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Academic performance and learning style self-predictions by second language students in an introductory biology course

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Abstract: Academic success in first-year college science coursework can strongly influence future career paths and usually includes a solid performance in introductory biology. We wanted to know whether factors affecting biology student performance might include learning style preferences and one's ability and confidence in self-assessing those learning preferences in order to engage in appropriate study strategies. We also wondered whether second language students who do not speak English at home differ from their classmates in either learning styles or self-assessment, in order to better understand our diverse student population. We examined these questions in a large introductory biology course at an undergraduate public university in California. In our study, students self-predicted their learning preferences using our simple survey tool and then completed the online VARK learning style tool. Results showed a good match between the survey tool's self-predictions and the VARK tool, with auditory learners showing the least accurate match. Speaking a second language other than English at home did not appear to influence learning preference profiles nor one's ability to self-predict those learning preferences. When asked to self-predict biology course grades, older students were slightly better predictors than younger students, with almost no difference between students who did and did not speak English at home. We suggest that success in introductory college science courses by second language speakers may involve factors other than learning style, or the ability to self-assess learning style and biology course performance.

Keywords: English second language, ESL, diversity, biology teaching, metacognition, self-efficacy

Undergraduate introductory biology courses are an essential foundation and part of the scientific 'gateway' for students hoping to enter careers such as those of scientists and health professionals (Wood, 2009). A solid academic performance in biology likely involves one's ability to self-assess all aspects of learning, since metacognitive awareness of learning may lead to higher achievement (Turan, et al., 2009; Young & Fry, 2008). Successful self-assessment may even improve understanding of the material being taught (Clauss & Geedey, 2010; White & Frederiksen, 1998), further enhancing a student's opportunity for academic success. These studies suggest that self-awareness of one's individual learning style may influence biology learning and ultimately course grades. In spite of the potential impact, few studies have examined science students' ability to self-assess individual learning style (Dobson, 2010).

Many factors clearly influence biology academic performance, although little is known about the factors that specifically affect second language learners. These students comprise a substantial percentage of the nation's college-age population. The students enrolled today in

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introductory biology courses were roughly represented back in the 2000 U.S. Census Report by the group of children aged 5-17 years, of which 18.4% spoke a language other than English at home (United States Census Bureau PHC-T-20 report, 2000). Indeed, nine states (i.e. Arizona, California, Florida, Nevada, New Jersey, New Mexico, New York, Rhode Island and Texas) reported that 20% or more of the children living in their states did not speak English at home, with California leading the nation at 42.6%. Population trends indicate that the percentage of second-language students continues to increase (United States Census Bureau, 2007 American Community Survey). These second language learners are also referred to as ESL (English-as-a-Second-Language) students, and they are likely to face unique challenges in learning college science.

In our university, we estimated that currently about half of the introductory biology students are second language speakers. We wanted to find out whether these second language biology students differ from their classmates in their learning style preferences along with their self-awareness and confidence in choosing those preferences. We also wondered if there is a correlation between one's learning style self-awareness and academic performance in biology. This information would help inform those involved in beginning science courses about some of the factors that may influence course performance among all students, particularly those who do not speak English at home.

II. Methodology

Recruitment occurred over two consecutive spring semesters of a first-semester course in Introductory Biology in 2009 and 2010. Participants in each of the seven laboratory sections were recruited and administered an online VARK learning style tool and our survey tool. Since attendance in the laboratory is required, data acquisition in the lab assured a more representative and larger sample of currently enrolled students as compared to the lecture. Data was acquired approximately 4-6 weeks before the end of the course, when students had become familiar with their class performance. The protocol was approved by the Institutional Review Board at San Francisco State University.

A. Participants.

Study participants were 288 men and women, aged 18-35 years old, who were enrolled in the first semester (Biology 230) of a two-semester introductory biology course at San Francisco State University (SFSU). SFSU is a public university in San Francisco, California and a member of the 23-campus California State University system, the largest comprehensive undergraduate university in the USA. Introductory Biology (Biology 230/240) is a one-year lecture/lab sequence for science majors with no prerequisites. Study participants were enrolled in the Biology 230 course, which includes course content in Cell Biology, Genetics, Plant Biology and Animal Physiology.

