International Journal of Education Research for Higher Learning *Print ISSN 2672-2690*
Volume 25, No. 2, October 2019 *Online ISSN 2672-2682*

A Path Analysis for the Enactment of Science as Inquiry among Philippine Science High School Teachers

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ABSTRACT

Teaching science as inquiry has not been widespread despite its documented effectiveness. The purpose of this study was to determine the path model for Philippine Science High School (PSHS) science teachers' intentions to enact inquiry in the classroom anchored on the Theory of Planned Behavior (TPB). The research instrument used consisted of Self-Assessment of Inquiry Practices (SIP) and Intentions to Teach Inquiry Questionnaire (ITSI). The respondents of this study were the science teachers of eleven campuses of the PSHS System. Results showed a moderate enactment of inquiry in the PSHS classrooms. High mean scores were obtained for levels of intentions to enact inquiry, attitude, workplace influence, and perceived capacity of the science teachers towards inquiry. Path analysis showed a strong correlation between attitude towards inquiry and workplace influence, between attitude and perceived capacity, and between workplace influence and perceived capacity. Among the three exogenous variables tested, only attitude significantly predicted the intention of PSHS science teachers to enact inquiry.Whereas intentions did not significantly predict the enactment of inquiry, perceived capacity of PSHS science teachers directly predicted the enactment of inquiry.

KEYWORDS: Teaching science as inquiry, attitude as predictor of intentions, Philippine Science High School

INTRODUCTION

The workplace of the 21st century shows a trend in decreasing manual labor and an increasing demand on complex skills. The educational system of the past no longer matches the workplace requirements of the 21st century. A 21st century learner is characterized as one who can solve problems, think critically, communicate effectively and work collaboratively with others.

Today's instruction must not train students to memorize facts and acquire vast amount of knowledge. Effective science education helps students acquire problem-solving and communication skills even if they do not end up as scientists or engineers. The new skills needed in the 21st century may be referred to as hard skills or soft skills. Hard skills include the traditional math and reading abilities as well as problem-solving skills. Soft skills pertain to collaborative and communication skills (Bybee, 2010).

According to Bybee (2010), inquiry is the vehicle that allows the shift away from rote-learning to the true nature of science that allows both gains in content knowledge and process skills. Inquiry engages learners in collaborative work, thereby enhancing communication and social skills. Minner, Levy and Century (2010) noted that science inquiry has been promoted in the US, Europe and Australia to increase student understanding of science. Shore, Birlean, Walker, Ritchie, LaBanca, and Aulls (2009) describe inquiry as both the core pedagogy and outcome. It has been central to many efforts to improve science education in the United States, Canada, Europe, Australia, and New Zealand. Inquiry has been the focus of science education in Singapore since 2008 (Kim, Tan & Talaue, 2013).

In the United States, Marshall (2013) identified four factors that are responsible for shifting instruction towards inquiry: changing societal needs, standardized tests, national standards, college-level courses and industry needs. With the advent of the internet, the concept of a learned person has shifted from one who has acquired a vast amount of knowledge to one who can solve problems, think critically, communicate effectively, and collaborate well with others. The rise of digital media with its repository of facts has contributed to the end goal of shifting learning from accumulating fact-based knowledge to problem-solving skills. The major national and international tests such as the Programme for International Student Assessment (PISA) and the Trends in International Mathematics and Science Study (TIMSS)

are testing higher-order thinking skills. In the United States, Next Generation Science Standards employs higher-order thinking skills. College-level courses (AP courses) prepare students to design their own laboratory investigations. There is a shift from breadth of coverage to deep conceptual learning. Lastly, contemporary jobs require problem-solving and collaborative skills.

In Europe, concerns have been raised regarding the decreasing interest of students in science. It has been noted that there are fewer students entering science and technology fields. This observation has been feared to impact Europe's capacity for technological innovations which could lead to economic, ecological and social consequences. Attention has focused on transforming teaching styles to increase student interest and achievement in science. Expert groups across Europe have identified Inquiry-Based Learning (IBL) as the pedagogy that is more appealing to the learners. The PRIMAS Project was undertaken to promote IBL in Europe (Dorier & Maa, 2012).

