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Influence of Students' Motivation on Academic Performance among Non-Food Science Students Taking Food Science Course

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Abstract

The purpose of this study was to investigate motivation towards food science course among non-food science students. Six factors of students' motivation, i.e., self-efficacy, active learning strategies, science learning value, performance goal, achievement goal and learning environment stimulation were investigated to predict factors that influence their academic achievement towards food science course. The sample of the study consisted of 84 undergraduate non-food science students from various faculties at a local public university. The data were adapted from Students' Motivation Toward Science Learning (SMTSL) questionnaire and was validated as a reliable tool. The results of the data analysis revealed that students had a moderate level of motivation towards food science course. A positive significant relationship score was obtained between overall motivations with academic performance. Three sub-factors, i.e., self-efficacy, active learning strategies and achievement goal were found to have positive significant relationship with academic performance. Multiple regression analysis indicated that self-efficacy and achievement goal had a positive contribution to the study.

Keywords: Self-efficacy, Active Learning Strategies, Science Learning Value, Performance Goal, Achievement Goal and Learning Environment Stimulation

Introduction

Students' motivation and interest in science has been widely discussed in relation to science education research (Osborne, 2008). Learners' motivation has been widely accepted as a key factor, which influences the rate and success of learning. In fact, motivation is an important component for students to achieve success in any learning environment (Bukhari *et al*., 2014; Yulselturk and Bulut, 2007). Previous studies had shown that students lacking in motivation

often encountered academic difficulties in science classes. Therefore, the most important responsibility for science educators is to foster students' motivation to learn (Sanfeliz and Stalzer, 2003). According to Lens and Vansteenkiste (2008), students' motivation was considered as a crucial factor in teaching and learning process at all level of education. Motivated students will enjoy learning science inside and outside the classroom. Mostly, these students believe in their ability to learn science and will take responsibility for their learning. Therefore, it is important for science educators to devote diligently in assisting students to connect science concepts. This can be done by explaining the importance of scientific literacy and its relationship to career opportunities in science (Bryan *et al*., 2011; Aschbacher *et al*., 2010).

The term motivation has various definitions. Loewen and Reinders (2011) defined motivation as the desire and incentive of an individual to engage in a specific activity, while Bukhari *et al* (2014) referred motivation as students' effort to enhance performance. Meanwhile, motivation towards science learning was defined as students' desire to learn science (Bolat, 2007). Lee and Brophy (1996) defined students' motivation in learning science as students' active engagement related to science tasks to achieve better understanding of science. Therefore, motivation to learn science promotes students to construct their conceptual understanding of science by recognizing science concept through elucidation of key concept and scientific questions. Furthermore, students will use their understanding of science concept to explain science phenomena and employ their knowledge to analyze information.

Previous studies have shown that motivation could affect students' learning and performance. For instance, Arbabisarjou *et al* (2016) found that there was a significant relationship between academic achievement motivation and academic performance among medical students. A longitudinal study by Liu and Hou (2017) has shown that intrinsic motivation considerably promotes academic performance. Other studies have also demonstrated that academic achievement motivation was significantly related to academic performance (Awan *et al.*, 2011; Amrai *et al*., 2011; Izuchi and Onyekuru, 2017). In a college chemistry class, Zusho *et al*., (2003) found that self-efficacy and task value, which were two motivational components, were the best predictors of students' performance. Meanwhile, Glynn *et al* (2009) exhibited that intrinsic motivation and self-efficacy had a strong influence on students' performance. Korantwi-Barimah *et al*. (2017) study amongst university students demonstrated positive significant correlations between academic self-concept, motivation and academic performance. The study indicated that motivational factors played vital roles in academic performance. In short, from previous studies, there were evident that students' motivation was imperative in science teaching and learning.

