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Short Communication

Learning Styles and Class Performance in Hybrid Finance Classes

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Abstract

We analyze the effect of student preferred learning style on course performance in an introductory finance class using the VARK learning styles survey developed by Fleming and Mills (1992) and validated by Leite (2010). Learning styles refer to the preferred way used by learners to understand, process, and retain information. The VARK framework classifies learners as Visual, Auditory, Reading, Kinesthetic, or Multimodal (combination of the previous) learning styles preferences. Using a sample of 79 non-traditional undergraduate students enrolled in business finance classes at a public urban university in the U.S. Southwest, we find that student preferred learning style has no impact on student performance, as measured by overall course grade. Prior cumulative GPA is the main determinant of course grade suggesting that students with higher GPA are likely to perform well in class, regardless of learning style preference. Results are robust after controlling for variables known in the literature to be potential determinants of grade, such as age, gender, ethnicity, dependents, or hours enrolled in the semester.

Keywords: Learning Styles, VARK, Hybrid instruction, Business Finance

1 Introduction

Learning styles refer to the preferred way used by learners to understand, process, and retain information. Several studies suggest that learners perform better when the instructor adapts course content delivery to students' preferred learning style (Dobson, 2009, 2010; El Tantawi, 2009). Using the VARK learning styles survey (Fleming and Mills, 1992) we analyze the effect of student preferred learning style on their overall course performance in two introductory finance classes. The VARK model classifies learners' preferences as visual, auditory (listening), reading, kinesthetic (learning by doing) or multimodal (combination of the previous learning styles).

We find that preferred learning style has no effect on overall course grade but prior GPA has a positive relationship with overall grade: students with higher GPA tend to earn higher grades. Our results suggest that multimodal students perform slightly better in business finance than students with a single learning style preference. In addition, we find that visual and kinesthetic learners have an advantage over reading and aural students (though this last relationship is marginally significant).

This paper is organized as follows: section two contains the literature review; section three describes the methodology; the discussion of major findings is in section four; while section five concludes.

2 Literature Review

Many learning style surveys have been proposed in the literature such as Kolb (1984); Dunn & Dunn (1990); Felder & Silverman (1988); Fleming (1991). Among the several learning style assessment tools in the market, we selected VARK since the VARK instrument has been statistically validated in a seminal work by Leite *et al* (2010) who found the Cronbach's alphas in the range of .77 to .85. In addition, the VARK survey is available for free online[1] and takes less than ten minutes to complete. Lastly, VARK survey results seems to match closely the preferred learning style of most survey takers.

[1] *Copyright Version 7.1 (2011) is held by Neil D. Fleming, Christchurch, New Zealand.*

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The VARK framework posits that learners can have a Visual, Auditory (listening), Reading, Kinesthetic (learning by doing) or a Multimodal (combination of the previous) learning styles. Visual learners tend to learn best by seeing, for example pictures, diagrams, graphs, videos. Aural or auditory learners have a preference for listening, so class discussions and lectures are more appropriate for them. Reading and writing learners prefer the use of textbooks, lists, note-taking, while kinesthetic learners prefer hands-on activities or learning by doing, such as experiments, object manipulation, or moving. According to Fleming (2011) over 60% of those who have completed the VARK survey have more than one preferred learning style and are classified as multimodal. For the purpose of the study if a student has two or more preferred methods, they are classified as multimodal. Fleming (2011) postulates that multimodal students possess flexibility to use the learning mode that best suits them, the professor, or the subject. However, he notes that no preferred learning style is superior, it is just different ways that people use for learning.

According to the VARK official website, (http://vark-learn.com/introduction-to-vark/research-statistics/), out of the more than 12,000 business students who have participated in the survey, about 28.3% have shown a kinesthetic preference, trailed by auditory (25.5%), reading (23.8%) and visual (22.4%). It is important to note that style preferences are fairly evenly distributed among all students.