Inquiry rests on several features: evidence, explanations, evaluation and communication. Science differs from other disciplines as it relies heavily on evidence. Physical evidences that are verifiable involve the use of observations using senses and measurements. Inquiry moves from evidence to explanations. Explanations are based on cognitive processes such as critical reasoning and logic. Explanations move from current knowledge to new understanding. Evaluation promotes reasoning as students seek alternatives. Finally, communication relies on articulation of evidence and clear explanations in a way that evidences and explanations can be reviewed (Minner, Levy & Century, 2010).

A review of 138 analyzed researches conducted between 1984 and 2002 revealed that inquiry instruction is favored over traditional approaches (Minner, Levy, & Century, 2010). Inquiry learning engages students in the learning process thereby increasing conceptual understanding. Marshall (2013) recommends using inquiry to teach core ideas. He advocates the use of guided inquiry because of a clearly defined target for learning. Successful guided inquiry promotes better short-term and long-term memory. The deep discussions make knowledge easier to acquire while multiple connections and scaffolding support long-term memory development. This is confirmed by Blanchard, Southerland, Osborne, Sampson and Granger (2010) who reported that high school and middle school students participating in a week-long inquiry laboratory showed higher scores and had long-term retention as indicated in delayed post-tests.

In the Philippines, the traditional idea of an effective science teacher is one who clearly explains science concepts and theories. The teacher necessarily possesses mastery of the subject matter and good communication skills. The traditional Philippine classroom is teacher-centered and knowledge flows from the teacher to the students (de la Cruz, Magno, Punzalan, 2013). In 2012, the Department of Education has adopted the K-12 curriculum. K to 12 science curriculum was designed to be student-centered and inquiry-based (Department of Education, 2012).

Despite strong evidence of the effectiveness of teaching science as inquiry, the adoption of inquiry is not widespread (Gengarelly & Adams, 2009). In both Japan and the US, inquiry-based teaching is not the norm (Tosa, 2009). This is because teaching science as inquiry brings many challenges. Three challenges to the implementation of IBL were the identified as related to the school system, to the available resources and to the individual teachers. Implementation of IBL is largely dependent on teacher attitudes and beliefs (Dorier & Maa, 2012). Mansour (2009) noted that teachers fail to develop constructivist ideas which are parallel to inquiry teaching as they themselves felt successful with traditional practices. They do not find relevance to switching to constructivist practices.

In the Philippines, there were 181 research and development (R&D) personnel per million population which is way below the UNESCO requirement of 380 per million population in 2009 (Department of Science and Technology, 2012). Of this number, 75 percent are technical people (scientists and engineers) while the others are support staff. In contrast, the Philippines lags behind its ASEAN neighbors wherein per million population, Singapore has 6,894 R&D personnel while it is ahead of Myanmar (104), Cambodia (58) and Lao PDR (38). A major program of the DOST in manpower development is the creation of a special science high school, the Philippine Science High School (PSHS) System. From an initial school established in Metro Manila in 1965, the system is rapidly expanding. One of the challenges of PSHS is to teach science concepts and skills alongside right attitude towards science. Teaching science as inquiry addresses this challenge.

Purpose of the Study. The purpose of this study was to evaluate the path model for PSHS science teachers' intentions to enact inquiry in the classroom anchored on the Theory of Planned Behavior (TPB). The TPB is a path model that considers three exogenous variables namely attitude, workplace influences, and

perceived capacity as predictors of the endogenous variable which is intentions. Intentions in turn were a predictor of a behavior which is the teaching of science as inquiry. The TPB also allows correlations among the exogenous variable.