B. VARK Learning Style Tool.

The VARK learning style tool is a 16-item questionnaire that provides users with a profile of their learning preferences. The VARK tool has been utilized extensively due to its ease of use and availability online, and was recently validated (Leite et al., 2010). Developed by Neil

Fleming, the VARK assesses user preferences for methods of taking in and putting out information in a learning context, expressed through four possible modalities: Visual (V), Auditory (A), Read/Write (R), and Kinesthetic (K). VARK learners can be categorized as unimodal (i.e. singly V, A, R or K), bimodal (e.g. VA, VR), trimodal (e.g. VAR, ARK) or quadmodal with all 4 learning preferences (i.e. VARK).

Hard copies of the VARK tool and our own survey tool (see below) were distributed and completed in the laboratory sections approximately 4-6 weeks before the end of the term. Each student created an anonymous code for tracking purposes. Responses to the VARK learning style inventory were later inputted online by the researchers for each individual, and analyzed using VARK version 7.0 (www.vark-learn.com). In our report, participants with greater than one preference (i.e. 2-4 preferences) are grouped as 'multimodal' learners. Results of the VARK learning preference tool were distributed to students along with references for study strategies approximately 2 weeks before the end of the course. A third party (i.e. staff) was used to hold identifications and codes in order to track student course grades.

C. Survey tool.

The 12-question survey tool was developed by the authors and a copy is found in the Appendix. Questions included demographic information such as gender, age group, intended major and career. Students were asked whether or not they spoke English at home. Regarding learning preference information, students were asked to select one or more statements describing their learning preference(s) (Question #9), to rank their confidence in those selections (Question #10), whether this was their first time answering questions about learning style (Question #11) and their interest in finding out their learning style (Question #8). Students were also asked to estimate their course letter grade (Question #12).

D. Analysis.

Student learning preferences. Each student's self-predicted learning preference(s) was coded according to their selected answers on survey question #9: a=visual (V), b=auditory (A), c=read/write (R) and d=kinesthetic (K) (see Appendix). These student-generated self-predictions were compared to the results obtained by analyzing each student's individual VARK learning style tool. To determine the match between each student's self-prediction and the VARK tool data, we generated a predictability score or 'VARK score' for each student. Because learning preferences can include single or multiple modalities (e.g. V, VK, VAK), and in order to eliminate bias when generating the predictability score, a 0/1 vector system was used; a value of 1 represented a modality that was present and a value of 0 represented a modality that was not present. The VARK score values ranged from 0 to 4, which correspond to 0 (perfect match between self-prediction and VARK learning style inventory), 1 (75% accuracy), 2 (50% accuracy), 3 (25% accuracy) and 4 (0% accuracy or no match). Therefore, VARK scores ranged from 0 to 4, representing the accuracy between the self-prediction and VARK inventory data.

Student academic performance. Students self-predicted their course grades at the time of the survey, and grades were coded according to the following rubric: A (86%), B (77%), C (66%), D (56%) and F (53%). These percentages represent the low end of the range for each letter grade, therefore making a more stringent test for grade comparisons. The actual grade for each student was recorded as the exact percentage of total course points achieved by the student at the end of the course (i.e. up to 100%). The comparison of self-predicted and actual course grades was determined by taking the absolute value of the difference between the predicted and actual grade percentages.

MATLAB Analysis. To determine any significant relationships with the VARK learning style preferences and/or course grade data, we performed a MATLAB analysis (Welch, 1990). A random permutation script was used to generate comparisons, with significance at $p < 0.05$. Fifty students were excluded from the MATLAB analysis since they did not fully complete the surveys required for cross-comparisons, yielding a MATLAB subset of 236 students. We analyzed age, gender, and language variables (items #3,6,7 on the demographic questionnaire) to determine any significant relationships with VARK learning style preferences or grade data.

III. Results

A. Demographic data and response rate.

In the spring 2009 and spring 2010 semesters, a total of 315 students enrolled, completed and received letter grades for the Introductory Biology Course (Biology 230). Of these 315 students, initially 288 respondents turned in both the VARK learning style and survey tools, yielding a 91% overall response rate for our study. Data from two students were not included in the overall analysis due to missing information, yielding 286 respondents. In the following section, we present their VARK learning preferences, self-predictions and demographic data.

