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IDENTIFYING PERCEIVED PROFESSIONAL DEVELOPMENT NEEDS OF TEACHERS: PROGRAM MANAGEMENT NEEDS OF SCIENCE TEACHERS IN KALINGA PROVINCE

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Abstract: *This study was conducted to determine the importance and competencies of the Kalinga national science teachers both in the secondary and the only government tertiary institution in the province of Kalinga, Philippines, as they relate to specific competencies in their field of specializations and to determine their professional development needs to be more competent in their chosen careers for both beginning and veteran science teachers.*

From the demographic characteristics of the respondents, females outnumbered the males in the teaching of science subjects. Marital status likewise for women did not hamper their teaching career for their families served as their inspiration and source of added information especially to current science issues.

The science teachers of Kalinga, Philippines perceived the importance of the different areas of science program management especially in the use of multimedia equipment in classroom teaching. This is followed on the teaching of skills and concepts in animal care or veterinary technology. Coupled to this, they perceived the importance of integrating advance science subjects with selected topics on agriculture. Equally, they admitted that they were somewhat competent in teaching the different areas of program management in science due to lack of training. Corollary to this, they admitted that the curriculum should be reviewed to include technology and agricultural subjects so that they can compete to the world arena of competition on science; hence, students will not be left behind to the call of the world on technology.

Thus, science teachers in Kalinga, Philippines both in the National Secondary School and the Kalinga State University (KSU),Philippines being the only government tertiary school in the province, perceived the need to develop the science program of the province.

Keywords: *Perceive, competence, program management, curriculum, technology, in-service training, skills, Kalinga-Apaya State College*

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INTRODUCTION

Science today seems caught in a cross-fire between two opposing world views. On the one hand, science is a major tool of the ideology currently driving the world economy, namely that of the free market system, continual growth and the pursuit of personal wealth. Science is increasingly being called on to produce knowledge and technology that promote environmentally sustainable, people-oriented development and long-term management of resources.

Career and Technical Education (CTE) teachers must stay current with the best professional practices and content area industry needs. Wash, Lovedahl and Paige (2000) argued that for beneficial change to occur in the classroom, "…teachers need access to information concerning current practices and trends" (p. 45). According to Boser and Daugherty (1994), advancing the educational profession forward requires providing teachers with "…updated information on curriculum, methodology, and technology to allow them to make philosophical and programmatic changes that augment technology education" (p. 4). Greenan, Mustapha and Ncube (1998) identified factors that motivate vocational teachers to improve their programs as – "…caring for students, concern for professional growth, and a desire to keep programs current with changing technologies" (p. 11). Joerger (2002) likewise emphasized the need for appropriate and timely pre-service and in-service activities for CTE teachers to ensure that they are properly equipped to contend with changing conditions in CTE. Lambeth, Elliot and Joerger (2008) identified professional development of teachers as part of the national CTE research agenda. While researchers can agree that appropriate pre-service and in-service training must be provided to teachers, it is much more difficult to identify the training that is most appropriate and most needed. This study sought to identify technical science teachers' perceived professional development needs both in the secondary and tertiary level as they pertain to program management.

CONCEPTUAL FRAMEWORK

As the nature of the global economy changes, science teachers face the challenge of providing learning experiences that prepare their students to enter the work force or to pursue additional educational opportunities. Aligned with industry, curriculum areas for technical science include information systems technology, media technologies, and current trends in science teaching. In order to prepare students for the needs of industry, science

teachers must continually work to stay in the forefront of good teaching practices in regard to technology. They must also have the skills and knowledge necessary to manage their programs. To meet this demand, these teachers need annual in-service training opportunities from both educational institutions and industry. It is through in-service training that skilled and technical science teachers expand their knowledge and improve their pedagogical and program management skills. But the present conditions of the teachers in the public schools only very few can afford this, unless government intervenes and provide upgrading activities for free (Durban & Catalan, 2012).

