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Impact of the STEM Program on Information Technology College Students' Goals: Perspectives from the Philippines

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Abstract: The implementation of the K to 12 Basic Education program in the Philippines included the addition of senior high school (SHS), grades 11 and 12, which aims to equip students with skills that would help prepare them for the workplace, higher education or entrepreneurship. The Department of Education (DepEd) states that from the 1.2 million SHS graduates as of the end of SY 2017-2018, around half are expected to proceed to college. This study aims to look at the effectiveness of the SHS program, in terms of preparing the students for higher education. Specifically, the study focused on students enrolled in an information technology education (ITE) degree program and how their SHS program contributed to readiness for college. The survey method was used to the first-year college students from both private and state universities. The results of the survey show that past performance and computer self-efficacy positively influence academic goals, which in turn positively influences the technology outcome expectations. However, the results show that technology outcome expectations do not significantly influence the achievement of academic goals.

Keywords: K to 12 education, social-cognitive career theory, past performance, self-efficacy, outcome expectations, academic goal

1. Introduction

The Philippines implemented in SY 2012-2013 the K to 12 Basic Education Program, in response to the need to address the mismatch of competencies and job requirements of industries ("DepEd Order No. 36, s. 2012.pdf," 2012). The K to 12 program includes kindergarten and twelve years of primary (six years) and secondary (four years junior high school and two years senior high school) education. The two years of senior high school (grades 11 and 12) aim to prepare students for entry to higher education and at the same time equip them with relevant and globally competitive skills that will promote employability and entrepreneurship or *technopreneurship* ("DepEd Order No. 36, s. 2012," 2012). With a curriculum that is aligned to the 21st Century Core Skills and College Readiness Standards, the Senior High School (SHS) offers different tracks: Academic, Technical- Vocational-Livelihood (TVL), Sports, and Arts & Design (DepED, 2014). Under the Academic track, the following strands are offered: General Academic (GA), Accountancy, Business and Management (ABM), Science, Technology, Engineering and Mathematics (STEM), and Humanities and Social Sciences (HUMSS) (DepED, 2014). The full implementation of SHS was in SY 2016-2017, and the first set of Grade 12 students that graduated at the end of SY 2017-2018 reached over 1.2 million (Mateo, 2018).

For the graduates who decide to continue to college, thereby having the opportunity to learn more and be ready for the workplace after four to five years, it is important that they have the appropriate preparation as this is one of the goals of the SHS program ("The K to 12 Basic Education Program | Official Gazette of the Republic of the Philippines," 2012). This study aims to evaluate the students' readiness for higher education, specifically, the SHS-STEM graduates who are currently enrolled in IT education degree programs. The SHS-STEM strand focuses on the several branches of sciences, pure and applied mathematics, engineering, and technology.

2. Research Design

This study will be conducted using a framework based on the social cognitive career theory (SCCT) (Smith, 2002) which states that past performance, computer self-efficacy, outcome expectations, and academic goal positively influences academic performance. This study will focus on the impact of past performance on academic goals only. Specifically, the focus is on academic goals which refer to the student's competence or the expectation of getting good grades and performing better compared to others (Moeller et al., 2012). In light of data privacy concerns and the availability of data, the study will exclude the evaluation of students' grades in relation to academic performance. We hypothesize that past performance predicts computer self-efficacy (H1) and outcome expectations (H3). On the other hand, computer self-efficacy has a positive influence on the academic goal (H2) and outcome expectations (H5). Lastly, we further posit that outcome expectations predict academic goal (H4).

3. Research Methodology

The participants were 162 1st year Information Technology students (65 women, 97 men) from two (2) private universities located in the capital and a state university located in the province. The survey was administered via Google Forms, where responses were received from mid-November to mid-December 2018. Participants were enrolled in a preparatory information technology course for the 1st semester of SY 2018-2019 and came from different secondary education institutions and track specializations: STEM, n = 126, 77.78%; HUMSS, n = 9, 5.56%; ABM, n = 10, 6.17%; and GA, n = 17, 10.49%.

The assessment of past performance was adapted from the 9-item Information Technology Literacy Measurement of Fraillon, et. al. (2014) to assess the students' knowledge of fundamental IT concepts. The study adapted the 30-item Computer Self-Efficacy scale (CSE) of Torkzadeh & Koufteros (1994) to assess students' self-perception of computer-related skills and knowledge. Further, the instrument for the Technology Outcomes Expectation was adapted from the Usefulness of Mathematics scale of Fennema & Sherman (1976) to assess current students' insights of the importance of information technology in regard to their future academic goals and career plans. The academic goal variable was assessed by asking the students what grade they expected to receive at the end of an ITE course. The grade distribution is: 1.0-1.9, Excellent (n = 74, 45.68%); 2.0-2.9, Good (n = 79, 48.77%); 3.0-3.5, Satisfactory (n = 9, 5.56%); 5.0, Failed; NC, No Credit; and WD, Withdraw.

The research model was tested by performing Structural Equation Modeling (SEM) for data analysis of the structural models, consistent with other studies that used PLS-SEM (Ebardo, 2018, 2017). The result of the pilot test shows *Cronbach alpha* of greater than 0.70 values and the *Average Variance Extracted (AVE)* of greater than 0.50, showing an acceptable degree of internal consistency reliability.