As seen in Table 1, the gender profile was approximately a female:male ratio of 2:1, with 2.4% not reporting gender. The majority of students were in the youngest age grouping (18-20 years), and 43% were of freshman class standing. The majority of students (i.e. 54.5%) did not speak English at home, compared to 45.5% who did speak English at home.

Table 1: Demographic information of all respondents (n=286)

	Spring 2009	Spring 2010	Total
Gender			
Female	70	118	188
Male	13	78	91
-blank-	3	4	7
Age			
18-20 years old	44	121	165
21-25 years old	70	28	98
26-35 years old	21	2	23
Current year			
Freshman	28	96	124
Sophomore	8	24	32
Junior	38	12	50
Senior	47	18	65
Post-baccalaureate	13	2	15
Language spoken at home			
Non-English	79	77	156
English	54	76	130

We were interested to know the career aspirations of students in our study, since those pursuing science-related careers might be more motivated toward higher grades and skew our results on second language speakers. When grouped according to whether students speak or did not speak English at home (see Table 2), the vast majority of students in both groups selected careers in the health professions. Interestingly, we found that students who did not speak English at home were more apt to select health careers in the traditional health professions of medicine, dentistry, pharmacy, veterinary and optometry (i.e. 46%), compared to 34% of the students speaking English at home.

Table 2: Career aspirations of all respondents

		English at home (n=130)	Non-English at home (n=156)
My intended career is:	Pre-Health career	83%	85%
	All other careers	17%	15%

B. Learning Preferences.

We found that the majority of students were interested in finding out about their personal learning styles whether or not they speak English at home (see Table 3). Moreover, greater than 90% of the students were mildly or very interested in finding out their personal learning styles, even though many respondents (i.e. 42-43%) report that they had previously answered questions about learning style, and that most students (i.e. 62-76%) were already ‘very sure’ of their own self-predicted learning style.

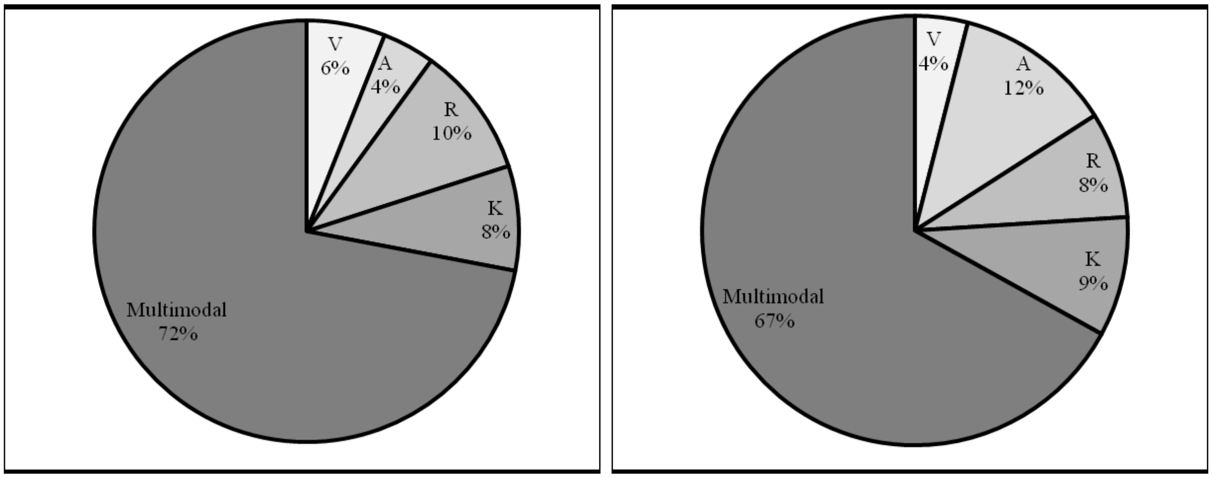
Table 3: Students' interest, knowledge and confidence about learning style.

		English at home (n=130)	Non-English at home (n=156)
"What is your interest in finding out your learning style?"	Not interested	9%	6%
	Mildly interested	29%	27%
	Very interested	62%	67%
"Today is the first time I am answering questions to predict my learning style."	True	57%	58%
	False	43%	42%
"To what degree are you confident in your self-prediction of your learning style?"	Not Sure	7%	5%
	Neutral	31%	19%
	Very Sure	62%	76%

The summary of students' self-assessed learning preferences is shown in Figure 1A. The vast majority or 72% of the students selected more than one learning preference or have 'multimodal' preferences. The number of multimodal preferences varied, although the majority selected two (i.e. 33% bimodal, 25% trimodal, 14% quadmodal selected all four VARK learning preferences). The remaining 28% of the students selected a single or 'unimodal' learning preference, with the most popular being the R or Read/Write preference.