The professional development of teachers is an important aspect of the national CTE research agenda (Lambeth, Elliot and Joerger (2008). One proven method of identifying CTE pre-service and in-service needs utilizes a descriptive survey based on the Borich Needs Assessment Model (Dobbins & Camp. 2000; Garton & Chung, 1996; Joerger, 2002; Layfield & Dobbins, 2002; Ricketts, Duncun & Peake, 2006). Most researchers use a modified version of the Borich model to evaluate the "perceived level of importance" and "perceived level of competence" of teachers pertaining to professional competencies identified by research and related to the issues of their respective states. In 1997, Garton and Chung used a modified version of the Borich Needs Assessment Model and a quadrant analysis to survey the in-service needs of beginning agriculture teachers.

Previous professional development needs assessment research has been conducted primarily on beginning teachers and in agricultural education (Duncan, Ricketts, Peake & Uessler, 2006; Edwards & Briers, 1999; Joerger, 2002; layfireld & Dobbins, 2002; Mundt & Connors, 1999).

Most beginning science teachers struggle with developing effective lesson plans (Gusey & Roehrig, 2009). They added that in order to create lesson plans that meet all students' needs, teachers need to have a deep understanding about student learning and strategies that help students construct knowledge and improve skills and abilities.

Creating classroom management and organization is one of the biggest challenges for beginning science teachers (Roehrig & Luft, 2004). Coupled to this, Mundt and Connors (1999) found out that classroom management/student discipline, time management, and managing the activities of the FFA chapter for beginning agricultural teachers identified as

the most pressing challenges. These challenges become more complicated to science teachers when technology was integrated into teaching sciences.

Several agricultural and general science education studies have sought to determine the in-service needs of experienced as well as beginning teachers. Layfield and Dobbins (2002) identified using computers in classroom teaching; preparing FFA degree applications; preparing FFA proficiency award applications; using multimedia equipment in teaching; and teaching recordkeeping skills as the most important in-service needs. They also identified the most important in-service needs of beginning agricultural education teachers to be utilizing a local advisory committee. Duncan, Ricketts, Peake & Uessler, (2006) identified the program management in-service needs of agricultural education teachers as the need for assistance with advising students who have an interest in post-secondary education, preparing various FFA applications, and developing an effective public relations program. Health-Camp and Camp (1990) identified three areas of difficulty for beginning teachers: system-related problems such as inadequate orientation, equipment, and supplies; student-related problems such as lack of motivation and undesirable behaviour; and personal struggles with self-confidence, time management, and organizational skills. Lu and Miller (2002) compared instructional technology in-service needs of teachers from Ohio with their counterparts in Taiwan whose highest rated needs were protecting computers from viruses and effectively using desktop video conferencing and tele-teaching technologies for distance learning (Lu and Miller, 2002).

The Department of Education issued an order (2012) on the assessment of learning outcomes under the K to 12 Basic Education Curriculum (BEC). The learning outcomes are defined by level: knowledge; process or skill; understanding; and products and performances. The different levels of assessment according to this Order are defined as follows:

1. Knowledge – the substantive content of the curriculum, the facts and information that the student acquires.
2. Process – skills or cognitive operations that the student performs on facts and information for the purpose of constructing meanings or understandings.

3. Understandings – enduring big ideas, principles and generalizations inherent to the discipline, which may be assessed using facets of understanding or other indicators of understanding which may be specific to the discipline.
4. Products/Performances – real-life application of understanding as evidenced by the student's performance of authentic tasks.

The different levels mentioned above shall be the outcomes reflected in the class record and shall be given corresponding percentage weights as follows:

Level of Assessment	Percentage Weight
Knowledge	15%
Process or Skills	25%
Understanding(s)	30%
Products/Performances	30%
Total	100%

OBJECTIVES

The purpose of this study is to determine science teachers' perceived levels of importance and competence as they relate to specific competencies, both for beginning and veteran teachers, and use that information to determine the perceived pre-service and in-service needs of this population. More specifically, the following objectives guide in the conduct of this study:

1. Determine the demographic characteristics and educational background of technical and General science teachers of the province of Kalinga SY 2014-2015;
2. Describe how the technical and General science teachers perceive the importance of the specific areas of program management on science;
3. Describe on how the technical and General science teachers perceived competence in the different specific areas of program management; and
4. Determine and perceive the professional development needs of the respondents in the specific areas of program management.