Theoretical Lens. The Theory of Planned Behavior (TPB) served as the research framework for the adoption of the desired behavior which is enacting inquiry in the science classroom. Ajzen (1991) introduced theTheory of Planned Behavior (TPB) in order to predict human behavior. The theory's central focus is the individual's intentions to perform a behavior. Intentions represent the aggregate of the individual's motivational factors towards a behavior. The stronger the intentions, the more likely the behavior will be manifested. On the other hand, non-motivational factors such as opportunities and resources also influence the performance of a behavior. These non-motivational factors are referred to as actual behavioral control. The enactment of a behavior can be jointly predicted both by intention (or motivation) and behavioral control. Intentions can be expected to influence performance to the extent that the person exerts behavioral control. However, actual control can be measured in terms of perceived behavioral control. This perception of behavioral control is the individual's judgment on his/her ability to execute the desired action.

According to Azjen (1991), the theory of planned behavior considers three predictors of intentions: attitudinal, normative and control beliefs. Attitudes develop from beliefs. For the attitudinal belief dimensions, the belief structures are based on relative advantage, complexity and compatibility. These characteristics are derived from the earlier work of Everett Rogers in 1983 concerning the characteristics of innovation. TPB also explores the components of subjective norms particularly the influence of significant others. The important referent groups are the superiors, peers and the subordinates. Lastly, control beliefs reflect past experiences and anticipated obstacles. It has both internal and external dimensions. Internal dimensions are related to the individual's perceived ability or self-efficacy as originally described by Bandura (1977). External dimensions are collectively called facilitating conditions, referring to the availability of resources and opportunities.

METHOD

This study was conducted in 11 campuses of PSHS across the country. Philippine Science High School was chosen as this is the country's premier science high school which offers globally-competitive education to highly selected Filipino high school students. PSHS scholars enjoy the prestige of being recognized as the cream of the crop. Since 1964, PSHS scholars have honored the country through achievements in national and international competitions. Scholars are entitled to free tuition, free loan of available textbooks and a monthly allowance based on the socio-economic indicators of the scholar's family.

The PSHS is an institute of the Department of Science and Technology. By virtue of Republic Act 3661, the PSHS opened its first campus in Diliman, Quezon City in 1964. With its success in emphasizing science subjects at the secondary level, PSHS campuses were established in the regions. Executive Order 1090 established PSHS Campuses in Visayas and Mindanao. The mandate of PSHS is: "To offer on a free scholarship basis , secondary courses with special emphasis on subjects pertaining to the sciences with the end in view of preparing its students for a science career" (Philippine Science High School, 2013). The scholarship requires scholars and their parents to adhere to an agreement that the scholar will pursue a university degree in science, technology, engineering or mathematics (STEM). Non-compliance of the agreement will necessitate a payback of the cost of the scholarship enjoyed.

PSHS scholars undergo a rigorous screening procedure through the National Competitive Examination (NCE). The number of scholars accepted annually is limited: 240 for the Main Campus in Diliman, Quezon City and 90 in each of the 13 regional campuses across the country. The older regional campuses are located in San Ildefonso in Ilocos Sur, Bayombong in Nueva Vizcaya, Baguio City, Clark Freeport Zone, Goa in Camarines Sur, Iloilo City, Argao in Cebu, Palo in Leyte, Balo-i in Lanao del Norte and in Davao City. More campuses are being established. The SOCSKSARGEN campus opened in 2013 while the Caraga Campus started its operations last June 2014.

The current curriculum offers integrated science courses at Grades 7 and 8. In Grades 9 and 10, the disciplines of biology, chemistry and physics are taken all at the same time. In the specialization years of Grades 11-12 which shall start in 2016, students will take up elective courses in science and math. In a typical

regional campus, those teaching sciences number about 12-13.