In the academic literature, the meshing hypothesis (Pashler *et al*, 2009) propose that instructors should adjust their instruction to fit the preferred learning style of their students. Pashler *et al* theorize that students will have less difficulty understanding the course material since it would be presented in a format they can easily relate to, leading to greater engagement and motivation, which will end in greater academic success. Drago and Wagner (2004) and Zajac (2009) find empirical support for this hypothesis. Many studies have found a positive relationship between academic performance and learning styles adaptation (see for example Felder, 1993; Fleming, 2001; Zapalska & Dabb, 2002).

On the other hand, studies conducted in business disciplines (Ayersman, 1996 in computer science; Clark & Latshaw, 2011 in accounting; Karns, 2006 in marketing; Van Zwanenberg *et al*, 2008 in general business) find no evidence that instructors' adjustment of teaching styles significantly affects student class performance. It is possible that students select certain majors, perhaps unknowingly, based in their own preferred learning style (Canfield, 1988). Given the evidence in regards to VARK's reliability and validity, we use this instrument to evaluate the influence of student learning style preferences in academic performance in an introductory hybrid business finance course using a sample of predominantly non-traditional students.

3 Methodology

The initial sample consisted of 86 students enrolled in two sections of Business Finance at a mid-size public institution in the Southwest. The final sample contains 79 cases as 7 cases were dropped due to missing data.

Participation in this study was voluntary, but about 97% of enrolled students completed the survey. Students were instructed to complete the 18-question online VARK survey at the official VARK website (www.vark-learn.com) and record their results. Then, they completed a brief personal profile survey on the course website with questions such as previous GPA, number of hours enrolled, gender, hours worked per week, and major.

The hybrid introductory finance class is required for all business majors. In hybrid learning, lecture time is limited to 80 minutes per week while students are expected to work outside of the class for at least 80 minutes. Based on homework's management system time spent on tasks, homework activities demand twice as much time from students on average than equivalent traditional face-to-face classes. In these courses, enrolled students take three in-class multiple choice exams: two partial exams and a comprehensive final exam. Exam questions include a combination of theory and calculated problems.

Table 1 presents a description of the sample. In regards to preferred learning styles, 26 students showed a multimodal preference, 18 were kinesthetic, 17 had a reading preference, 10 showed an aural preference, and 8 had a visual preference. A total of 60 students (76% of the sample) consider themselves of Hispanic origin. Classes are comprised of non-traditional students with an average student age of 31. Non-traditional students tend to work full time during the term, are older, and are more likely to be head of household. During this term, students enrolled an average of 8.7 hours and worked almost 30 hours per week outside the university. The average GPA for the class is 3.2 (on a 4 point scale).

Table 1: Descriptive statistics

Variable	Total	Std. Err.
Kinesthetic Preference	18	3.752
Reading Preference	17	3.676
Aural Preference	10	2.974
Visual Preference	8	2.699
Multimodal Preference	26	4.203
Hispanic	60	3.823
	Average	Std. Err.
Age	31.1	1.005
Enrolled_hours	8.7	0.488
Credit_hours	84.6	5.553
GPA	3.2	0.047
Dependents	0.8	0.131
Hrs_work	29.7	1.648

The average grade in the class was 77 with a mode of 80. The distribution of grades in the class classified by preferred learning style is presented in Table 2.

Table 2: Letter grade (4-point scale) and learning style preference per student

	Preferred Learning Style				
Letter Grade	Visual	Aural	Reading	Kinesthetic	Multimodal
F	2	2	1	1	1
C	1	4	7	6	3
B	4	3	5	7	13
A	1	1	4	4	9
Total (Percent)	8 (11%)	10 (13%)	17 (22%)	18 (24%)	26 (34%)

Nearly one-third of the sample have a multimodal preference (34%). About 24% of enrolled students show a kinesthetic preference, 22% present a reading preference, 13% an auditory or aural preference, only 11% show a visual preference.

