strategic and surface) and for each scale after removing one item from the approach (package *psy*). A categorical analysis of the data was conducted: median and standard deviation for each question were computed, as well as the pairwise correlation between questions. Finally, a maximum likelihood factor analysis was performed, limited to three factors (package *psych*). The goal of the latter was to observe whether or not there was a matching between the three factors determined and the existing ASSIST scales.

4. Data - Findings

The results illustrating the reliability coefficients are found in Table 1. The Cronbach's alphas found for each of the scales are the following: Deep scale = 0.63, Strategic Scale = 0.82 and Surface Scale = 0.61. These values are close to the range of values previously reported by Entwistle, found in different studies in which alpha ranges from 0.66 to 0.88. Although the values for both the Deep scale and the Surface scale are slightly below, the values obtained for the Strategic scale (which is, according to Entwistle et al., associated with the achieving motivation, with high academic performance and, more weakly, with a lack of interference in studying from social or sporting activities) are in a much

higher range. Additionally, the "Scale alpha if item deleted" is given in this same Table 1. It appears that removing some questions from the different scales sometimes improves the value obtained for the alpha (e.g. when removing item 12 from the Deep Scale the Cronbach's alpha increases from 0.63 to 0.68). More detailed explanations to this will be given further.

The values found in Table 2 represent the results of the maximum likelihood factor analysis. For this the Rotation Method chosen was "Oblimin with Kaiser Normalization". The analysis allows relating items that are highly correlated (either negatively or positively). Ideal results would find items in the same group to be highly correlated with each other, whereas items from different groups would have poor or negative correlation. Additionally, correlations between a set of two factors should be low or negative. Results obtained illustrate for most of the items (some exceptions such as Q12. Using Evidence and Q4. Syllabus Bound), a clear correlation to one factor (each time a positive correlation was observed) more than to the two others (correlations lower than the correlations to the first factor and sometimes even negative). Also, the correlation between factors is very low for factors: I-III and II-III and slightly higher for factors I-II.

Table 3 illustrates the correlation between each of the different questions addressed. The correlations vary in the range of -0.31 to +0.59. And finally, Figure 1 is a representation of the median answer for each question. The standard deviation is plotted as well. The value of the standard deviations seem to have high values, but this is mainly due to the fact that the answers are discrete values [1, 2, 3, 4, 5], thus a standard deviation close to the value ±1 only suggests that the answer may easily be in the category just above or just below.

Table 1. Scale Reliability Analysis of the 18 ASSIST Items

Below, the different questions of the English Short Version ASSIST categorized into their different classes: Deep Scale, Strategic Scale and Surface Scale.	Scale alpha if item deleted
Deep Scale Cronbach's alpha = 0.63	
Q2. When I'm reading an article or book, I try to find out for myself exactly what the author means.	0.55
Q6. Before tackling a problem or assignment, I first try to work out what lies behind it.	0.57
Q10. When I'm working on a new topic, I try to see in my own mind how all the ideas fit together.	0.55
Q12. Often I find myself questioning things I hear in lectures or read in books.	0.68
Q15. Ideas in course books or articles often set me off on long chains of thought of my own.	0.60
Q17. When I read, I examine the details carefully to see how they fit in with what's being said.	0.53
Strategic Scale Cronbach's alpha = 0.82	
Q3. I organise my study time carefully to make the best use of it.	0.76
Q5. I work steadily through the term or semester, rather than leave it all until the last minute.	0.79
Q7. I'm pretty good at getting down to work whenever I need to.	0.81
Q9. I put a lot of effort into studying because I'm determined to do well.	0.77
Q11. I don't find it at all difficult to motivate myself.	0.81
Q13. I think I'm quite systematic and organised when it comes to revising for exams.	0.77
Sufrace Scale Cronbach's alpha = 0.61	
Q1. I often have trouble in making sense of the things I have to remember.	0.53
Q4. There's not much of the work here that I find interesting or relevant.	0.63
Q8. Much of what I'm studying makes little sense: it's like unrelated bits and pieces.	0.57
Q14. Often I feel I'm drowning in the sheer amount of material we're having to cope with..	0.55
Q16. I'm not really sure what's important in lectures, so I try to get down all I can.	0.54
Q18. I often worry about whether I'll ever be able to cope with the work properly.	0.57

