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Student Approaches to Learning: An Exploratory Study

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STUDENT APPROACHES TO LEARNING: AN EXPLORATORY STUDY

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ABSTRACT

In this study, the partial least square approach (PLS) is applied to investigate students' approaches to learning in the framework of online or hybrid courses. A total of 140 valid responses from students who have finished or are currently enrolled in at least one MIS online or hybrid course were analyzed using a structural equation model and the results are presented herein.

Keywords: experiential learning theory (ELT), students' approaches to learning (SAL), surface approach (SA), deep approach (DA), Bigg's study process questionnaire (SPQ).

INTRODUCTION

Higher Education in the United States has evolved and is now expected to provide a successful and satisfying educational experience, and is held accountable by policy makers, students, parents, and the private sector. [32]. Higher education institutions offering blended education programs are finding themselves in an increasingly competitive market. The United States is a global hub with universities filled with students from diverse countries, who have distinct experiences, cultures and backgrounds. This makes it difficult for professors to determine what learning style will be suitable for their students.

Approaches to learning have been a focal topic of research for the last 30 years. With today's modern technologies, many studies have investigated what types of learning styles are utilized by students in different majors.
While recognized by many as an important factor in higher education, learning styles are 'not significantly related to student achievement or course comprehension" [17]. Other authors discuss the importance of learning styles to student satisfaction [29].

Reviewing material from a pre-requisite course is of concern because some students have limited retention of the prerequisite knowledge required to be successful in upper level or graduate courses. This metaphorical dumping of all acquired information at the end of the semester can be referred to colloquially as *Empty Box Syndrome*. Every semester it seems to the professors that students are starting off with a blank slate; and this of course does not facilitate the learning process. This implies that most students approach learning on the surface level, doing just enough to pass the exams to move on to the next class [2,3]. Students fearful of failing in the classroom often use the surface approach (SA) to learning. Students identified as having a deep approach (DA) to learning are intrinsically interested in the subject matter and desire to develop competence in a particular academic area. The underlying assumption of this study is that learning styles are an important factor in higher education and can contribute to higher student's academic performance in online or hybrid course delivery.

The purpose of this study is to determine if there is a relationship between learning style (deep approach or surface approach) and GPA as for performance in management information systems courses.

Understanding how learning styles affect student perception of satisfaction is an important element when considering marketability (recruitment and retention of students). By understanding learning style preferences, developers can give greater attention to designing elements that will appeal to a broader group of learning styles. Those who deliver distance education programs will benefit by understanding that, by their very nature, some course elements may alienate some learners. Finding out the approaches of students towards learning will also help the students see where their weak points lay, and would therefore help the faculty and administration see to what extent their students are partial to the Deep Approach or the Surface Approach. Hence, the results of this study would help the faculty and the administration in institutions of higher learning devise ways to encourage students to approach learning using the Deep Approach. This approach has been shown to have a positive

correlation to student's Grade Point Average (GPA) [31,15,30].

This paper will adopt the subsequent structure. We start with a depiction of the theoretical foundations of this research. To elaborate, we first discuss learning styles. We follow this by an explanation of the experiential learning theory (ELT). Next we present our methodology and results. We conclude with a discussion of the results in addition to the research implications.

EXPERIENCE & LEARNING STYLE

In education, the view that people have different learning styles is not a new idea. Much research has been done on learning styles, particularly involving students, to facilitate a smoother didactic atmosphere in institutions of pedagogy [1,7,9,21,19]. The research on learning styles dates as far back as the 1970s, and it has been attacked from various view points [9,1,19].

Dunn [7], an early learning styles researcher wrote, "Learning style is the way in which each person absorbs and retains information and/or skills; regardless of how that process is described, it is dramatically different for each person" [7].

Educators have increasingly recognized that learning styles have a profound influence on student performance especially at the tertiary and university levels, where more independent and creative thought is required ([25].

Much of the literature on learning styles involves improving the immediate and long term results of the teaching and learning episode. While there are many differences and often contradictory learning style models by theorists such as Dunn and Dunn [8,20,11,14,16], the focus of this study is on the experiential models of learning styles suggested by Kolb [20].