4 Results

In order to determine whether student preferred learning style affects class performance as measured by final overall grade in the course, we run a linear regression defined in the following equation (1):

$$Grade = \alpha + \beta_1\, pref\_v + \beta_2\, pref\_a + \beta_3\, pref\_r + \beta_4\, pref\_k + \beta_5\, age + \beta_6\, gender + \beta_7\, GPA + \beta_8\, Hispanic + \beta_9\, hrs\_work + \beta_{10}\, dependents + \beta_{11}\, enrolled\_hrs + \varepsilon \quad (1)$$

The dependent variable is *Grade*, which represents the overall course grade earned by a student, on a 100 scale, at the end of the semester. We use the following explanatory variables: *pref_v, pref_a, pref_r, pref_k* are indicator variables taking a value of 1 if the preferred learning style is visual, aural, reading, kinesthetic, respectively; otherwise 0. The base category is *pref_m* which takes a value of 1 if the student preferred learning mode is multimodal. *Age* is the student age at the beginning of the term. *Gender* is another indicator variable that equals 1 if the student is female or 0 otherwise. *GPA* is the student grade point average (on a 4-point scale) at the beginning of the term. The variable *Hispanic* takes a value of 1 if the student considers herself of Hispanic origin or else 0. Since this sample consists mainly of non-traditional students, we asked them to state the number of average hours of weekly paid work (*hrs_work*); if they had dependents in charge (*dependents*) which is another indicator variable taking a value of 1 if they did or 0 in case they did not have dependents, while the variable *credit_hrs* represents the number of credit hours the student had enrolled at the beginning of the semester. Lastly, α is the constant and ε is the error term.

Results presented in Table 3 suggest that only *GPA* is a significant predictor of class performance for this sample. As in Calafiore & Damianov (2011), we find that students with higher GPA tend to earn higher grades in business finance. Since cumulative GPA is often used as a proxy for past academic performance (see for example Damianov *et al*, 2009), it is possible that students with good prior grades are more likely to find a way to be successful in class regardless of how the course content was presented to them or their stated learning preferences.

Preferred learning style seems not to influence class performance. It is interesting to note that the signs of the coefficients for the different learning style preferences (*pref_v*; *pref_a*; *pref_r*; *pref_k*) are all negative. This implies that the base category, multimodal students (*pref_m*), tend to perform better in class than all other individual categories. This result, though not statistically significant, runs counter to Fleming (2009) who states that a particular learning style is no better than another learning style; our results suggest that multimodal students are expected to earn higher grades in business finance.

Another interesting finding is the negative sign in *hrs_work, dependents,* and *credit_hrs* variables which implies that those who worked more during the week, had dependents under their care, and enrolled in more credit hours during the term, tend to earn lower final grades in the class. This provides support to the claim about hybrid courses being more demanding than traditional face-to-face courses due to increased coursework required to be completed outside of regular class time. This is one of the most common observations made by students in their end of semester student evaluations of the course.

Table 3. Regression results showing factors influencing final grade in the class

Ind. Variable	Coef.	Std. Error	t	P>t	[95% Conf.	Interval]
pref_v	-8.622	5.653	-1.53	0.132	-19.916	2.671
pref_a	-8.541	5.302	-1.61	0.112	-19.133	2.050
pref_r	-2.481	4.052	-0.61	0.542	-10.577	5.614
pref_k	-2.199	4.039	-0.54	0.588	-10.267	5.869
age	-0.135	0.180	-0.75	0.456	-0.495	0.225
gender	-0.327	3.072	-0.11	0.915	-6.465	5.810
GPA	12.901	4.040	3.19	**0.002****	4.831	20.971
Hispanic	0.391	4.048	0.10	0.923	-7.696	8.478
hrs_work	-0.102	0.111	-0.92	0.363	-0.324	0.120
dependents	-1.243	1.394	-0.89	0.376	-4.027	1.542
enrolled_hrs	-0.057	0.036	-1.60	0.114	-0.129	0.014
_constant	51.333	17.147	2.99	**0.004****	17.079	85.588