As of 2014, there are 13 PSHS campuses across the country. Eleven campuses were selected for this study as two were just recently opened and there were few science teachers. The campuses in Luzon are from the Cordillera Administrative Region (CAR in the Cordilleras), Ilocos Region Campus (IRC in Region I), Cagayan Valley Region (CVC in Region II), Central Luzon Campus, (CLC in Region III), Main Campus (MC in the National Capital Region), and the Bicol Region Campus (BRC, in Region V). In the Visayas, the campuses are the Western Visayas Campus (WVC, Region 6), Central Visayas Campus (CVisC in Region VII), and the Eastern Visayas Campus (EVC in Region VIII). In Mindanao, two campuses were included: the Northern Mindanao Campus (NMC in Region X) and the Southern Mindanao Campus or SMC in Region XI (Philippine Science High School, 2013).

Research Respondents. This study employed a complete enumeration of science teachers in the eleven campuses of the PSHS System. All science teachers from the eleven PSHS campuses were given written questionnaires. A total of 113 PSHS science teachers participated in the study. All science teachers from the campuses of Ilocos (12), Cordillera (9), Cagayan Valley (10), Bicol (13), Western Visayas (10), Eastern Visayas (9) and Southern Mindanao (12) participated. The participation rate of teachers from four campuses were lower: Main Campus (20/26), Central Luzon Campus (5/8), Central Visayas (6/10), and Central Mindanao (7/9). Overall, the participation rate was 90.4 percent.

Research Instruments. The descriptive correlation method was used as the research design. Descriptive correlation allows examination of the strength of the associations among the variables (Castro, Kellison, Boyd & Kopak, 2010). A researcher-made survey instrument patterned after the original work of Taylor and Todd (1995) was employed in this study. . Some of the questions were adapted from the Promoting Inquiry-based Learning in Mathematics and Science Education Across Europe (Primas) Project (Dorier & Maa, 2012). The questionnaire consisted of two parts. Part 1 was the Self-Assessment of Inquiry Practices (SIP) while the Intentions to Teach Inquiry Questionnaire (ITSI) was Part 2.

The SIP consisted of 20 items of Likert-scaled questions intended to provide information on the current level of inquiry as perceived by the PSHS science teacher.

A rating of 5 indicates that teaching science as inquiry takes place all the time while a rating of 4 means that it takes place most of the time, 3 for sometimes, 2 for a few times and 1 indicates that teaching science as inquiry does not take place. The questionnaire contains ten questions (Items 1-10) that describe traditional practices and ten questions that describe inquiry practices (Items 11-20). The questions on traditional practices were subjected to rescoring.

The Intentions to Teach Inquiry Questionnaire (ITSI) followed the recommendations of Ajjan and Hartshorne (2008) to have each construct indicated by five to six items. The intentions to teach inquiry is defined as inclinations towards teaching science as inquiry by the PSHS teachers. Items were modified from Capo and Orellana (2011) and Castillo (2012). Intentions were indicated by five items. Items for Attitude pertained to a positive evaluation of outcomes. The constructs for Attitude were written in terms of Perceived Usefulness, Ease of Use, and Compatibility. Items for workplace influence were formulated with respect to referent individual or group. The constructs for Workplace Influence were expressed as Supervisor's Influence, Peer Influence, and Student Influence. Items for perceived capacity included factors that promote or discourage performance of the intended behavior. Perceived Capacity was derived from the constructs of Self-Efficacy and Facilitating Conditions. In all, ITSI contained a total of 45 items. Questions have a 1-5 Likert Scale with 5 indicating strongly agree, and 1 indicating strongly disagree. All statements were stated positively. These questionnaires were subjected to content validity experts in the field. The research instrument underwent internal consistency reliability test through a pilot test on 30 science teachers from another school system. The Cronbach alphas were greater than the social science standards of reliability which should be greater than 0.70 indicating the suitability of the questions in conducting a survey.

Statistical Tools. Path analysis was employed in this study to identify the strength of effects of the variables in the proposed path model consistent with TPB. According to Ritzhaupt, Dawson and Cavanaugh (2012), the strength of effects in path analysis is measured in terms of the standardized regression coefficient, ß. Path analysis also measures correlations among the endogenous variables. The resulting model was evaluated for goodness of fit using AMOS software. For this purpose, the indices used were: CMIN/DF, Goodness of Fit Index (GFI), Normed Fit Index (NFI), Tucker-Lewis Index (TLI), Comparative Fit Index (CFI), and Root Mean Square Error of Approximation (RMSEA).