Self-Determination Theory (SDT) is a framework study, which relates human motivation and personality. This theory focuses on creating a working environment, which encourages the development of individual intrinsic motivation. According to SDT, when individual are motivated, they intend to accomplish a task and undertake goal-oriented behavior to attain the objective. SDT has been widely used in studies related to motivation in school environment. Previous research has demonstrated that students' self-determination within teaching and learning environment was associated with positive outcomes, such as academic performances (Ryan and Deci, 2009). Students who were intrinsically motivated will be inclined to emphasis on their effort and engagement in learning and school activities (Shen *et*

al., 2009). Therefore, in this study, students will be motivated if they feel that teaching and learning environment encourage and assist them in learning food science.

Objective of the Study

The objective of this study was to investigate students' motivation factors that influence the performance of non-food science students enrolled in Food Science course. The motivation factors explored in this study were self-efficacy, active learning strategies, science learning value, performance goal, achievement goal and learning environment stimulation.

Methodology

This study employed a quantitative correlational study. This design helped to determine the degree of relationship or predict certain outcomes between two or more variables (Fraenkl *et al*., 2012). A total of 84 undergraduate students who were enrolled in several faculties at a local public university were randomly selected. Data were collected using a survey questionnaire. Students' motivation scale was measured using 35 items adapted from the students' motivation towards science learning instrument by (Tuan *et al.*, 2005). This instrument consists of six factors, i.e., (a) self-efficacy (7 items); (b) active learning strategies (7 items); (c) science learning value (5 items); performance goal (4 items); achievement goal (5 items) and (d) learning environment stimulation (6 items). According to Tuan *et al* (2005), self-efficacy measures students' believe in their ability to perform well in science learning tasks. Active learning strategies will look into how students take an active role in using variety of strategies to construct new knowledge based on their previous understanding. Meanwhile, the value of science learning is to allow students to acquire problem-solving competency, experience the inquiry activity, stimulate their thinking, and find the relevance of science with daily life. Performance goal measures students' goal in science learning when they need to compete with their peers and obtain attention from their teacher. Whereas achievement goal measures students' satisfaction as they increase their competency and achievement during science learning. Finally, learning environment stimulation measures how learning environment, such as curriculum, teachers' teaching, and students' interaction influenced their motivation in science learning. Respondents answered using a five-point Likert scale indicating that they strongly disagreed (1), disagreed (2), not sure (3), agreed (4), or strongly agreed (5) with the questionnaire statements. Academic performance was calculated based on the total score marks of students.

Reliability of the questionnaire items were tested in a pilot study which was conducted to students' who were not involved in the actual study to obtain Cronbach alpha value. Cohen (2007) suggested the Cronbach alpha value of more than 0.90 to be categorized as very highly reliable, 0.80 to 0.90 as highly reliable and 0.70 to 0.79 as reliable. Table 1 shows the results of the Cronbach alpha values obtained from the pilot study. The Cronbach alpha for each dimension ranged from 0.757 to 0.897, which indicated that the questionnaire items used to measure students' motivation were reliable.

Table 1
Cronbach Alpha Values for the Instruments Used in Pilot Study to Test the Instrument Reliability

Variables	Cronbach alpha value	Category
Self-efficacy	0.757	Reliable
Active learning strategies	0.843	highly reliable
Science learning value	0.823	highly reliable
Performance goal	0.798	Reliable
Achievement goal	0.839	highly reliable
Learning environment stimulation	0.771	Reliable
Overall students' motivation	0.897	highly reliable

Introduction to Food Science course was offered to non-food science students in a local public university as an elective course. Students are normally enrolled in this course during early semesters of their Bachelor degree. It consists of several topics, which include food chemistry, food microbiology, food processing, food law, nutrition and current trends in food science. This course was taught for 3 hours in a week for one semester (14 weeks). The assessments were done through quizzes, assignments and group work activities. One of the tasks necessitates students to convey the given topic through group presentation. Marks were provided based on the content and presentation skills. Final grades were given based on final exam examination and continuous assessments.