The results of the VARK inventory tool analysis (see Figure 1B) confirmed that the majority or 67% of the students have multimodal preferences, similar to the self-prediction data (i.e.72%). However, 47% of these multimodal learners had all four learning preferences, compared to only 14% who self-predicted all four. This suggests that many students with multimodal preferences were largely unaware that they have more than two preferred ways to input new information.

There were slightly more students with a single or 'unimodal' learning preference obtained with the VARK learning style inventory than in the self-prediction data (i.e. 33% vs. 28%, respectively). Those students with an A or 'auditory' unimodal preference were most numerous and nearly three-fold higher than the self-prediction data (i.e. 12% vs. 4%).



A B

Figure 1: VARK learning preference(s) of all respondents. A) Self-prediction and B) VARK learning style inventory results.

We then determined the match between each student's individual self-perception or 'self-prediction' of their learning preferences to those results obtained with their individual VARK inventory (see methods). The match is represented by a VARK score ranging from 0 to 4, with a value of '0' representing a perfect match and 4 as no match. We grouped students according to their language at home and found similar results among the two groups as seen in Table 4. Most students had excellent to good VARK scores ranging from 0 to 2 (i.e. 77.7% of English-at-home and 75% of non-English-at-home students). Therefore, there was a fairly good match between one's individual VARK self-prediction and the VARK inventory data for approximately 3 out of 4 student respondents.

Table 4. Match between students' self-prediction and VARK inventory tool. The lower the VARK score, the greater the match between VARK self-prediction and inventory data.

	English at home		Non-English at home	
VARK Score	n	%	n	%
0	20	15.4	26	17
1	38	29.2	45	29
2	43	33.1	45	29
3	26	20	35	22
4	3	2.3	5	3
	130	*100%*	*156*	*100%*

We also compared the VARK scores of students with different VARK learning preferences. We first grouped students according to the VARK inventory results, and calculated the mean overall VARK score (i.e. 0-4) for that group. As seen in Table 5, students with multimodal learning preferences on the VARK tool had self-predicted their preferences quite well. There was virtually no difference between students who spoke English at home and those who did not. Among those with unimodal preferences, the best predictors in both groups had a Visual preference and the poorest predictors had an Auditory preference. Thus, whether one speaks English at home or not appears to have little influence on one's ability to predict learning preference(s), regardless of one's preferences.

Table 5: Mean VARK scores for students grouped according to their learning preferences. The lower the VARK score, the greater the match between VARK self-prediction and inventory data.

Learning preference(s)	English at home	Non-English at home
V	1	1.5
A	2.3	2.4
R	1.3	1.9
K	1.7	1.9
Multimodal (2-4 preferences)	1.6	1.5

We expected that students with some experience answering learning style questions were better able to self-predict or self-assess their learning style, so we included this query on our survey instrument (Question #11). However, we found very little difference between those who did or did not have experience answering learning style questions (Figure 2).