Ethical Considerations. The research instrument was tested for validity by three internal and three external expert validators. The instrument was examined and approved by the panel of examiners prior to implementation. Permission was sought from the authorities of the schools before the written questionnaires were administered. Moreover, the participation of the PSHS science teachers was voluntary. Transmittal of the questionnaire followed official protocols from the School Heads to the Department Heads, and finally to the teachers concerned.

Informed consent of the respondents was sought. The information contained the objectives, methods, and potential benefits of the study. Information on the burden of time required to complete the questionnaire was offered. The participating teachers were given at least two weeks to complete the questionnaires. Confidentially of the responses has been maintained.

RESULTS AND DISCUSSION

Results of the self-assessment of inquiry practices show an overall mean of 2.94 which reflects moderate level of enactment of inquiry in the PSHS classroom. PSHS science teachers reported that they provide the students opportunities to construct their own explanations based on a given data. The teachers also allow students to come up with alternative explanations. Both of these statements imply that critical thinking is being promoted inside the classroom. Minner, Levy, and Century (2010) described one of the features of inquiry as providing explanations based on evidence. The self-assessment of the science teachers revealed that features of inquiry practices were evident in the classrooms.

Level of Intentions towards Teaching Science as Inquiry

All the indicators of intentions of PSHS science teachers to enact inquiry in the classroom were rated High to Very High with an overall mean of 4.40. With a mean of 4.94 interpreted as Very High, there is a very strong intention to use inquiry in the future. With a mean of 4.53 or Very High, there is also a very strong intention to learn more about inquiry. The lowest mean score of 3.99 or which is also High was given to the intentions of teachers to support the practice of teaching science as inquiry. These results revealed that intentions to teach science as inquiry emanates from the individual teacher.

Levels of Attitude, Workplace Intentions and Perceived Capacity

The attitude of PSHS science teachers towards inquiry can be described as High with an overall mean of 4.19. The mean for perceived usefulness was Very High at 4.54. The mean for compatibility which was 4.19 and ease of use which is 3.84 were both High. The highest mean of 4.65 interpreted as Very High was given to the idea that inquiry is useful in promoting interactions in the classroom. In inquiry, students engage in discourse. This results to a deeper and wider understanding of the concepts. This is aligned with the 21st century standards of enhancing effective communication skills (Partnerships for 21st Century Learning, n.d.).

On the other hand, the lowest mean score of 3.15 or Moderate was given to the idea regarding availability of sufficient time to teach science as inquiry. While PSHS science teachers like the idea of inquiry, they lament the fact that there are time constraints. The restrictions imposed by time constraints on teaching science as inquiry has long been reported (Blanchard, Southerland & Granger, 2009; Dorier & Maa, 2012). A science teacher spends time not only in the classroom but also in student discipline and student motivation. Some PSHS teachers pointed out that their teaching assignments are not limited to purely teaching so that these assignments pose restrictions on how they can use their time. Further, planning an inquiry lesson is challenging and time consuming. Another constraint is the class period of one hour. Some attempts to engage in investigation and discourse can be constrained by time limitations. There are also challenges imposed by class interruptions such as weather disturbances. Teachers are sometimes compelled to cover a lot of material through traditional strategies such as lectures to compensate for interruptions.

The overall mean for workplace influence is 3.93, indicating High level of influence by the referent groups. The factors contributing to the workplace influence are those coming from the superiors, peers, and students. While all scores were High, it is revealing that the student influence with a mean score of 4.14 is higher than the influences of both superiors and peers with a means of 3.81 and 3.83 respectively. These results indicate that the PSHS science teachers value the feedback they get from their students. The strong influence of students have also been reported in previous studies (Blanchard, Southerland & Granger, 2009; Gengarelly & Abrams, 2009).