METHODOLOGY

A descriptive research design with a survey method was used. Data were collected from technical and general science teachers employed in the province of Kalinga which described their perceived level of importance and competence across a variety of program management tasks and duties. Technical and general sciences encompass the following

content areas: Biological science teachers, Chemistry teachers and other science related curriculum.

Survey instrument was developed and adapted from previous research on agricultural teachers by Duncan, Ricketts, Peake & Uessler, (2006). The Joerger (2002) instrument was modelled after Garton and Chung's (1996) instrument which was based on the Borich Needs Assessment Model (Borich, 1980). This model utilized survey methodology of which respondents were provided with data that could be weighted and ranked in order of priority (Journal of Agricultural Education, 1997). Borich (1980) likewise stated that "... the needs assessment model is essentially a self-evaluative procedure which relies on teachers' judgments about their own performances. The assumption underlying the needs model is that the performer can best judge his or her own performance and, when explicitly asked to do so, can make an objective judgment" (p. 42).

A panel of experts, consisting of faculty from KASC and nearby schools were requested to evaluate the instrument for its content and construction validity. The reliability of the instrument was accessed through an analysis after all the data were collected.

The population for this study were the technical and general science teachers employed in Kalinga for SY 2014-2015. Said respondents were selected as to their fields of specialization since only technical and science teachers were the primary respondents of this study. Questionnaires were distributed to the different high school teachers through mail and by going to the school and distributed the same to the teachers. Since the researcher is an employee of the University per se, she was the one who administered the distribution of questionnaires to her colleagues. Personal interviews were likewise done while waiting for the questionnaires to be answered. Questionnaires that were sent through mails and through hand mails by the students from the Kalinga State University were retrieved by sending them to the researcher through mails and through hand carry respectively.

Collected data were analyzed using the Statistical Package for the Social Sciences (SPSS) software.

At least 89 respondents completed the instrument from the 128 population of this study resulting in a response to 69.5%.

RESULTS AND DISCUSSION

The first section of the instrument focused on the demographic characteristics of respondents in regard to the following variables: gender, age, civil status, highest degree earned and number of years in the service. Section two asked the respondents on the perceived importance of specific areas of program management. Section three asked the respondents on the different competencies in the specific areas of program management and section four asked the respondents to determine and perceive their professional development needs in the specific area of program management.

Table 1: Demographic characteristics and educational background of technical and general science teachers (N=89)

Demographic Characteristics	Number of Respondents	Percent
a. Gender		
male	29	32.6
female	60	67.4
b. Age		
less than 25 (10)		
• Male	4	4.49
• Female	6	6.74
23-34 (26)		
• Male	8	8.98
• Female	18	20.22
35-44 (31)		
• Male	8	8.98
• Female	23	25.84
45-54 (14)		
• Male	4	4.49
• Female	10	11.23
55-65 (8)		
• Male	5	5.61
• Female	3	3.37
c. Civil Status		
single (27)		
• Male	11	12.35
• Female	16	17.97
Married (59)		
• Male	17	19.10
• Female	42	47.19
Widow (2)		
• Male	1	1.12
• Female	1	1.12

