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Pre-service Science Teachers' Emphases and Views about Science Education Curriculum

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Understanding the conformity between curricular beliefs and implemented curricular goals are considered one alternative way to assess pre-service teachers' preparedness for in-service teaching. In this research, the curriculum emphases of the pre-service science teachers and views about science education curriculum were evaluated. 213 pre-service science teachers from seven Teachers Education Institutions (TEI) have participated in the study. The research design "Concurrent Triangulation Research Design" was utilized. Knowledge development in science was given the most emphasis by the pre-service science teachers, while fundamental of science was given the least emphasis. Among the inter-rater responses to the open-ended question, the results also revealed that knowledge development in science was emphasized by the highest number of pre-service teachers, while fundamental of science was emphasized by the least number of pre-service teachers. The high emphasis given by the pre-service teachers on the importance of knowledge development in science as compared to fundamental science shows that the curricular beliefs of the pre-service teachers conformed to one of the curricular goals of science education, which is to develop students' scientific knowledge. One challenge emerged during the analysis is how the curricular beliefs, which are known to be progressive in learning, transpire to actual teaching practices.

Keywords: science education curriculum, curriculum emphases, curricular beliefs, pre-service science teachers, curriculum

INTRODUCTION

Pre-service teacher's beliefs about teaching influence their pedagogical practices and approaches in teaching just like how belief influence individual attitude and behaviours (Peker & Ulu, 2018). It has been suggested that evaluating the curricular beliefs of the pre-service teachers was essential in improving their pedagogical practices (Buehl & Five, 2016; Tanrıverdi & Apak, 2014). Studies showed that there were three common emphases in science teaching: theoretical concepts, application of scientific knowledge, and development of scientific processes (Van Berkel, 2005; van Driel, Bulte, & Verloop, 2005, 2008). The first emphasis highlights the importance of theories in learning science and was emphasized seriously to prepare learners in their future course

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works. The main objective of the said emphasis is to familiarize learners with the theories in science and consider them as absolute and certain. The second emphasis highlights the importance of science and technology to society. Thus, application of scientific knowledge is the main features of the said emphasis. The historical and philosophical aspect of learning science is the hallmark of the third emphasis. This emphasis aims to understand the historical development of science and technology and how great scientists used scientific processes in finding answer to their problem. Thus, developing scientific processes is the main concern in the said emphasis. In the study of Van Berkel (2005), the situation of chemistry education, which he called as 'Dominant School Chemistry', was described as highly concentrated on the theoretical contents, less emphasis on the development of scientific processes, and less emphasis on the application of scientific knowledge. This condition was described by Van Berkel (2005) as 'Default Curriculum', in which the focus of science learning is concentrated on the content of science. Thus, not considering the theoretical concepts as a tool for decision making and processes design make the said emphasis as default curriculum. It was also the reason why escaping from the usual practice of science teaching is very difficult to achieve (Hansson et al. 2020). Since beliefs can influence individual attitudes and behaviour, Pre-service teachers' beliefs about teaching and learning might also impact ways on how they create lessons and activities in teaching. It has been observed that the failure of new curriculum reform was associated to contrasting beliefs of the teachers in teaching (van Berkel, 2005; van Driel et al., 2005).