Results and Discussion

A total of 84 respondents were randomly selected for this study, which consisted of 25 males (29.8%) and 59 females (70.2%). Students' motivation towards learning food science refers to students' ability to engage when taking a food science course for achieving a better understanding of food science. Motivation to learn in this course will promote students construction of their conceptual understanding of food science. Descriptive statistics were used to examine the mean and standard deviation of all six dimensions (see Table 2). The overall mean students' motivation is 3.82 (SD = 0.399), which indicated that they were highly motivated during the food science course, even though they were non-food science students and enrolled in this course as an elective.

The highest mean revealed from the descriptive analysis was on science learning value (Mean = 4.29, SD = 0.461). This finding indicated that respondents enrolled in this course perceived the value of learning food science as they engaged in the course. The lecturers played important role through lectures and task delivered to help students to engage and assist them to stimulate their thinking by relating the subject relevancy to their daily life. Students also acknowledged that the food science curriculum, lecturers' teaching strategies and students' interaction influenced their motivation in learning.

The second highest mean referred to active learning strategies with a value of 3.95 (SD = 0.491). This shows that respondents used variety of strategies to retrieve existing knowledge to interpret new experiences in order to construct new understanding. According to Alderman (2004), students with optimum motivation had advantages since they have adaptive attitudes and strategies. Moreover, the food science course in this study was offered

as an elective course as opposed to other courses where students take as core courses in their respective program of study. Motivation is vital for the students enrolled in this course to help them develop greater interest in food science hence benefited them during lectures to obtain good grades.

The third highest mean was on learning environment stimulation (Mean = 3.89; SD = 0.633), which indicated that food science curriculum, lectures' teaching strategies and interaction among students influenced their motivation in learning food science. Performance goal was found to have the lowest mean in students' motivation towards food science (Mean = 3.09, SD = 0.927). This showed that the students who were enrolled in this course as an elective emphasized more on obtaining good grades rather than competing with peers or gaining attention from their teachers.

Table 2
Mean and Standard Deviation for Students' Motivation

Variables	**Mean**	**SD**	**Level**
Self-efficacy	3.77	0.607	High
Active learning strategies	3.95	0.491	High
Science learning value	4.29	0.461	High
Performance goal	3.09	0.927	Moderate
Achievement goal	3.66	0.582	Moderate
Learning environment stimulation	3.89	0.633	High
Overall students' motivation towards Food Science learning	3.82	0.399	High

Level of motivation: 1 – 2.33 = low; 2.34 – 3.67 = moderate; 3.68 – 5.00 = high

Pearson's correlation analysis was carried out for the overall motivation and six constructs of students' motivation and academic performance to determine whether there was any significant relationship between the variables. The analysis showed that there was a significant positive relationship between overall motivations with academic performance (r = 0.379**, p = 0.001) There were significant positive relationships between self-efficacy (r = 0.530**, p = 0.001), active learning strategies (r = 0.258**, p = 0.001) and achievement goal (r = 0.322**, p = 0.001) and academic performance (see Table 3). However, no significant value was seen between food science value, performance goal and learning environment stimulation with academic performance. The findings from this study support previous work by (Arbabisarjou *et al.*, 2016; Liu and Hou, 2017; Awan *et al.,* 2011; Amrai *et al.,* 2011; Izuchi and Onyekuru, 2017; Korantwi-Barimah *et al.*, 2017; Zusho *et al.*, 2003).

Table 3
Relationship between Students' Motivation towards Food Science Learning Construct and Academic Performance

		Self-efficacy	Active learning strategies	Food Science learning value	Performance goal	Achievement goal	Learning environment stimulation
Academic performance	r Sig (2 tailed)	0.530** *p* = 0.001	0.258* *p* =0.005	0.209	0.167	0.322** *p* = 0.005	0.156

** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2-tailed)

A multiple regression was performed to predict factors that influence students' academic performance in learning food science. The assumptions for normality, linearity, homoscedasticity, independence of residuals and sample size had been met. The model summary is given in Table 4. The co-efficient of determination from three independent variables (self-efficacy, active learning strategies and achievement goal) contributed to 36.2% of the academic performance.