Widower (1) • Male • Female	 1	 0 1.12
d. Degree earned Bachelor's Degree (46) • Male • Female MA (34) • Male • Female Ph. D. (9) • Male • Female	 16 30 9 25 4 5	 17.97 33.70 10.11 28.08 4.49 5.61
e. Number of years in service 1-5 years (29) • Male • Female 5-10 years (15) • Male • Female 11-15 years (19) • Male • Female 16-20 years (11) • Male • Female 21-25 years (7) • Male • Female 26 years & above (8) • Male • Female	 8 21 7 8 6 13 3 8 2 5 3 5	 8.98 23.59 7.86 8.98 6.74 14.60 3.37 8.98 2.24 5.61 3.37 5.61

a. Gender

The work force in teaching science was dominated by women teachers as indicated in Table 1 where female teachers were at least 67.4 percent against to 32.6 percent for male teachers This was supported by CHED Chairperson Patricia Licuanan (PDI, Thursday, May 31, 2012) when she said, "more women are enrolled in education courses and there are more female teachers". Coupled from the study of Reyes (2000), it is a general observation that there are more female than male teachers in Philippine schools at any curriculum level. Likewise from the study of the Education in Iran (Wikipedia), it says that Iranian women

have fair access to higher education as seen by a significant increase in female enrolment and graduation rates as women university students now outnumber males, thus Iranian women emerge to more prominent positions in the labor force, and the presence and confidence of professional women in the public sphere.

b. Age

As to the age of the respondents, it revealed that ages 35-44 years of age comprise the highest number of teachers and 8.98% also belong to age of nearly retiring teachers.

c. Civil Status

Majority of the science teachers were married which comprised of 66.3%. This indicates that having a family is not a hindrance, but perhaps, a facilitating factor to success in teaching (Reyes, 2000). An actual interview to the respondents was revealed that both of their spouses and children served as one of the factors that contributed to the accomplishment of their careers for they also shared their ideas and knowledge about science of which the respondents in turn shared the added information to their students.

d. Degree Earned

As to the degree earned, majority of the respondents finished their Bachelors Degree. Most of them were BSEd and BEEd with specialization in General Science and Math. Others were graduates of BS Biology, Chemistry, Criminology, Bachelor of Science in Nursing (BSN), Bachelor of Science in Agriculture (BSA) and Bachelor of Science in Agricultural Engineering (BSAEng). It is a significant finding that they took units in education which qualified them to take the Licensure Examination for Teachers (LET) Board exam. In an interview conducted, most of the science teacher respondents were enrolled in the graduate studies for they believed that to have an advanced education, their knowledge will be broaden especially on current issues and their field of specialization will be updated. It was noted likewise that apart from the knowledge they gained from advance education, they also wanted promotion from gaining advance studies. A prestige which everybody desires to be. Corollary to this, the completion of graduate studies can booster teacher's self confidence (Reyes, 2000). In some cases, this may also serve to energize a teacher who lost the zest for teaching.

The nine science teachers (10.11%) who earned a doctorate degree still continue their zest in teaching. They engage themselves in doing relevant researches and extension in

consonance to the CHED Activities, Projects and Programs on Relevant and Responsive Research, Development and Extension (RDE).

e. Number of Years in Service

On the number of years of service, nearly 33% of the teachers reported having less than five years of teaching experience. This shows that most of the science teachers in this study were still young in the service. It is a significant finding that the new teachers showed with much gusto and dedication in teaching science. This is shown by them through the advice of the seasoned teachers with 21 and above years of dedicated service.

Table 2. Importance of Specific Areas of Program Management as Perceived by the Science Teachers of Kalinga (N=89)

Areas	Weighted Mean	Rank
1. Teaching about science relationships with the environment.	3.94	4
2. Using multimedia equipment in classroom teaching (computers, LCD, etc.)	4.20	1
3. Integrating advanced science subjects (Agriculture, Fishery, etc.) with selected topics on agriculture.	4.15	3
4. Teaching skills and concept in landscape design and its maintenance.	3.61	8
5. Teaching skills and concepts in soil management.	3.58	9
6. Teaching skills and concepts in small animal care/veterinary technology.	4.17	2
7. Teaching agribusiness skills and concepts.	3.83	6
8. Teaching skills and concepts in electricity and welding.	2.38	11
9. Teaching plant and animal biotechnology skills and concepts.	3.89	5
10. Teaching skills and concepts in food products processing, operations and management.	3.78	7
11. Teaching skills and concepts in aquaculture.	3.11	10
Description: Important	**3.69**	