Table 2. Maximum Likelihood Factor Analysis

Question number & Related Item	Factor I	Factor II	Factor III
Deep Scale			
Q2. Seeking Meaning	0.22	***0.57***	0.16
Q6. Interest in Ideas	0.25	***0.57***	-0.16
Q10. Relating Ideas	0.38	***0.60***	-0.14
Q12. Using Evidence	-0.20	***0.05***	-0.06
Q15. Relating Ideas	0.03	***0.39***	0.04
Q17. Using Evidence	0.26	***0.63***	0.04
Strategic Scale			
Q3. Time Management	***0.76***	0.26	0.10
Q5. Alert to Assessment	***0.68***	0.11	0.14
Q7. Time Management	***0.53***	0.39	-0.22
Q9. Achieving	***0.77***	0.45	0.06
Q11. Achieving	***0.46***	0.27	-0.29
Q13 Organized Studying	***0.71***	0.34	-0.09
Sufrace Scale			
Q1. Lack Purpose	-0.22	-0.27	***0.44***
Q4. Syllabus bound	-0.24	-0.30	***0.11***
Q8. Unrelated Memorizing	-0.27	-0.40	***0.30***
Q14. Fear of Failure	0.16	0.08	***0.69***
Q16. Fear of Failure	0.06	-0.19	***0.50***
Q18. Unrelated Memorizing	0.07	0.10	***0.62***

Correlations Between Factors	Factor I	Factor II	Factor III
Factor I – Strategic	1.00	-	-
Factor II – Deep	0.38	1.00	-
Factor III - Surface	0.03	-0.07	1.00

Table 3. Correlation Between Questions

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	-0.03	1.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	-0.06	0.22	1.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	0.19	-0.09	-0.14	1.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	-0.06	0.05	0.56	-0.16	1.00	-	-	-	-	-	-	-	-	-	-	-	-	-
6	-0.19	0.33	0.16	-0.16	0.09	1.00	-	-	-	-	-	-	-	-	-	-	-	-
7	-0.28	0.23	0.34	-0.19	0.25	0.28	1.00	-	-	-	-	-	-	-	-	-	-	-
8	0.46	-0.10	-0.12	0.35	-0.11	-0.31	-0.25	1.00	-	-	-	-	-	-	-	-	-	-
9	-0.21	0.30	0.56	-0.24	0.54	0.29	0.48	-0.20	1.00	-	-	-	-	-	-	-	-	-
10	-0.15	0.29	0.29	-0.16	0.12	0.34	0.35	-0.21	0.33	1.00	-	-	-	-	-	-	-	-
11	-0.14	0.16	0.34	-0.12	0.30	0.13	0.33	-0.24	0.35	0.32	1.00	-	-	-	-	-	-	-
12	0.11	0.08	-0.16	0.08	-0.10	0.01	-0.11	0.14	-0.13	0.08	0.00	1.00	-	-	-	-	-	-
13	-0.22	0.13	0.59	-0.10	0.43	0.26	0.44	-0.23	0.50	0.41	0.38	-0.15	1.00	-	-	-	-	-
14	0.17	0.14	0.15	0.04	0.17	-0.01	-0.08	0.02	0.18	-0.02	-0.25	-0.18	0.06	1.00	-	-	-	-
15	-0.04	0.21	0.02	-0.08	-0.03	0.21	0.04	-0.15	0.07	0.27	0.08	0.09	0.07	0.06	1.00	-	-	-
16	0.30	0.03	0.05	0.05	0.15	-0.24	-0.08	0.22	0.04	-0.10	-0.06	-0.03	-0.06	0.34	-0.04	1.00	-	-
17	-0.10	0.44	0.20	-0.23	0.13	0.30	0.19	-0.16	0.33	0.43	0.16	0.07	0.17	0.09	0.21	-0.08	1.00	-
18	0.23	0.17	0.05	-0.06	0.11	-0.01	-0.05	0.05	0.08	-0.05	-0.18	-0.09	0.04	0.52	0.13	0.26	0.07	1.00