Table 4
Model Summary

R	R square	Adjusted R squared	Standard error of the estimates
0.601	0.362	0.335	8.34008

Table 5 shows the results of ANOVA analysis using Multiple Linear Regression model. The test statistic was significant at 0.05 level of significance ($F_{(3,73)} = 13.783$, p=0.000) with the *p*-value smaller than 0.05, indicating the combination of predictors (self-efficacy, active learning strategies and achievement goal) significantly predicted academic performance.

Table 5
ANOVA

Model	Sum of squares	Df	Mean square	F	Sig
Regression	2876.028	3	958.676	13.783	0.000
Residual	5077.652	73	69.557		
Total	7953.68	76			

a. Predictors: self-efficacy, active learning strategies and achievement goal
b. Dependent variable: academic performance

Table 6 illustrates the results of multiple regression which indicated that only self-efficacy (*t* = 0.523, *p* = 0.000) and achievement goal (*t* = 0.219, *p* = 0.044) influenced students' academic performance. However, active learning was not a predictor that influenced academic performance.

Table 6
Co-efficient Multiple Linear Regression for Academic Performance

Model	Unstandardized co-efficient		Standardized co-efficient		
Independent variable	Beta	Standard Error	Beta	*T*	Sig.
(Constant)	20.771	8.822		2.354	0.021
Self-efficacy	8.693	1.642	0.523	5.295	0.000
Active learning	-0.135	2.277	-0.007	-0.059	0.953
Achievement goal	3.534	1.728	0.219	2.045	0.044

Generally, the model for prediction for students' motivation was as follows:
$Y = 20.771 + 0.523x_1 + 0.219\ x_2 + Ɛ$
where:

Y	=	Academic performance
x_1	=	Self-efficacy
x_2	=	Achievement goal
Ɛ	=	Error

Further analysis indicated that only students' self-efficacy and achievement goal were factors that influence students' academic performance of non-food science students, which were enrolled in food science course. This is in agreement with Glynn *et al.* (2009), who showed that that self-efficacy had a strong influence on students' academic performance. It is speculated that since most of the students enrolled in this course were from earlier semesters of their bachelor degree, they may be lacking of basic knowledge and understanding in food science. Therefore, it is believed that high self-efficacy was crucial to sustain in this course for fourteen weeks. Furthermore, high understanding and efficacy were also vital to obtain favorable score in this course. As previously discussed, students enrolled in this course as elective to obtain high scores to improve overall points in their program of study.

Conclusion

This study has provided vital information on factors, which influenced the academic performance of non-food science students' taking food science course. From six factors examined of students' motivation, two factors, i.e. self-efficacy and achievement goal influenced students' academic performance. It was empirical that these motivational factors impact the academic performance of these students. Students with high self-efficacy and focused goal were able to perform well and increased their competency and achievement in this course.

References

Alderman, M. K. (2004). *Motivation for Achievement: Possibilities for Teaching and Learning*. London: Lawrence Erlbaum Associates.

Amrai, K., Motlag, S. E., Zalani, H. A., and Parhon, H. (2011). The relationship between academic
motivation and academic achievement students. *Procedia - Social and Behavioral Sciences*, *15*, 399-402.

Arbabisarjou, A., Zare, S., Shahrakipour, M., and Ghoreishinia, G. (2016). The relationship
between academic achievement motivation and academic performance among medical students. *International Journal of Pharmacy & Technology*, *8*(2), 12272-12280.

Aschbacher, P. R., Lee, E., and Roth, E. J. (2010). Is science me? High school students' identities,
participation and aspirations in science, engineering, and medicine. *Journal of Research in Science Teaching*, *47*(5), 564 – 582.

Awan, R-U., Noureen, G., and Naz, A. (2011). A study of relationship between achievement motivation, self-concept and achievement in English and Mathematics at secondary Level. *International Education Studies*, *4*(3), 72 – 79.