4. Results and Discussion

The student's past performance in SHS has a significant effect on the student's self-efficacy in using information and communications technology (ICT)-related technologies in college, which supports H1. Computer self-efficacy also influences the students to achieve their academic goals in college; therefore, H2 is supported. Also, both past performance and computer self-efficacy have a strong influence on technology outcome expectations, which supports H3 and H5. However, the technology outcome expectations have a less significant effect on the students' achievement of their academic goals. Thus, the evidence for H4 is not enough to support the hypothesis, which is consistent with the previous study (Smith, 2002). Therefore, further investigations may need to consider clarifying and refining the outcome expectations measurement.

The research paper did not consider the actual grade to refer to academic performance since the study was conducted prior to the end of the semester and grades were not available yet. Academic goals defined by students in terms of grade expectations served as the reflection and perception of their performance in school. Past studies show that students' previous performance in school mediated by self-efficacy could be a determining factor to shape academic grade goals (OECD, 2012). Thus, the higher the expectation or academic goals of the student, the more they are prepared for higher education.

A practical application of this study may include designing the curriculum and educational process in college that allows assessment of IT students' previous experience using technology and efficacy concepts. With these, educators will have a better understanding of the competency and confidence of the students and will facilitate the revision of teaching methods and policies in response to the current needs of the students. Additionally, the SHS curriculum must also be updated to provide students with an understanding of the impact of different influences on their self-development and to explore career options for learning and work.

5. Limitations and Conclusion

The newly implemented K to 12 Basic Education program in the Philippines provides opportunities for expansion of this study and other future research endeavors. First, there is a need to enrich the data collected to ensure equal representation of all the universities in the Philippines. Second, a comparative analysis is recommended between private and public schools in determining the effectiveness of the implementation of the said program. Also, future research should apply other methodologies such as qualitative interviews, content analysis or social media analytics to discover other socio-cultural factors that may also influence students on their academic perception and performance in the field of ICT.

The study contributes to the body of knowledge by using the social-cognitive career theory to explain what influences students to achieve their academic college goals. The results of this study support previous studies that students' past performance influence computer self-efficacy, encouraging them to achieve their academic goals (Smith, 2002). Therefore, it is important that educators and institutions investigate the data acquired from past performance, computer self-efficacy, and outcome expectations and incorporate it into the curriculum and ICT education to further enhance students' motivation in terms of academic achievement.

References

Council, N., & Education, M. (2018). Fennema-Sherman Mathematics Attitudes Scales: Instruments Designed to Measure Attitudes toward the Learning of Mathematics by Females and Males Author: Elizabeth Fennema and Julia A. Sherman Source: Journal for Research in Mathematics Education, *7*(5), 324–326.

DepED. (2014). Senior High School (SHS) Curriculum and Program Requirements, 1–27.

DepEd Order No. 36, s. 2012.pdf. (2012).

Ebardo, R. (2017). The use of activity trackers for health empowerment and commitment : the Philippine cycling perspective commitment : the Philippine cycling perspective ". *In 7th International Workshop on Computer Science and Engineering WCSE 2017*, pp. 25–27.

Ebardo, R. A. (2018). Visibility and Training in Open Source Software Adoption : A Case in Philippine Higher Education. *In 8th International Workshop on Computer Science and Engineering WCSE 2018*, pp. 368–373.

Fennema & Sherman. (1976). Mathematics Attitudes Scale: Instruments Designed to Measure Attitudes toward the Learning of Mathematics, *7*(5), 324–326.

Fraillon, J., Ainley, J., Schulz, W., Friedman, T., & Gebhardt, E. (2014). *Preparing for Life in a Digital Age*.

Mateo, J. (2018). Senior high school results exceeded expectations — DepEd | Philstar.com. Retrieved December 13, 2018, from https:// www.philstar.com/headlines/2018/05/11/1814173/senior-high-school-results-exceeded-expectations-deped

Moeller, A. J., Theiler, J. M., & Wu, C. (2012). Goal Setting and Student Achievement: A Longitudinal Study. *The Modern Language Journal*, *96*(2), 153–169.

OECD. (2012). *Grade Expectations: How Marks and Education Policies Shape Students' Ambitions*. PISA, OECD Publishing.

Smith, S. M. (2002). The Role of Social Cognitive Career Theory in Information Technology based Academic Performance. *Information Technology, Learning, and Performance Journal*, *20*(2), 1–10.

The K to 12 Basic Education Program | Official Gazette of the Republic of the Philippines. (2012). Retrieved December 13, 2018, from https://www.officialgazette.gov.ph/k-12/

Torkzadeh, G., & Koufteros, X. (1994). Factorial validity of a computer self-efficacy scale and the impact of computer training. *Educational and Psychological Measurement*, *54*(3), 813–821.

Villarreal, B. J., Heckhausen, J., Lessard, J., Greenberger, E., & Chen, C. (2015). High-school seniors' college enrollment goals: Costs and benefits of ambitious expectations. *Journal of Adolescence*, *45*, 327–340.