EXPERIENTIAL LEARNING THEORY (ELT)

Kolb's learning style model has been described as one of the dominant approaches to categorizing cognitive styles [22]. Kolb posited four major learning styles: converger, diverger, assimilator, and accommodator. Kolb's approach is experiential rather than mechanistic. He describes learning as "the process whereby knowledge is created through the transformation of experience." "Knowledge results from the combination of grasping and transforming experience" [20]. ELT is the foundation of Kolb's learning model, which provides that there are four respective modes that lead to the acquisition of knowledge. Two of these are modes of grasping experience, through Concrete Experience (CE) and Abstract Conceptualization (AC). The other two are modes of transforming experiencing through Reflective Observation (RO), and Active Experimentation (AE). Knowledge is formed when there is interaction between these four modes which represent experiencing, reflecting, thinking and acting. This interaction depends on the context of the information being processed, and this is portrayed in Figure 1

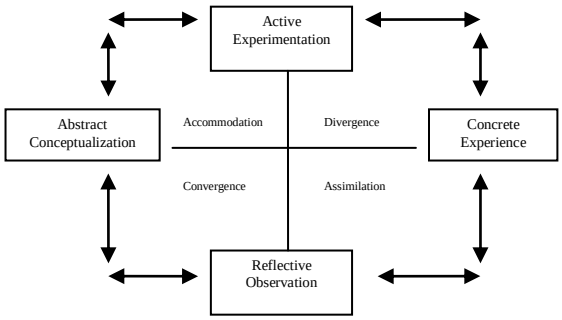


Figure 1. Kolb's Learning Theory [20]

The ways that we employ these different modes in the learning cycle is what defines our individual learning styles. The orders in which we choose to employ these modes are dependent on our hereditary traits, environmental influences, and past experiences [20]. Also when faced with mundane or conflicting decisions in our everyday lives, we select a resolution based on a choice between concrete and abstract, or active and reflective modes. These choices form patterns that our brains become accustomed to; hence, our behavioral characteristics are formed [21]. Kolb's definition of ELT hypothesizes that learning plays a major role in human and personal development. His earlier work demonstrated that our learning styles are impacted by our personalities, focal point of our education, careers, and present job responsibilities [20].
Kolb's model provides an excellent framework for planning teaching and learning activities and it can be usefully employed as a guide for understanding learning difficulties, vocational counseling, academic advising and so on [28].

Biggs's Study Process Questionnaire (SPQ)

Biggs distinguishes between a "surface approach" and a" deep approach" to learning. Biggs's SPQ was developed to assess the approaches of students in tertiary institutions towards learning and studying [2,3]. Biggs based his model on three ways in which students attack learning: deep, surface, and achievement approaches. The above approaches however are each made up of a motive and its accompanying strategy. Motives were defined as the driving force behind a student's study process, and certain strategies were linked with these motives.

This original version has three approaches: Deep approach (DA), Achieving Approach (AA), and Surface approach (SA). However, this questionnaire has been revised to consist of only two approaches: SA and DA [5]. Since the development of the original SPQ in 1987, there have been various changes in higher education. The student population in colleges and universities are now more heterogeneous, learning curricula have changed considerably and so has the administration and structure of these learning institutions. The more recent emphasis on didactic effectiveness and staff development suggested that a shorter version of the SPQ would be useful [5]. The revised two-factor SPQ (R-SPQ-2F) consists of 20 questions with two main scales: DA and SA, and four sub-scales: Deep Motive (DM), Deep Strategy (DS), Surface Motive (SM), and Surface Strategy (SS). SPQ is an appropriate measure that was derived from Biggs 3P Model, which posits that there are three phases of learning.

GPA and STUDENT APPROACHES TO LEARNING (SAL)

The SAL framework is derived from qualitative work on student learning [4,10,18,24]. Several researchers inclusing Biggs have utilized this framework to study the approaches students have to their learning and the SAL framework is often regarded as having a student-focused methodology underpinning its development.

Gijbels, Van de Watering, Dochy, and Van den Bossche [15] tested the relationship between the academic outcomes (GPA) of students and the way they approach the process of learning. The R-SPQ-2F instrument [5] together with the final grades of the students in a problem-solving multiple-choice examination were used to collect data. one hundred thirty-three second-year law school students enrolled in a class for the first time were sampled, 65% of whom were female, and 35% male. Even though the Surface Approach (SA) scores of the students were slightly lower than their Deep Approach (DA) scores, correlation analysis showed no relationship between problem-solving skills that affect student GPAs, and their approach to learning. Further analysis revealed that male students adopted a significantly higher level of SA and that older students adopted significantly deeper approaches to learning.