Science teachers were asked to rate eleven statements using the following scale: Not Important (NI), Of Little Importance (OLI), Somewhat Important (SI), Important (I) and Very Important (VI). As reported in this table, Kalinga National Science Teachers both in the Secondary school and in the KSU view all competencies to be both “very important” and “important”. The top five areas were perceived to be of important to them include using

multimedia equipment in classroom teaching (computers, LCD, etc.), teaching skills & concepts in small animal care/veterinary technology, integrating current advances in science (Agriculture, Fishery, etc.), teaching about science relationship with the environment, and teaching plant & animal biotechnology skills & concept.

Even the other areas seemed to be important to them being science teachers. It is to be noted that science teaching is a multifarious task that demands for the effective promotion of scientific literacy (Cabansag, 2013) and to acquire this literacy, Cabansag added, Science teachers must be professionally trained to get them well prepared in their subject areas to affect desired science teaching. Corollary to this, Bartomalaque from the University of San Carlos Cebu City added that Science is frequently perceived to be of great importance because of its link to technology and industry which, from a national perspective, may be areas with high priority for development.

The availability of modern instructional technology to all schools is a national concern; hence, the utilization of multimedia equipment in classroom teaching such as computers, LCD, etc. are very important as perceived by the science teachers. This will help create a learning-centered environment that facilitates student interaction with relevant information through application. According to them, the presence of computer technology could help improve students' learning, therefore, teacher in-service education programs should be planned and conducted for agricultural education teachers with a focus on use of instructional technology tools, including computer technology, to enhance learning in the classroom and laboratory. Integrating technology into the classroom instruction not only to science subjects but to all subjects since "*the world is becoming more technology savvy*" (Guzey & Roehrig : *Cassie's profile*, 2009).

The aforementioned statements are supported by Layfield and Scalon (1999) who recommended several strategies for technology implementation in agricultural education. One strategy involved is to provide in-service training workshops in relation to various technologies to provide teachers with skills to improve student learning. For a teacher to grow professionally and become better as a teacher of science, a special, continuous effort is required (Showalter, 1984, p. 21).

The role of the teacher has been shown to be very important for integrating agriculture into the curriculum (Terry, Herring & Larke, 1992). Respondents perceived the importance of

integrating current advances in science (e.g. Agriculture) technology into the curriculum. Science teachers believe that with the integration of agriculture subjects in the curriculum, students will have a positive outlook for agriculture no matter what career they want to pursue; hence, awareness to agricultural knowledge is important. They likewise believed that agriculture is a broad science-based, environmentally conscious industry with a positive future and many career opportunities, including areas related to horticulture, natural resources, forestry and food processing.

However, the result revealed that the area on the teaching skills and concepts in electricity and welding got the lowest mean. The respondents answered that this is a very skilled in nature and that they are not much adept to such skill.

Table 3. The Competence in Specific Areas of Program Management as Perceived by the Science Teachers of Kalinga (N=89)

Areas	Weighted Mean	Rank
1. Teaching about science relationships with the environment.	3.25	4
2. Using multimedia equipment in teaching science.	3.48	1
3. Teaching skills and concept in landscape design and its maintenance.	3.30	3
4. Teaching skills and concepts in soil management.	2.19	6
5. Teaching skills and concepts in small animal care/veterinary technology.	1.62	8
6. Teaching agribusiness skills and concepts.	1.96	7
7. Teaching skills and concepts in electricity and welding.	1.26	9
8. Teaching plant and animal biotechnology skills and concepts.	3.46	2
9. Teaching skills and concepts in food products processing, operations and management.	3.12	5
Description: Somewhat Competent	**2.63**	

Science teachers were asked to rate the same 11 statements using the following scale: Not Competent (1.0-1.50); Less Competent (M= 1.51-2.50); Somewhat Competent M= 2.51-3.50); Competent (M= 3.51-4.50); and Very Competent (M= 4.51-5.0). As reported in this table, it shows that the competence in specific areas of program management as perceived by the respondents is 2.63 which are described as somewhat competent. Among the indicators presented, the highest is 3.48 which is somewhat competent and the lowest is

1.26 and described as not competent. The decision being less competent as perceived by the respondents is because the area is very-skilled in nature. Just like in Table 2 where the same area got the lowest mean because this is more on the skill to perform and very procedural in nature.