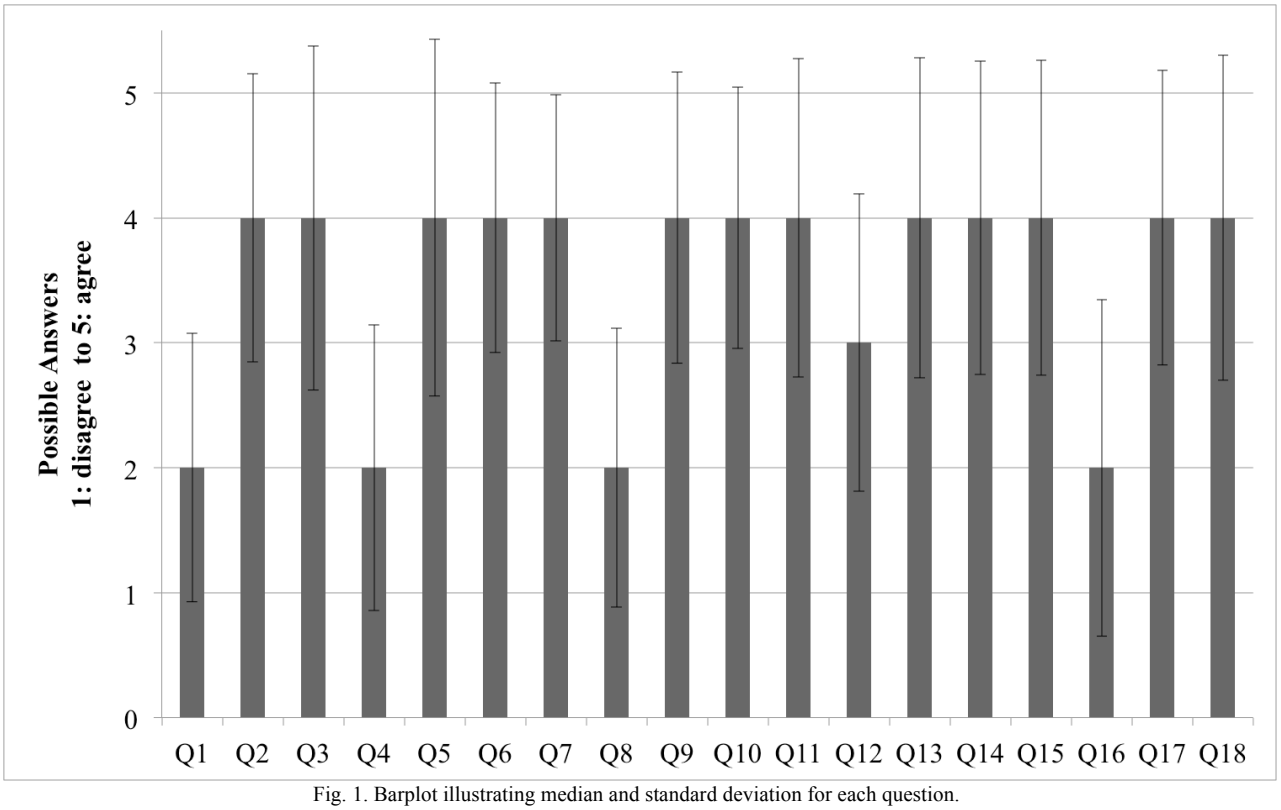

Fig. 1. Barplot illustrating median and standard deviation for each question.

5. Analysis and Conclusions

The results obtained in this study support the reliability and the correlation between the different questions found in each scale. Additionally, several further observations can be made based on the results. First of all, it seems that several questions bring less support to the questionnaire. For example, when determining the scale alpha when the item Q12 is removed, the value seems to increase if compared to the global Cronbach's alpha value for the Deep Scale. The same kind of effect can be observed when looking at the scale alpha for the Q4 (these were the only two questions with such an effect on the Cronbach's alpha). Possible explanations for these trends might be tied to the way in which the questions are posed. Indeed, it is possible that the "here" in Q4 can sometimes be ambiguous; it may happen that participants mistake the actual "here" which actually relates to their studies, to the "here" which designates the questionnaire. Also the "often" that is used in Q12 should maybe be accompanied with a value in order for the participants to have an idea of what "often" actually means (possibly something like "more than once per lecture" or "X times over the course of an article review/book"). In other studies (Speth et al., Gadelrab), these questions do not seem to have such a negative effect on the value of the Cronbach's alpha. Additionally, questions 17, 3, and 1 seem to be more essential to the value of the Cronbach's alpha (i.e. their scale alpha value is greater that the Cronbach's alpha associated to their Approach to Learning). Thus, the fact that both Q12 and Q17 are related to the "Using Evidence" category found in the Deep Learning Approach further suggests that it is the formulation of Q12 and not its "item type" (i.e. Using Evidence) which poorly supports Cronbach's alpha.