On the other hand, Snelgrove & Slater [26] found that the Deep Approach to learning was positively correlated to GPA, and that the SPQ was a valid predictor of the profiles of the three cohorts (n=300) of nursing students that were sampled in a tertiary institution in the United Kingdom. The original version of the SPQ was used to collect data. The study concluded that SPQ is a valid tool for nursing professors to attain knowledge of the way their students learn. This helps them make any necessary adjustments, and they also found that deep learning has an effect on academic performance.

There are other researchers who have had similar results to Snelgrove & Slater [26] such as Zeegers [31] who conducted a longitudinal study over a three-year period to (a) assess the predictability of the SPQ on GPA, (b) observe the variation in SAL over a three-year period, and lastly, (c) determine the effect of university entry mode, gender, and age on learning approaches. Two hundred students beginning their first year enrolled in a science course were sampled. The independent variable was the student's learning styles, while the dependent variable was their Grade Point Averages. The results using paired-samples t-test for the changes over time, and repeated-measures analysis of variance (ANOVA), as well as Pearson's r, showed that a shift in SAL is possible as students continue to learn over time, the Achieving Approach (AA) changes the most over time, while sex showed no effect on SPQ scores, but age did show an effect on both SPQ scores and GPA.

Skogsberg & Clump [27] investigated the difference in approaches to learning in two majors; in this case they sampled biology and psychology majors. Eighty-seven psychology

majors and ninety-two biology majors were tested using the R-SPQ-2F [5]. The independent variables and dependent variable were both majors and student learning approaches, respectively. MANOVA and ANOVA were used. The data obtained supported the concept of students in different majors approaching learning differently. The psychology majors utilized the Deep Approach more than the biology majors, as evidenced by their higher scores on the R-SPQ-2F. This being said, both majors scored identically on the Surface Approach measures. This meant that students in both majors used the Surface Approach, but the psychology majors backed up their reading using the Deep Approach.

METHODOLOGY

The model below has been adapted from the R-SPQ-2F (2001) to show the relationship between academic performance and the way students approach learning: in depth or just on the surface.

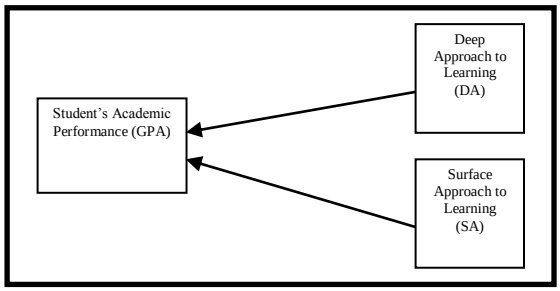


Figure 2. The GPA and SAL Relationship Model

The model posits that the deep approach (DA) and surface approach (SA) to learning are predictors of grade point averages (GPA).Based upon an examination of previous research, the following hypotheses were developed:
H_1 – There is a positive relationship between the deep approach (DA) to learning and a student's academic performance.

H_2 – There is a negative relationship between the surface approach (SA) to learning and a student's academic performance.

Participants

The sample for this study consisted of seventy management information systems majors attending a private university in the southeast United States.

Procedure

The researchers administered the questionnaire to the students. Students were informed that participation was voluntary and that the questionnaires would remain anonymous.

Measurement Instrument

Biggs, Kember, and Leung's R-SPQ-2F [5] is the revised version on Biggs' original SPQ [2,3]. Both instruments were developed to assess how students in higher learning institutions approach learning. The R-SPQ-2F is a self-report questionnaire consisting of 20 questions with a 5 point Likert scale: 1 representing never or only rarely true, and 5 representing always or almost always true. This questionnaire was chosen over the original because its conciseness is suitable for college students. The revised two-factor SPQ has two main scales which are Deep and Surface; they individually make up 10 questions on the questionnaire. Each of these scales has two subscales – Motive and Strategy, with a total of six scales. According to Biggs and his contemporaries [5], the R-SPQ-2F passed the goodness of fit test, and its Cronbach's alpha values were found to be reliable. For the two main scales, DA and SA, the Cronbach's Alpha values were 0.73 and 0.64 respectively. As for the subscales , Deep Motive (DM) was 0.62, Deep Strategy (DS) 0.63, Surface Motive (SM) 0.72, and Surface Strategy (SS) 0.57.