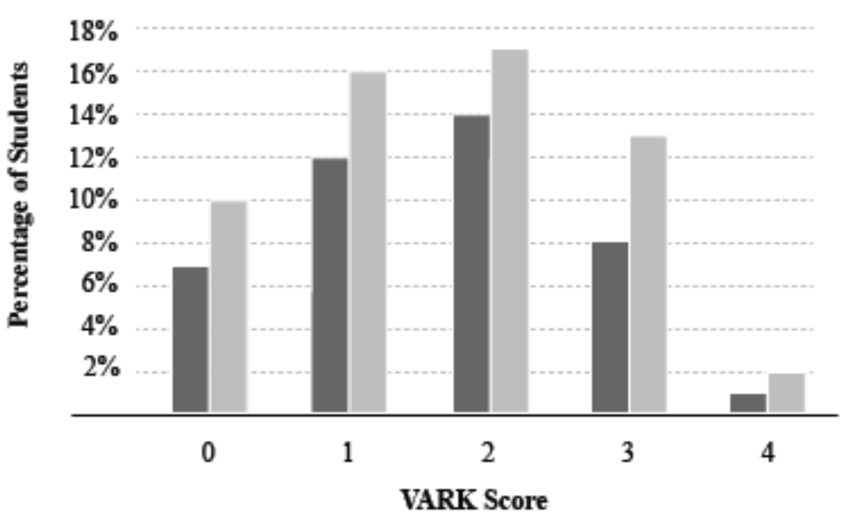
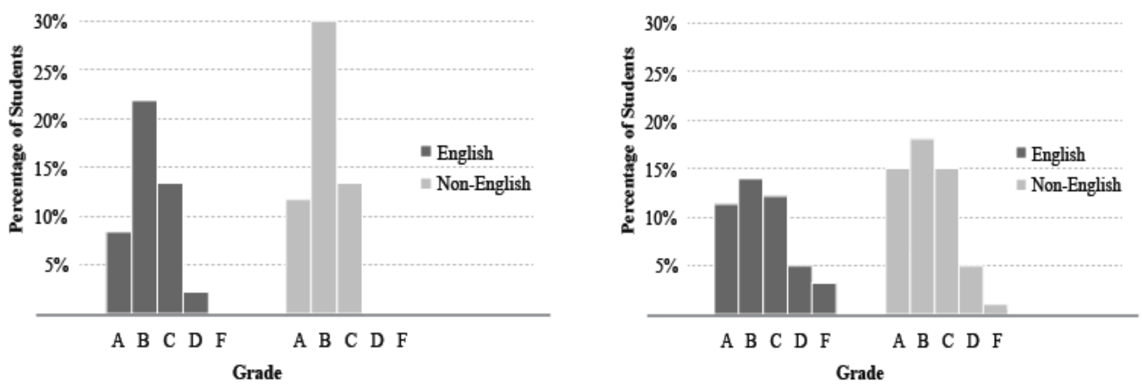


Figure 2. Student self-prediction of learning style preferences grouped according to one's prior experience answering learning style questions as a percentage of total respondents. Dark gray (not the first experience); light gray (first experience). VARK scores range from 0 to 4 (best to poorest).

C. Academic Performance Data.

Self-Prediction of Course Grade. In the following section, we analyzed a subset of 236 students who fully completed their surveys (i.e. 82% of all respondents) using the MATLAB analysis (see methods). The percentage of students in the subset not speaking English at home was nearly identical to the entire pool (i.e. 55% versus 54%, respectively). Therefore, the subset represents a cross-sectional group of second language speakers for the academic performance analyses.

As seen in Figure 3A, the largest group of students (i.e. 52%) predicted they would receive a B in the Biology 230 course. By grouping students according to whether they self-predicted a high grade, 72% of the students predicted receiving A or B, compared to 28% predicting C or D (no students predicted receipt of an 'F'). Interestingly, more second-language students predicted high grades (i.e. grades A or B) compared to their classmates who spoke English at home (42% and 30%, respectively).



A **B**

Figure 3. Introductory Biology Course Grades. Students were grouped by those who speak English at home (English) and those who do not speak English at home (Non-English). Data is shown for A) Self-predicted course grades, and B) Actual course grades.

Actual biology course grades. As seen in Fig. 3B, students who speak English at home received fairly similar course grades to those who did not speak English at home, with the largest group of students in both groups receiving 'B' grades. A smaller percentage of students in the non-English-at-home group actually failed the course and more received A grades.

Comparison of self-predicted and actual course grades. The B grade was both the most self-predicted and the most frequently received grade among all respondents. Yet both groups of students predicted higher scores than those that they actually received. When grouping students with a ‘high grade’, the majority of student respondents received A’s or B’s (i.e. 57%), while 43% received C, D or F.

Students were also grouped according to the overall accuracy of their letter grade predictions. To obtain this information, each student’s prediction on Question #12 of the survey form was compared to the actual course letter grade that the student received after removing any + or – designations. The student either did or did not predict their letter grade correctly. As seen in Table 6, a slight majority of the students correctly predicted (i.e. matched) their introductory biology course grade to their actual course grade, regardless of whether or not English was spoken at home.

Table 6: Ability to self-predict biology course letter grades.