Dependent variable: grade; Adjusted $R^2 = 0.198$; **Statistically significant at the 5% level

As a robustness check, we analyze the likelihood that a preferred learning style may lead to a particular grade (on a 4-point scale) in the business finance class. We run an ordered logistic regression model as described in equation (2):

$$Actual\_Grade = \alpha + \beta 1\, pref\_v + \beta 2\, pref\_a + \beta 3\, pref\_r + \beta 4\, pref\_k + \beta 5\, age + \beta 6\, gender + \beta 7\, GPA + \beta 8\, Hispanic + \beta 9\, hrs\_work + \beta 10\, dependents + \beta 11\, enrolled\_hrs + \varepsilon \quad (2)$$

The dependent variable, *Actual_Grade*, is the letter grade a student earned in the class transformed into a 4-point scale. For students earning an F, the *Actual_Grade* variable takes a value of 0; for students earning a C, B, and A, the *Actual_Grade* variable takes the values of 2, 3, and 4 respectively. The explanatory variables are similar to those described in equation (1). Table 4 presents the results from the ordered logistic regression model.

Table 4. Ordered Logistic Regression Results

Variable	Coefficient	Std. Err.	Z	P>z	[95% Confidence Interval]	
pref_v	-0.488	0.849	-0.57	0.565	-2.152	1.176
pref_a	-1.551	0.806	-1.93	**0.054***	-3.131	0.027
pref_r	-1.023	0.621	-1.65	**0.099***	-2.240	0.193
pref_k	-0.774	0.613	-1.26	0.207	-1.976	0.427
age	-0.023	0.027	-0.87	0.386	-0.077	0.030
gender	-0.242	0.460	-0.53	0.598	-1.143	0.658
GPA	1.887	0.644	2.93	**0.003****	0.624	3.149

Hispanic	-0.386	0.648	-0.6	0.552	-1.655	0.884
hrs_work	-0.009	0.017	-0.52	0.605	-0.041	0.024
dependents	-0.155	0.206	-0.76	0.450	-0.558	0.248
enrolled_hrs	-0.006	0.005	-1.07	0.286	-0.016	0.005

Log likelihood = -86.621; Pseudo R^2 = 0.1127; **Statistically significant at the 5% level; **Statistically significant at the 10% level;

In line with our previous findings, the higher the student GPA at the beginning of the course, the higher the actual grade in the class (statistically significant result at the 5% level). Once again, the signs of the coefficients for the different learning style preferences (*pref_v*; *pref_a*; *pref_r*; *pref_k*) are all negative, with statistically significant results at the 10% level for aural and reading students (*pref_a* and *pref_r*). In other words, multimodal students (*pref_m*) tend to perform better in class than all other individual categories, especially aural and reading students. The problem-solving nature of a traditional business finance course content may give a slight advantage to visual, kinesthetic, and multimodal learners over those with aural and reading preferences.

5 Conclusion

Consistent with Pashler *et al* (2009) we find that student preferred learning style does not impact student performance, as measured by overall grade, in hybrid business finance classes. Results are robust after controlling for variables known in the literature to be potential determinants of grade, such as cumulative GPA, age, gender, dependents, or hours enrolled in the semester. The only variable in our study that is positively related (at the 5% significance level) with course grade is the student's cumulative grade point average (GPA). GPA can be a proxy for student ability or effort (Damianov & Calafiore, 2011). As Pintrich and De Groot (1990) say, successful students need to have the skill and the will or motivation for learning.