Instrument Validation

We applied a Partial Least Squares (PLS) tool (Smart-PLS 2.0 M3). SEM permits a simultaneous assessment of the structural component (path model) and measurement component (factor model) in the one model.
Similar to LISREL and associated structural equation approaches, PLS presents the benefit of permitting the complete research model to be tested just once.

The measurement model consists of relationships among the conceptual factors of interests and the measures underlying each construct. The data indicates that the measures are robust in terms of their internal consistency reliability as indexed by the composite reliability (Table 1). The composite reliabilities of the different measures ranged from 0.675 to 1. The recommended threshold value is 0.70 [23].

Table 1 Composite Reliability

	Composite Reliability
DA	0.817026
SA	0.675602
SAP	1.000000

Convergent validity measures the degree to which items on a scale are in theory linked. A common rule-of-thumb is a loading greater than 0.7. In the outer model, it is necessary to observe the loading column. In this case, all items loaded on their constructs from 0.55 to 1 indicating convergent validity.

We tested discriminant validity by exploring the average variance shared between a construct and its measures (AVE). Fornell and Larcker [13] recommend values higher than 0.50. Each element in the principal diagonal are always higher than off-diagonal elements in their corresponding row and column (Table 2).The pattern supports our scales' discriminant validity, as the components in the main diagonal are constantly higher than the off-diagonal components in their equivalent row and column.

Table 2 Latent Variable Correlations

	DA	DV	SA	SAP
DA	1.000000			
DV	-0.169745	1.000000		
SA	-0.218234	0.415867	1.000000	
SAP	0.301174	-0.425871	-0.363263	1.000000

In the inner model, we have to observe the AVE index. Each AVE should exceed the 0.5 guideline as suggested (table 3). DV and SA didn't make the cutoff.

Table 3 AVE

	AVE
DA	0.526429
DV	0.218756
SA	0.417268
SAP	1.000000

RESULTS

One hundred students participated in the study. There were thirty surveys with missing values and therefore were eliminated from the data set, leaving 70 valid responses.

Demographics

The population was comprised of 47% females and 53% males; 2% of the students were freshmen, 16% were sophomores, 30 % were juniors and 52% were graduating seniors.

Assessing the Measurement Model

The structural model provides information as to how well the theoretical model predicts the hypothesized paths. Smart PLS provides the squared multiple correlations (R^2) for each endogenous construct in the model and the path coefficients. R^2 (table 4) indicated the percentage of a construct's variance in the model, whilst the path coefficients indicate the strengths of relationships between constructs [6]

Figure 1 presents the resulting PLS model. The figure shows the variance explained R^2in the dependent constructs and the path coefficients (β) for the model. All beta coefficients are in the expected direction and statistically significant at $p<0.05$ except for the SA path. Consistent with Chin [6], bootstrapping (200 resamples) was applied to produce standard errors and t-statistics. This permits us to measure the statistical significance of the path coefficients.

Table 4 R Square

	R Square
DA	0.028813
DV	
SA	0.172945
SAP	0.183661

Table 5 Cronbach' Alpha

	Cronbachs Alpha
DA	0.702162
DV	-0.138037
SA	0.302460
SAP	1.000000

Table 6 T-Statistics

	T Statistics (|O/STERR|)
DA -> SAP	2.800133
DV -> DA	0.716801
DV -> SA	0.992603
DV -> SAP	0.896263
SA -> SAP	3.202839

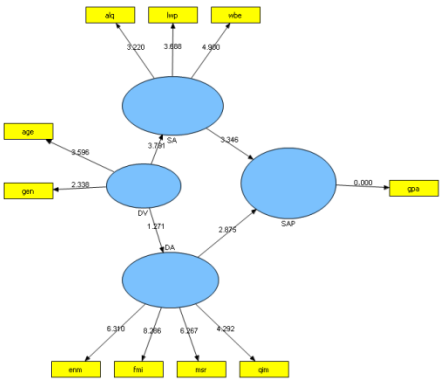


Figure 3 The Structural Model (Appendix)

The statistical objective of PLS is to show a high R^2 and significant t-values, thus rejecting the null hypothesis of no effect. The t-values (table 6) need to be significant to support the hypothesized paths (above 1.96 or 2.56 for Alpha levels of .05 and .01 respectively). Chin [6] also recommends that path coefficients range between 0.20 and 0.30 along with measures that explains 50% or more of the variance in the latent variable or model. In our case, surface approach (SA) had negative effects on student's academic performance (SAP) as hypothesized and deep approach (DA) had a positive effect on SAP as hypothesized. The variance was 0.219 for DA and -0.32 for SA. The variances were relatively weak. This may be attributed to the fact that other factors (external variables or facilitating conditions) were not included in the model.