As far as workplace influences are concerned, values for standard deviation are below 1.00 indicating homogeneity. This means that all PSHS science teachers regardless of location have similar positive experiences with their superiors, peers and students regarding teaching science as inquiry.

Data for PSHS science teachers' perceived capacity to enact inquiry has an overall mean of 3.78 or High. The factors contributing to the perception of capacity are self-efficacy and facilitating conditions, both of which obtained High mean ratings of 3.84 and 3.72 respectively. The highest mean score of 4.08 or High was given to the appropriateness of the class size. At PSHS, class size is maximum at 30. This high score may have cultural dimensions as other schools in the Philippines have large class sizes. On the other hand, the lowest mean score of 3.39 or Moderate was given to the appropriateness of class schedules to conduct science as inquiry. Dorier and Maa (2012) recognized that both class size and class periods dictate suitability for active learning situations. In the case of PSHS, the challenge is more on the class schedules. As earlier pointed out, time constraints are a major limitation in the conduct of inquiry. Science classes are usually allocated a one-hour class period with both students and teachers moving from their previous classes to the next. The deep discussions described by Marshall (2013) require time of engagement. It can be frustrating to cut an otherwise engaging discussion when the bell rings, signaling the end of the lesson. This lack of control over time is recognized by the science teachers as reflected in the mean score of 3.39 or Moderate.

With the exception of the item on appropriateness of class schedules for inquiry, all other indicators of perceived capacity have standard deviations less than 1.00 indicating homogeneity of responses. As practiced, some of the science subjects with more number of meetings per week are allocated two-hour periods while others have only one-hour periods. This is the probable reason for the heterogeneous responses for class schedules.

Predictors of the Enactment of Inquiry in the PSHS Science Classroom

Results of the path analysis of the hypothesized model are shown in Figure 1. The analysis revealed a strong and positive correlation between the exogenous variables. In particular, it shows that attitude is strongly correlated to workplace influence (r=0.72) and to perceived capacity (r= 0.67). This means a high rating in attitude also means a high rating in workplace influence and a high rating in perceived capacity. There is also a strong correlation between workplace influence and perceived capacity (r=0.62) so that a high score in one factor would also means a high score in the other factor. For example, if there is an increase in the influence of the superior, an expected increase in the teacher's capacity to teach science as inquiry can also be observed.

By following the original paths of TPB, it can be seen that of the three exogenous variables, only the attitude significantly predicts intention to enact inquiry (ß=0.40, $p<.05$). This denotes that the regression weight for attitude in the prediction of intention is significantly different from zero at the 0.05 level (two-tailed). In other words, when attitude goes up by 1 standard deviation, intention to enact inquiry goes up by .40 standard deviations. This further suggests that only attitude exerts a significant motivational factor to the intentions of PSHS teachers to teach science as inquiry.

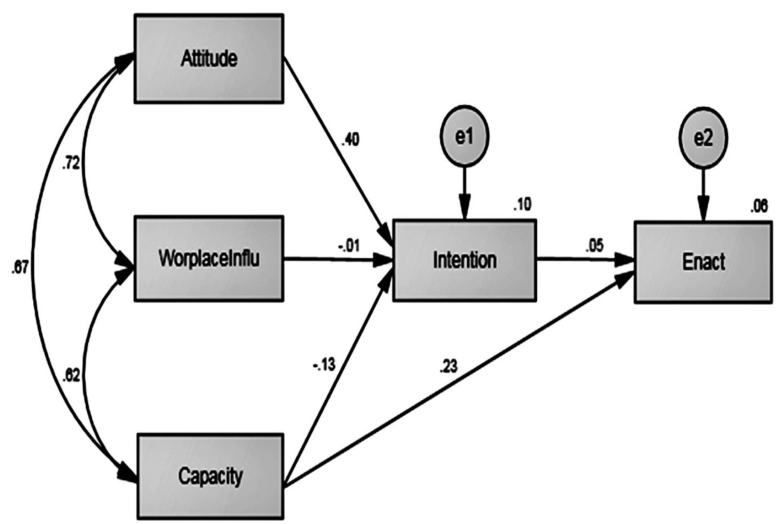

Figure 1. Path Model of the Intentions to Enact Inquiry in the PSHS Science Classroom based on the Theory of Planned Behavior.