After having taken note of the questions positively influencing the Cronbach's alpha, it is though interesting to see that the correlation between some of these items and their attributed factor (in Table 2.) are not the highest correlations found within each approach. Indeed, Q1 has a correlation of 0.44 with its factor, when the highest correlation between an item and the factor is of 0.69. For the other two questions, the correlations seem to support the positive influence on the Cronbach's alpha. The results of the inter-correlation between the factors agree with the "choice" of three factors. If one of the correlations were to be significant, it would have suggested that the two factors were not so different from each other and would not necessarily need to be separated into two distinct factors/approaches. Also based on correlations, but this time within two different questions, Table 3 further supports the factor analysis, meaning that the highest correlations are found for two questions belonging to the same approach.

Finally, results found in figure 1 illustrate that most of the participants tend to prefer deep or strategic learning approaches. This is underlined by the fact that the questions with the lowest medians (lower values correspond to disagreement with the question) are related to the questions 1, 4, 8 and 16 which all belong to the surface learning approach. This might be explained with the help of the way in which the questionnaire was distributed. Although the questionnaire was not aimed specifically to a certain population (participants' main requirement was that they were native Italian speakers), it was spread by the authors of this study themselves. As all four are currently studying in an engineering school, is might be proper to assume that the population to which the questionnaire was addressed (the authors' connections, and maybe one or two degrees of connections further) had an increased probability of studying in a similar environment. This remains as a simple assumption in order to explain the trend of the data but confirmation could only have been obtained if we had asked each participant to indicate in which domain he/she was studying. Another possible explanation is a self-critique bias: one may tend to overestimate himself and answer as if he had a deep approach to learning even when it is not the case. A possible correction to this factor would require the intervention of an external expert judging every participant. A combined model exploiting the expert (external evaluation) and the questionnaire (self-evaluation) could also be developed. However, this would miss the strengths of a questionnaire, i.e. cheapness and easiness to distribute, and it would also exceed the scope of this research.

To conclude, the values found for the Cronbach's alpha are in the range 0.61 – 0.82. Therefore, there is statistical evidence to affirm that our translated test is reliable, and it is particularly strong for what concernes the strategic approach to learning. Moreover, our Cronbach's alpha scores are close to the ones found in other translated versions (namely, Gadelrab, 2011 and Speth et al., 2007) and to the ones found by Entwistle himself for the short ASSIST. This means that the translation is still as reliable as it may and should be.

The aim of this study was to determine the validity and reliability of Entwistle's Approaches and Study Skills Inventory for Students Test translated into Italian. On this basis, we can conclude that the results obtained with both the Cronbach's alpha and the factor analysis support the Italian version of the test, this even with a population that is below 200 participants. Thus it appears that the Italian short version of the ASSIST could be used in order to assess the approaches to learning of Italian speaking students.

Acknowledgements

We would like to acknowledge the help of Roland Tormey in the design of the study and his precious suggestions about references and methods to be used. We would also like to thank all the students that participated in the study.

References

Entwistle, N., Tait, H., & McCune, V. (1997). Scoring key for the approaches and study skills inventory for students (ASSIST). *Unpublished paper. University of Edinburgh, Scotland*.

Diseth, A. (2001). Validation of a Norwegian Version of the Approaches and Study Skills Inventory for Students (ASSIST): application of structural equation modelling. Scandinavian Journal of Educational Research, 45, 381-394.

Speth, C. A., Namuth, D. M., & Lee, D. J. (2007). Using the ASSIST Short Form for Evaluating an Information Technology Application: Validity and Reliability Issues. *Informing Science*, *10*.

Valadas, S. C. A., Gonçalves, F. R., & Faísca, L. M. (2010). Approaches to studying in higher education Portuguese students: a Portuguese version of the approaches and study skills inventory for students. *Higher Education*, *59*(3), 259-275.

Biggs, J. B. (1987). *Study Process Questionnaire Manual. Student Approaches to Learning and Studying*. Australian Council for Educational Research Ltd., Radford House, Frederick St., Hawthorn 3122, Australia.

Gadelrab, H. F. (2011). Factorial Structure and Predictive Validity of Approaches and Study Skills Inventory for Students (ASSIST) in Egypt: A Confirmatory Factor Analysis Approach. *Electronic Journal of Research in Educational Psychology*, *9*(3).

R Core Team (2013). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. ISBN 3-900051-07-0, URL http://www.R-project.org/.

Appendix A

A.1. Short ASSIST test translated into Italian

Grazie davvero per aver investito il tuo tempo nel completamento di questo questionario: è davvero apprezzato.