CONCLUSION

The richness and complexity of the literature on learning styles make it difficult to determine which models are appropriate to use in assessing the effects of learning style in MIS education. There is no single learning style that will be perfect for every individual since human beings are complex.

Studies on learning styles give attention both to how a student learns and to how a student prefers to learn. This study is exploratory as a sample size of 100 may be limiting and may not be representative of the entire population of MIS students.

This study did not include factors related to the effectiveness of professors. The best instructors may already be responsive to the learning style preferences of the students resulting in higher satisfaction levels that would not be explained by these results.

If learning styles are an effective tool in creating and delivering education programs that improve learner satisfaction, institutions need to give a greater consideration to how this tool is used. Developers of courses will benefit from understanding which learning style preferences demonstrate a natural satisfaction with various course elements and which do not.

FUTURE WORK

One potential influence on learning style is gender and age. This study analyzed perceptions of students in a small university in the United States. Perception of students internationally may differ as culture impacts the educational delivery system. We intend to extend this study to determine if significant differences exist in an international setting as well as nationally.

In order to improve the generalization of our study findings, we are still collecting more surveys to increase the sample size. Other factors

could be also incorporated into the research model. A longitudinal study will also be conducted.

REFERENCES

1. Biggs, J. B. (1979). Individual differences in study processes and the quality of learning outcomes. *Higher Education*, *8*, 381-394.

2. Biggs, J. B. (1987a). *Student approaches to learning and studying*. Camberwell, Australian Council for Educational Research.

3. Biggs, J. B. (1987b). *The Study Process Questionnaire (SPQ): Manual*. Hawthorn, Australian Council for Educational Research.

4. Biggs, J.B. (1993). What do inventories of students' learning processes really measure? A theoretical review and clarification. *British Journal of Educational Psychology*, *63*, 3-19.

5. Biggs, J. B., Kember, D., & Leung, D. (Mar 2001). The revised two-factor study process questionnaire: R-SPQ-2F. *British Journal of Educational Psycology*, *71*, 133-149.

6. Chin, W. (1998). Issues and Opinions on Structural Equation Modeling, *MIS Quarterly*, *22*(1), 7-16

7. Dunn, R. (1984). Learning style: State of the science. *Theory into Practice*, *23* (1), 10-19.

8. Dunn, R. & Dunn, K. (1978). *Teaching students through their individual learning styles*. Englewood Cliffs, NJ: Prentice Hall.

9. Entwistle, N. (1987). *Understanding classroom learning*. In N. Entwistle (Series Ed.), changing perspectives in education. London: Hodder and Stoughton.

10. Entwistle, N. & Waterson, S. (1988). Approaches to studying and levels of processing in university students. *British Journal of Educational Psychology*, *58*, 258-265.

11. Felder, R.M., & Soloman, B.A. (2004). *Index of Learning Styles*. http://www.ncsu.edu/felder-public/ILSpage.html, accessed April 4, 2007.

12. Felder, R.M., & Spurlin, J. (2005). Applications, reliability, and validity of the index of learning styles. *Int. J. Engng Ed*, *20* (1), 103-112.

13. Fornell, C. and Larcker, D. F. (1981). Evaluating Structural Equations Models with Unobservable Variables and Measurement Error, *Journal of Marketing Research*, *18*, 39-50.

14. Gardner, H. (1993). Frames of mind: The Theory of multiple intelligences (10th Ed). New York: Basic Books.

15. Gijbels, D., Van de Watering, G., Dochy, F., & Van den Bossche, P. (2005). The relationship between students' approaches to learning and the assessment of learning outcomes. *European Journal of Psychology of Education, 20*(4), 327-341.

16. Gregoric, A. F. (1982). *An adults guide to style*. Maynard, MA: Gabriel systems.

17. Hannafin, M., Oliver, K., Hill, J., Glazer, E., & Sharma, P. (2003). Cognitive and learning factors in web-based distance learning environments. In M. Moore & W. Anderson (Eds), *Handbook of distance education* (245-272). Mahwah, NJ: Lawrence Erlbaum.