It is possible that our results reflect a combination of several factors. The instructor uses a variety of content delivery methods such as lectures, required homework and readings online, solving problems in class, which may partially appeal to all types of learning styles. In addition, students are encouraged to form peer study groups and to take advantage of tutoring available outside class time. This availability of delivery methods would allow students to select the most appropriate study tool to fit their preferred learning style, contributing to mastering the course material. Moreover, since our sample is dominated by non-traditional students, it is likely that throughout their life experiences non-traditional students have been exposed to different instructional styles which has allowed them to learn independently of the course delivery mode or adapt to the class material to the style that best fits their needs.

Lastly, based on the logistic regression results, there seems to be a hierarchy of preferences: multimodal students perform better than students with a single learning style preference; and visual and kinesthetic learners have an advantage over reading and aural students (though this last relationship is marginally significant).

The results from this study add light to the discussion on the limited value of adapting instructional methods to students' preferred learning method.

Conflict of Interest: none declared.

References

Ayersman, D. J. (1996). Effects of computer instruction, learning style, gender, and experience on computer anxiety. *Computers in the Schools*, *12*(4), 15-30.

Calafiore, P., & Damianov, D. S. (2011). The effect of time spent online on student achievement in online economics and finance courses. *The Journal of Economic Education*, *42*(3), 209-223.

Canfield, A. A. (1988). *Learning styles inventory*. Western psychological services.

Clark, S. D., & Latshaw, C. A. (2012). "Peeling the onion" called student performance: an investigation into the factors affecting student performance in an introductory accounting class. *Review of Business*, *33*(1), 19-28.

Damianov, D. S., Kupczynski, L., Calafiore, P., Damianova, E. P., Soydemir, G., & Gonzalez, E. (2009). Time Spent Online and Student Performance in Online Business Courses: A Multinomial Logit Analysis. *Journal of Economics and Finance Education*, 8(2), 11-22.

Dobson, J. (2009) Learning Style Preferences and Course Performance in an Undergraduate Physiology Class. *Advances in Physiology Education*, 33, pp. 308-314

Dobson, J. (2010) A Comparison between Learning Style Preferences and Sex, Status, and Course Performance. *Advances in Physiology Education*, 34, pp. 197-204

Drago, W. A., & Wagner, R. J. (2004). Vark preferred learning styles and online education. *Management Research News*, *27*(7), 1-13.

El Tantawi, M. (2009). Factors Affecting Postgraduate Dental Students' Performance in a Biostatistics and Research Design Course. *Journal of Dental Education*, 73, pp. 614-623

Felder, R. M. (1993). Reaching the second tier. *Journal of college science teaching*, *23*(5), 286-290.

Fleming, N. D. (2001). *Teaching and learning styles: VARK strategies*. IGI global.

Fleming, N.D. and Mills, C. (1992), Not Another Inventory, Rather a Catalyst for Reflection, *To Improve the Academy*, Vol. 11, 1992., page 137.

Leite, W., Svincki, M., and Shi, Y. (2010) Attempted Validation of the Scores of the VARK: Learning Styles Inventory With Multitrait–Multimethod Confirmatory Factor Analysis Models. *Educational and Psychological Measurement*, 70:2 pp. 323-339

Pashler, H., McDaniel, M., Rohrer, D., & Bjork, R. (2009). Learning Styles: Concepts and Evidence. *Psychological Science in the Public Interest*, 9(3), 105–119. https://doi.org/10.1111/j.1539-6053.2009.01038.x

Pintrich, P. R., & De Groot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of educational psychology*, *82*(1), 33.

Van Zwanenberg, N., Wilkinson, L. J., & Anderson, A. (2000). Felder and Silverman's Index of Learning Styles and Honey and Mumford's Learning Styles Questionnaire: how do they compare and do they predict academic performance?. *Educational Psychology*, *20*(3), 365-380.

Zajac, M. (2009). Using learning styles to personalize online learning. *Campus-wide information systems*, *26*(3), 256-265.

Zapalska, A. M., & Dabb, H. (2002). Learning styles. *Journal of Teaching in International Business*, *13*(3-4), 77-97.