On the other hand, perceived capacity (ß= .23, $p<.05$) appears to directly influence enactment of inquiry in the classroom. This means that for every unit increase in the perceive capacity of teachers, there is a corresponding increase in the enactment of inquiry by 0.23. This implies that perceived capacity contributes to the enactment of inquiry in PSHS.

The result of the path analysis also showed that the squared multiple correlations were equal to 0.06. This indicates that only 6% of the variation in the enactment of inquiry can be explained by the intentions of the teachers. Moreover, attitude, perceived capacity, and workplace influence only explained 10 percent of the variance of the intention to enact inquiry.

Meanwhile, Table 1 shows the results for goodness of fit tests. The fit indices were 0.346 for CMIN/DF, 0.996 for Normed Fit Index (NFI), 1.04 for Tucker-Lewis Index (TLI), 1.00 for Comparative Fit Index (CFI), 0.997 for Goodness of Fit Index (GFI), and 0.000 Root Mean Square Error of Approximation (RMSEA). These show that all the fit indices have been met and that the model fits the data.

Table 1. Goodness of fit measures of the Hypothesized Model

Index	Criterion	Model Fit Value
CMIN/DF	< 3.00	0.346
NFI	> .95	0.996
TLI	> .95	1.04
CFI	> .95	1.00
GFI	> .95	0.997
RMSEA	< .08	0.000
PCLOSE	> .05	0.767

CONCLUSION

The path analysis shows that among the three exogenous variables tested, notably attitude, work place influence, and perceived capacity, only attitude significantly predicted the intentions of PSHS science teachers to enact inquiry. While intentions did not significantly predict the enactment of inquiry, perceived capacity of PSHS science teachers directly predicted the enactment of science as inquiry. In the light of these findings, the examination of curriculum may be continued with a fresh view of decongesting coverage of science subjects to enable class time to be spent not only in subject matter coverage but also in teaching science process skills. Since self-efficacy is a predictor of the enactment of inquiry in the science classroom, a professional development program is necessary to enhance the PSHS science teachers' self-efficacy in teaching science as inquiry.

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International Journal of Education Research for Higher Learning
Volume 25, No. 2, October 2019
Print ISSN 2672-2690
Online ISSN 2672-2682

Research Culture and Productivity of the Faculty in State Universities and Colleges

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ABSTRACT

The main objective of this study descriptive-correlational research was to find out the research culture and productivity of the State Universities and Colleges (SUCs). Survey questionnaire was used to gather relevant data. Results showed that the respondents recognized that conducting research was one of their primary duties. By welcoming or accommodating teacher-researchers in their classroom encouraged others conduct research and motivate finish their graduate studies. Respondents felt fulfilled when something of value came out their scientific investigation and ake pride when their research was in line with the achievement of the national socio-economic goals. Their enthusiasm in gathering data, reading research outputs, and surfing in the internet motivated them to do research for their promotions. In terms of research incentives, there was an institutional funding for research; SUCs provided seminars and workshops. On research organization, SUs had research center and it was well organized; in-house review and evaluation of all the researches were done annually. However, presentation of research outputs in international fora was rarely supported. The institution stipulated the average teaching load of the faculty, there were available research mentors; research was the primary mission of the school; SUCs had research advisory boards; had an Institutional Research Board; received training grants; issued research participation; and funded faculty research. The findings showed that the faculty were productive in research; however, those were not publish. Most of the faculty used descriptive and experimental researches dealt with issues on social sciences and agriculture which were utilized for community extension and instruction.

KEYWORDS: Research culture, productivity, faculty, State Universities and Colleges