18. Kember, D., Wong, A. & Leung, D.Y.P (1999). Reconsidering the dimensions of approaches to learning. *British Journal of Educational Psychology*, *68*, 395-407.

19. Kolb, D. A. (1971). *Individual learning styles and the learning process*. Working Paper#535-71, Sloan School of Management, Massachusetts Institute of Technology.

20. Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. New Jersey: Prentice-Hall.

21. Kolb, A. Y., & Kolb D. A. (2005). Learning styles and learning spaces: enhancing experiential learning in higher education. *Academy of Management Learning & Education*, *4*(2), 193-212.

22. Liu, Y. & Ginther, D. (1999). Cognitive styles and distance education. *Online Journal of Distance Learning Administration*, *2*(3).

23. Nunally, J. (1978). *Psychometric*, 2nd Edition, New York: McGraw Hill

24. Prosser, M. & Trigwell, K. (1999). *Understanding learning and teaching*. Buckingham:SRHE and Open University Press.

25. Ross, J. L. & Schulz, R. A. (1999). Using the World Wide Web to accommodate diverse learning styles. *College Teaching*, *47*(4), 123.

26. Snelgrove, S., & Slater, J. (2003). Approaches to learning: psychometric testing of a study process questionnaire. *Journal of Advanced Nursing, 4* (5), 496-505.

27. Skogsberg, K., & Clump, M. (Mar 2003). Do psychology and biology majors differ in their study process and learning styles? *College Student Journal*. *37*(1).

28. Tennant, M. (1988). *Psychology and adult learning*. London: Routledge.

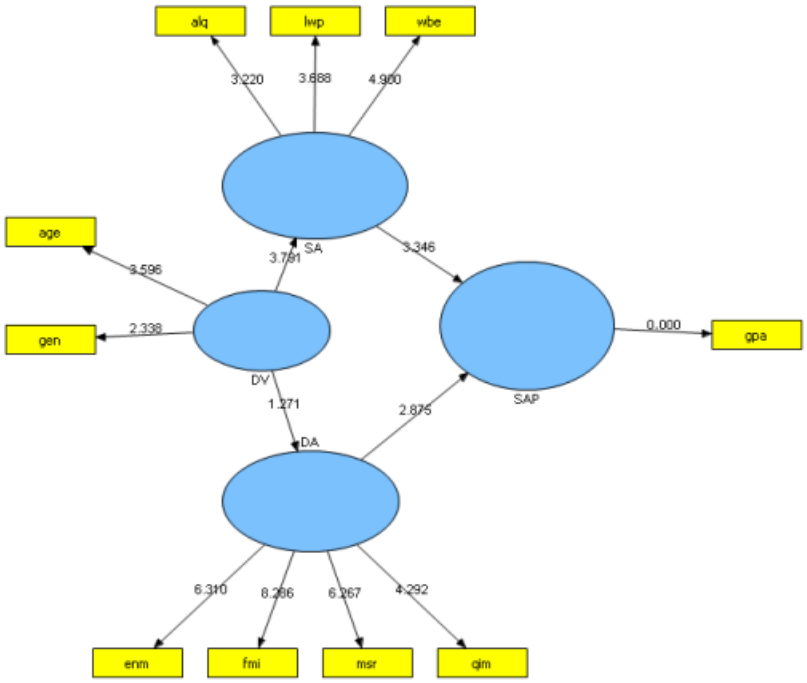
29. Verduin, J. & Clark, T. (1991). *Distance education: The foundations of effective practice*. San Francisco: Jossey-Bass.

30. Watkins, D. (2001) Correlates of approaches to learning: A cross-cultural meta-analysis. In R.J. Sternberg & L. Zhang (Eds), *Perspectives on thinking, learning, and cognitive styles*, 165-196. London: Lawrence Erlbaum Associates.

31. Zeegers, P. (Mar 2001). Approaches to learning in science: a longitudinal study. *British Journal of Educational Psychology*, *71*, 115-132.

32. Zusman, A. (1999). Issues facing higher education. In P. Altbach, R. Berdahl, & P. Gumport (Eds), *American higher education in the twenty-first century*. 107-148. Baltimore: John Hopkins University Press.

Appendix



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