	English at home (n=107)	Non-English at home (n=129)
Students with a correct prediction	56%	53%
Students with an incorrect prediction	44%	47%

Students with prior experience answering learning style questions were slightly better predictors of their course grades. Using survey questions #11 and #12, we found that 58% of the students were answering questions on learning style for the first time and had an average grade percentile difference of 5.78% (i.e. absolute value of their self-prediction grade % minus the actual grade % received in the class), while 42% of the students had prior experience answering learning style questions and showed an average grade percentile difference of 4.65% (a lower value, thus reflecting a greater accuracy of self-prediction).

D. Comparison of self-prediction of one’s learning preferences and grade performance.

We calculated the mean absolute value of each student’s letter grade percentage minus the actual percentage of total points received (see above section). This was used to obtain a value known as the Grade Percentile Difference for each student, which is the self-prediction of one’s grade. To make a comparison with the VARK learning style predictions, we used the VARK scores. We first compared demographic variables to see if students differed in their predictions. We found no significant difference between the ability of males and females to predict their grades and learning preferences. Also, there was no significant difference between the ability of English-at-home and Non-English-at-home students to predict their grades and learning preferences. Among the demographic variables we tested, the only relevant factor we found was the influence of a student’s age. As seen in Figure 4, the eldest group showed the strongest ability to self-predict their own course grades, although age was not an advantage for self-predicting learning preference(s).

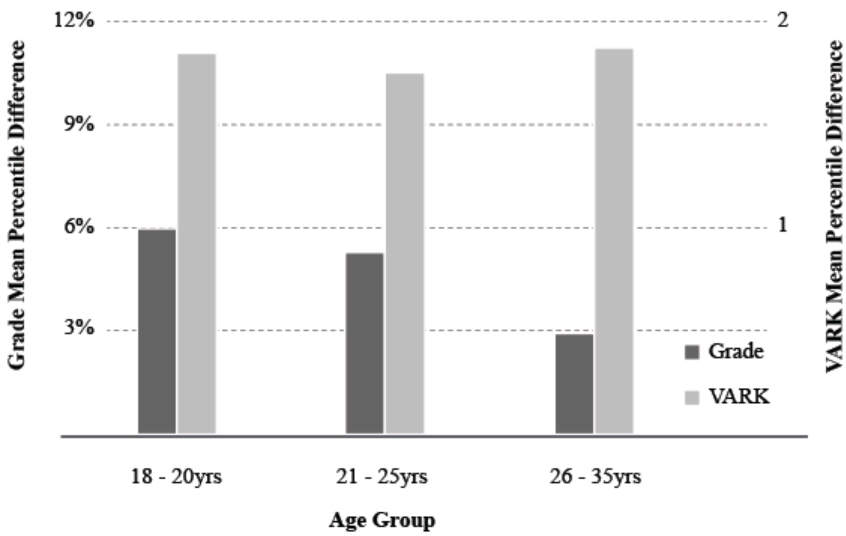


Figure 4. Ability to Self-Predict VARK Learning Preference(s) and Course Grades by student age. The average percentile differences for course grade prediction (dark gray) and VARK learning preference prediction (light gray) were determined using the MATLAB subset. The height of the bar indicates the difference between the actual and predicted values. Therefore, the smaller the height of the bar, the *greater* the accuracy or match of the self-prediction.

We used our data to gain a general idea of whether students who show the strongest self-prediction of individual learning style (i.e. VARK score) also have the highest course grades. It might follow that those who are self-aware of their personal learning preferences might engage in more successful study strategies, thus resulting in higher course performance. Although not rigorously designed to answer this research question, we compared these two variables (see Figure 5) and found that students with both good (i.e. 0-2) and poor (i.e. 3-4) VARK predictions received a wide variety of course grades. Students with good and poor scores also received roughly the same ratios of A/B/C grades compared to D/F grades. Thus, there appears to be no clear relationship between one's ability to predict VARK learning preferences and course grade. However, in comparing students by language spoken at home, the non-English-at-home students with good VARK scores tended to receive more A/B/C grades compared to English-at-home students, while those with poor VARK scores did not receive any F grades. This suggests that students who did not speak English at home tend to perform slightly better in biology, or at least achieve slightly higher grades than their classmates with similar VARK scores.