Bukhari, T. Z., Khan, J., Shahzadi, I., & Khalid, A. (2014). Mediating role of motivation to learn in determining e-learning outcomes: a conceptual study. *Business and Management*, *6*(2), 179-189.

Bolat, N. (2007). Motivation and success levels of 6th and 7th grade students in Science and Technology course at primary education with respect to learning styles (in Turkish). (Unpublished Master Thesis), Osmangazi University, Eskişehir, Turkey.

Bryan, R. R., Glynn, S. M., and Kittleson, J. M. (2011). Motivation, achievement, and advanced placement intent of high school students learning science. *Science Education*, *95*(6), 1049–1065.

Cohen, L., Manion, L., and Morrison, K. (2007). *Research Methods in Education* (6th Ed.). London: Routledge.

Fraenkel, R., Wallen, N. E., and Hyun, H. H. (2012). *How to Design and Evaluate Research in Education* (8th Ed). New York: McGraw-Hill.

Glynn, S. M., Taasoobshirazi, G. and Brickman, P. (2009). Science motivation questionnaire: Construct validation with non-science majors. *Journal of Research in Science Teaching, 46,* 127–146.

Izuchi, M-R. N., Bruno, U., and Onyekuru, B. U. (2017). Relationships among academic self-concept, academic motivation and academic achievement among college students. *European Journal of Research and Reflection in Educational Sciences, 5*(2), 93 – 102.

Korantwi-Barimah, J. S., Ofori, A., Nsiah-Gyabaah, E., and Sekyere, A. M. (2017). Relationship between motivation, academic self-concept and academic achievement amongst students at a Ghanaian Technical University. *International Journal of Human Resource Studies*, *7*(1), 61 – 73.

Lee, O., and Brophy, J. (1996). Motivational patterns observed in sixth-grade science classrooms. *Journal of Research in Science Teaching*, 33(3), 585–610.

Lens, W., and Vansteenkiste, M. (2008) Promoting self-regulated learning: A motivational analysis. In D. H. Schunk and B. J. Zimmerman (Eds.), *Motivation and self-regulated learning: Theory, research, and applications* (pp. 141-168). Mahwah, NJ: Lawrence Erlbaum Associates.

Liu, Y., and Hou, S. (2017). Potential reciprocal relationship between motivation and achievement: A longitudinal study. *Social Psychological International*, doi.org/10.1177/0143034317710574

Loewen, S., and Reinders, H. (2011) *Key Concepts in Second Language Acquisition*. Hampshire: Palgrave Macmillan.

Osborne, J. (2008). Engaging young people with science: does science education need a new vision? *School Science Review*, *89* (328), 67–74.

Ryan, R. M., and Deci, E. L. (2009). Promoting self-determined school engagement: Motivation,
learning, and well-being. In K. R. Wentzel & A. Wigfield (Eds.), *Handbook on Motivation at School*. (pp. 171-196). New York: Routledge.

Sanfeliz, M., and Stalzer, M. (2003). Science motivation in the multicultural classroom. *The Science Teacher*, *70*(3), 64 – 66.

Shen, B., McCaughtry, N., Martin, J., and Fahlman, M. (2009). Effects of teacher autonomy support and students' autonomous motivation on learning in physical education. *Research Quarterly for Exercise and Sport, 80*(1), 44–53.

Tuan, H-L., Chin, C-C., and Shieh, S-H. (2005). The development of a questionnaire to measure students' motivation towards science learning. *International Journal of Science Education*. *27*(6), 639–654

Yukselturk, E., and Bulut, S. (2007). Predictors for student success in an online course. *Educational Technology and Society*, *10*(2), 71–83.

Zusho, A., Pintrich, P. R., and Coppola, B. (2003). Skill and will: The role of motivation and cognition in the learning of college chemistry. *International Journal of Science Education, 25*(9), 1081–1094.