ASSIST – Versione Breve
Questionario per Studenti su Approcci e Tecniche di Studio

Questo questionario è stato ideato per permetterti di descrivere, in maniera sistematica, il tuo approccio allo studio. La tecnica consiste nel chiederti un numero significativo di domande che si sovrappongono in una certa misura per fornire una buona copertura generale di diversi metodi di studio. La maggior parte dei punti è basata su commenti fatti da altri studenti. Per cortesia rispondi sinceramente, così che le tue risposte descrivano accuratamente il tuo **vero** modo di studiare, e procedi nel questionario abbastanza **rapidamente**, assicurandoti di rispondere a **ogni punto**.

Decidendo la tua risposta, pensa in termini degli **ultimi corsi che hai seguito**. E' inoltre molto importante che tu risponda a **tutte** le domande: verifica di averlo fatto.

***5** significa sono d'accordo (□)* *** 4** = parzialmente d'accordo (□**?**)*
***2** = parzialmente in disaccordo (**x?**)* *** 1** = in disaccordo (**x**)*
*Cerca di <u>non</u> usare **3** = incerto (**??**)*

---

1. Ho spesso problemi nel dare un significato alle cose che devo ricordare.
2. Quando leggo un articolo o un libro, cerco di scoprire per conto mio cosa voglia dire l'autore esattamente.
3. Organizzo le mie ore di studio con attenzione per farne l'uso migliore.
4. Degli argomenti trattati qui, non c'è molto che io trovi interessante o importante.
5. Lavoro costantemente durante il semestre, piuttosto che fare tutto all'ultimo minuto.
6. Prima di affrontare un problema o una consegna, cerco anzitutto di capire cosa c'è dietro.
7. Sono piuttosto bravo a mettermi sotto col lavoro quando è necessario.
8. Molto di ciò che sto studiando ha poco senso: sono come pezzi e tasselli scorrelati.
9. Metto molto impegno nello studio perché ci tengo a riuscire bene.
10. Quando lavoro su un nuovo argomento, cerco di figurare nella mia testa come tutte le idee si collegano tra loro.
11. Non trovo per nulla difficile automotivarmi.
12. Mi trovo spesso a mettere in dubbio cose che sento a lezione o leggo dai libri.
13. Credo di essere piuttosto sistematico e ben organizzato quando è ora di ripassare per gli esami.
14. Spesso mi sento soffocare dall'immenso carico di studio con cui abbiamo a che fare.
15. I concetti di libri scolastici o articoli mi fanno spesso viaggiare con la mente in lunghe catene di pensieri.
16. Non sono davvero sicuro di cosa sia importante a lezione, quindi cerco di scrivere tutto quello che riesco.
17. Quando leggo, esamino i dettagli con attenzione per vedere se sono coerenti con quanto viene detto.
18. Mi preoccupo spesso di non essere in grado di affrontare il lavoro in maniera appropriata.

A.2. Frequency of answers for each question

Question number & Related Item	1	2	3	4	5
Deep Scale					
Q2. Seeking Meaning	0.05	0.15	0.03	0.48	0.29
Q6. Interest in Ideas	0.02	0.17	0.04	0.50	0.27
Q10. Relating Ideas	0.03	0.10	0.03	0.43	0.40
Q12. Using Evidence	0.07	0.42	0.08	0.34	0.09
Q15. Relating Ideas	0.07	0.28	0.11	0.35	0.19
Q17. Using Evidence	0.06	0.16	0.06	0.47	0.26
Strategic Scale					
Q3. Time Management	0.11	0.19	0.04	0.37	0.29
Q5. Alert to Assessment	0.15	0.25	0.05	0.32	0.23
Q7. Time Management	0.02	0.08	0.04	0.37	0.49
Q9. Achieving	0.04	0.13	0.06	0.37	0.40
Q11. Achieving	0.10	0.29	0.08	0.39	0.14
Q13 Organized Studying	0.07	0.21	0.03	0.40	0.28
Sufrace Scale					
Q1. Lack Purpose	0.38	0.44	0.02	0.13	0.02
Q4. Syllabus bound	0.23	0.42	0.13	0.19	0.04
Q8. Unrelated Memorizing	0.34	0.44	0.03	0.17	0.02
Q14. Fear of Failure	0.06	0.21	0.06	0.40	0.26
Q16. Fear of Failure	0.20	0.35	0.04	0.30	0.10
Q18. Unrelated Memorizing	0.09	0.24	0.06	0.40	0.21