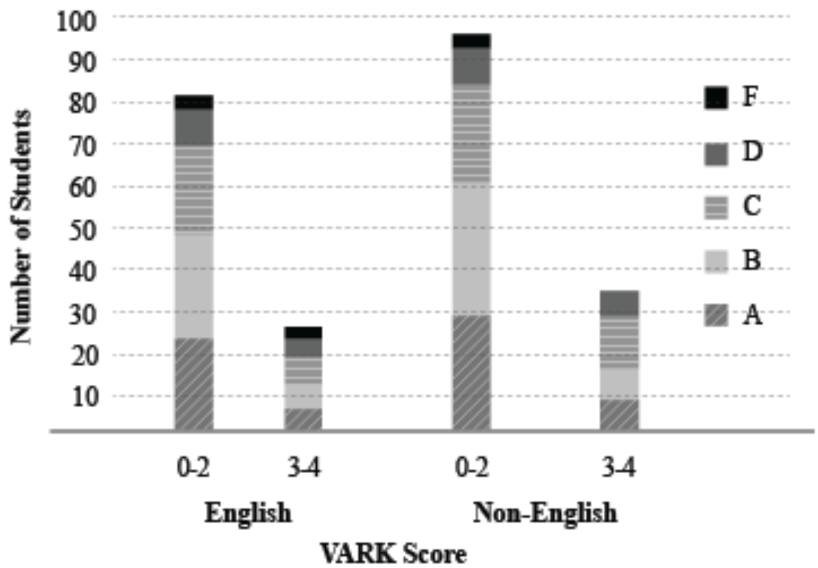


Figure 5. Relationship between VARK score and course grade. Students were grouped according to the level of their VARK scores ranging from 0 to 4, i.e. 0-2 (good scores) or 3-4 (poor scores), as compared to their final course letter grade A through F. Results are shown for students who either speak or do not speak English at home.

IV. Discussion and Conclusion

In our study on learning preferences, speaking a language other than English at home did not appear to influence learning preference profiles. This finding is possibly in contrast to reports in the community college (Lincoln & Rademacher, 2006) and K-12 institutions (Felder, 1995; Reid, 1987) where it was reported that second language speakers have different learning preferences. These differences may be accounted for by a wide variety of factors, including the academic discipline or field, educational setting and regional variation.

The majority (i.e. 3/4) of our second-language students had a strong self-awareness of their personal learning style as demonstrated by the strong match between their self-predictions and the results obtained by filling out the VARK online tool. Indeed, the biology students in our study had a high self-awareness of their learning styles whether or not they spoke English at home. This strong self-prediction result is similar to Dobson (2010) who reported that 2/3 of physiology students had a correct match between their perceived preference and the VARK tool. The reason for our slightly higher number of successful matches (i.e. 3/4 versus 2/3) may be that biology students in our study were allowed to pick multiple preferences, which resulted in multiple selections by more than 70% of our students. Dobson (2010) also reported that kinesthetic (K) learners had the weakest self-awareness of their learning style, while we found the poorest matches among those with auditory (A) learning preferences. The significance of strong self-prediction is that self-knowledge helps students achieve self-efficacy, which ultimately helps them learn and promotes self-satisfaction (Gurpinar et al., 2010).

The present findings showed that the majority of second language speakers were pre-health students and that they felt confident about their self-predictions. This particular self-confidence is somewhat in contrast to results that showed self-confidence may be low among minority pre-health students (Koenig, 2009; Barr et al., 2010), many of whom may speak a second language at home. The reason for a lack of confidence is complex although it may partly stem from poor self-assessment skills (Cassidy, 2007). It may be that our students represent a more confident group when compared to other institutions. Conversely, our students may not be as confident as they perceive, because they also expressed the desire to know more about learning styles in spite of their self-confidence about that knowledge.

Although we had initially expected that low self-awareness of one's learning style might negatively impact biology course performance, we did not find any clear correlation between self-awareness of learning style and grades. This appears in contrast to studies showing that self-perception is related to academic performance (Lievens-Widenski & May, 2010; Young & Fry, 2008; Schraw & Dennison, 1994; Sperling et al., 2004). Our results are not in contradiction, but merely suggest that academic performance may involve aspects of self-awareness other than learning style self-awareness. Interestingly, Gal and Ginsburg (1994) showed that students' general self-perceptions of ability may actually increase anxiety and/or learning difficulties which suggests that self-awareness may sometimes negatively impact performance.