The result of this study showed that science teachers were not well enough trained although some had undergone trainings but they felt their trainings were not enough; hence majority of those who were interviewed have the same clamour for more trainings and seminars to this effect to become more competent in their own fields of specializations. Lack of proper training of science teachers could be one of the factors of low performance in science of the Filipino student in the local, national including in the world arena of competition.

Table 4: Perceived Professional Development Needs Of Technical And General Science Teachers In The Specific Area Of Program Management (N=89)

Professional development needs	Percent	RANK
1. Integrating current advances in science technology into the curriculum.	100%	1
2. Teaching about science relationships with the environment.	100%	1
3. Teaching problem-solving & decision-making skills.	100%	1
4. Using multimedia equipment in teaching science.	100%	1
5. Teaching integrated science with selected topics on agriculture.	83.14%	2
6. Teaching proper safety practices and attitudes in the classroom and in the laboratory rooms.	0	
7. Teaching agribusiness skills and concepts.	0	
8. Teaching skills and concepts in electricity and welding.	0	
9. Teaching students to think critically and creatively.		44.94%

The professional development needs of technical and general science teachers are represented by the mean weighted discrepancy score. The five highest ranked need areas were integrating current advances in science technology into the curriculum, teaching about science relationship with the environment, teaching problem-solving & decision-making skills, using multimedia equipment in teaching science and; teaching integrated science with selected topics on agriculture.

Many educational technology tools are now available at the market. However, integrating technology into instruction is still challenging for most teachers. When educational technology tools are used appropriately and effectively in science classrooms, students actively engage in their knowledge construction and improve their thinking and problem solving skills (Novak & Krajcik, 2006, p.76).

The findings of this study suggest that teachers should reflect on their classroom practices in order to incorporate technology and inquiry into their teaching more effectively. Conducting action research projects that will make teachers analyze their experiences and reflect on their practices which will allow them to see the effectiveness of technology on students' learning and to reflect on and modify their practices. Thus, professional development programs focusing on technology integration should provide teachers' opportunities to reflect on their teaching and share their experiences both with professional development leaders and peers (Guzey & Roehrig, 2009).

HYPOTHESIS

The level of importance and competence as perceived by the technical and general science teachers in identifying their professional development needs had a great influence in identifying their program management needs as science teachers.

CONCLUSIONS

Based from the findings, the following conclusions were drawn:

1. From the different variables on the demographic characteristics of the respondents, female teachers outnumbered males in the teaching of science subjects.
2. Science teachers perceived the different areas of program management as important in their chosen field of specialization.
3. Technical and general science teachers revealed that they were somewhat competent to the different science areas of program management.
4. Majority of the science respondent teachers revealed that almost all of the science program areas were perceived as their professional development needs in order for them to be more competent in their chosen field of specialization.

RECOMMENDATIONS

On the bases of the findings and conclusions drawn, the following recommendations are presented:

1. Kalinga Science administrators and school heads need to review their curriculum thoroughly and may revise it to accommodate the areas where their curriculum is failing to equip science teachers with the skills they need to be successful.
2. Since we are moving forward to education assurance quality in the next millennium, higher governing authorities in the DepEd and in the CHED may examine their pre-service and in-service trainings to determine the needs of their teachers according to their fields of specializations.
3. Other schools may consider analyzing the data of this research to identify national trends in science education subjects. Identifying these trends may prove useful in determining the direction of science education is heading and may help officials in science education provide better pre service and in-service trainings.
4. Further research needs to be conducted on comparison studies between beginning and experienced science teachers that may allow better teaching education and professional development programs that may focus on their program management needs to science program in the province.

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