We did not observe any marked gender differences in learning style preferences among second-language students, similar to our earlier report on physiology students (Breckler et al., 2009) and agreeing with reports that gender plays a minor role in education and learning styles among humanities students (Newman-Ford et al., 2009; Kratzig & Arbuthnott, 2006). However, the result is in contrast with reports that learning preference profiles may be different among male and female physiology students (Dobson, 2010; Wehrwein et al., 2007).

In our study, biology students who speak a second language at home have an academic performance similar to their classmates speaking English at home. Although second language speakers in our study performed as well as their classmates, good grades may be more difficult to obtain for this population. For instance, Hussain et al. (2009) have suggested that assessment is a concern for second language students and this might weigh heavily in expected grade outcomes. Assessment questions that involve complex sentence structures, fill-in/completion statements and essay-writing are all considered difficult assessment formats by ESL students (Teemant, 2010) and are often used in biology coursework. In contrast, Soto and Anand (2009) have proposed that learning a second language may actually improve biology performance by providing the equivalent of pre-requisite courses. Second language speakers also do better than predicted by their high school grades (Ramist et al., 1994). In spite of solid performance by second language speakers, these students may encounter other obstacles to their career goals. For example, students with reduced English language fluency might be expected to have lowered standardized test scores (Cuddy et al., 2006), networking ability, acquaintance with professors for letters of recommendation, informal advising, family financial support, and access to relevant volunteer experiences, all of which might impact student success.

Although we did not set out to measure retention rates of second language speakers, it is interesting to note that low grades and lost confidence are usually major factors for students who decide to discontinue their science coursework (Seymour & Hewitt, 1994; Barr et al., 2010). Other reasons that have been suggested include sociological factors such as cross-cultural issues, gender and race (Barr et al., 2010; Koenig, 2009; Adamuti-Trache & Andres, 2008; Apfelthaler et al., 2006; Andreou et al., 2005; Dunn, 1993). It would be interesting to examine whether our students speaking a second language at home have similar retention rates in science coursework as their English-at-home classmates who achieve comparable grades.

As for other future studies, we don't yet know whether the actual language being spoken by an individual student influences their learning style or course performance, although this has been suggested in studies of foreign language speakers conducted by LoCastro (1994). Another potential direction may be to assess whether student's involvement in ESL remedial/preparatory classes plays a role. These programs provide academic support, reinforce different learning strategies, and encourage confidence in students (Rosenthal, 1992; Bragg et al., 2006). Based on our data, one may reason that these types of programs are successfully equipping the second language learners with the tools to identify learning strategies needed for academic success. While our study was done at single time points, it would also be interesting to design longitudinal studies on biology second language learners since it has been shown that longitudinal changes in individual learning styles occur (Busato et al., 1998), especially in ESL students (Reid, 1987).

In summary, second language students enrolled in college biology have learning style profiles similar to their classmates. They also have a strong self-awareness and confidence in their individual learning styles, as well as a solid academic performance in biology. Our results implicate that if there are differences observed in course performance by second-language speakers, the contributing factors must be something *other* than learning style. Suggestions for such factors might include pre-course GPA and attendance (Soto & Anand, 2009) and/or other factors taking place outside the classroom for first-generation college students (Soto & Anand, 2009; Newman-Ford et al., 2009).

Acknowledgements

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Appendix 1: Survey tool

1. Month/year you started at this college:
2. Current year in school:
3. Gender: male, female
4. My intended major is:
5. My intended career is:
6. My age group is: 18-20yr, 21-25yr, 26-35yr, >35yr
7. Do you speak a language other than English at home? yes, no
8. On a scale of 1-5, please rate your interest in finding out your learning style with answers ranging from "mildly interested (1)" to "extremely interested (5)"
9. Circle one or more learning style(s) you feel best describes how you learn: a. Seeing text or diagrams helps me to take in new information. b. Hearing the material helps me to take in new information. c. Writing down what I hear or read helps me to take in new information. d. Touching or observing a physical model helps me to take in new information.
10. To what degree are you confident of your answer to the previous question? Please mark answer ranging from "Not Sure" (1) to "Very Sure" (5).
11. Please indicate as true or false: "Today is the first time I am answering questions to predict my learning style."
12. What is your approximate, estimated grade for this course? A, B, C, D, F

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