Pre-service teacher training was considered as one important aspect of teacher education curriculum program in the Philippines, as it trains teachers to become competent teachers in the future (Ulla, 2016). For a student in a teaching course program to complete a degree in teaching, practice teaching is a requirement that a student need to complete and finish. After completing the course works in college and university, pre-service teachers can enrol for practice teaching course which is usually performed outside the campus. Practice teaching in the country is guided with the guidelines and policies mandated by the Department of Education (DepEd), to make it more systematic and formal. The government agencies in the Philippines responsible in designing teacher education curriculum are the Commission on Higher Education (CHED) and the Department of Education (DepEd). Wherein, the agency responsible in setting, monitoring, and evaluating teacher education curriculum program is the CHED while the agency responsible in creating guidelines and policies for teaching and practice teaching courses programs is the DepEd. Practice teaching is considered as the final stage of teaching education program in the Philippines before students in teaching program can complete degrees in teaching. Since teaching training programs enhanced pre-service teachers' knowledge and skills in teaching, the authorities inclined to inculcate priority in improving pre-service teachers' training program in the Philippines (Ganal, Andaya, & Guiab, 2015). In the field of science teaching, improving pre-service teachers' awareness on the importance of STEM education in the development of scientific literacy is part of the goal of the said teacher training program. Wherein, the integration of science, technology, engineering, and mathematics in STEM education is an innovative approach used in developing scientific literacy. In addition, enhancing the knowledge of the pre-service science teachers on the use of problem-based learning in teaching contributes to the development of pedagogical competencies of the pre-service teachers which include linking scientific knowledge to everyday life, creating inquiry processes useful in solving problem, associating existing knowledge to new knowledge (Sugiharto, Corebima, Susilo, & Ibrohim, 2019). Studies showed that most of the pre-service teachers' views regarding STEM education were classified as highly unsophisticated or naïve (Eroglu & Bektas, 2016; Kızılay, 2016). In an interview made to 25 pre-service teachers, finding showed that 'engineering can lead to the development of new technologies, and can makes life easier'. The interactions between science and technology have been also mentioned, it was stated that science can results to new technologies while technologies can result to new scientific discoveries (Kızılay, 2016). At present, the current science education curriculum in the country is inclined toward the development of the scientific literacy and scientific knowledge. Part of the curriculum intend to engage learners in activities that involve decision making, application, and inquiry processes (Department of Education, 2016). Science in everyday life of learners is one of the emphases of the current science education curriculum. Whereas science, technology, and society are integrated during science teaching. On the other hand, the current science education curriculum aimed to train learners with knowledge and skills needed to excel in the outside world (SEI-DOST & UP NISMED, 2011). There are three components of science learning embedded in the current science education curriculum. The first component aimed to develop understanding and application in science, the second component aimed to develop learners' skill in science inquiry, while the third component intended to develop learners' constructive scientific attitude and values (Department of Education, 2016). Wherein, the approaches commonly considered in facilitating the said components are the inquiry-based approach, problem-based learning, context-based learning, multidisciplinary or interdisciplinary approach. These components are inclined to the current goal of science education curriculum, which is to develop scientific processes and applications of scientific knowledge (Department of Education, 2016). Physics teachers' curriculum emphases had been linked to their views about teaching. Wherein, those who have expressed high emphasis on the theoretical aspect of physics learning considered mathematics as the main concern in learning physics while those who have expressed high emphasis on the social relevance of physics learning considered both mathematics and practical issues as the main concerns in learning physics (Hansson, Hansson, Juter, & Redfors, 2020). Furthermore, science teaching become 'subject-centered' when the emphasis is more on the deeper understanding of the subject. On the other hand, science teaching could be 'social-centered'. Wherein, the inclusion on the importance role of science to the society makes science teaching 'social-centered' (Robert & Orpwood, 1982; Rubba, 1989). Learners in this learning condition are engaged in decision making activities and train to apply knowledge in various perspective. Designing and doing scientific processes is also part of science learning. Science teaching become 'student-centered' when learners are engaged in activities that develop their skills in designing scientific processes needed for scientific investigation (Li et al., 2019). Pre-service teachers' views on teaching allows us to determine the curriculum emphases they valued. In this research, the curriculum emphases of the pre-service science teachers were evaluated. Their insights about the goal of the current science education curriculum were analysed. Specifically, this research was designed to answer the following questions:

1. Which curriculum emphasis was given the:
    a. most important by the pre-service science teachers.
    b. least important by the pre-service science teachers.

2. Based on the views of the pre-service science teachers about the science education curriculum, which curriculum emphasis was emphasized by the
    a. most number of pre-service science teachers.
    b. least number of pre-service science teachers.

Science Education Curriculum Emphases

To indicate the reasons why students should learn science and what science teachers should emphasize in science, Robert (1982) introduced seven curriculum emphases, which he defined as a set of coherent messages of science education to learners. Two of the seven curriculum emphases, 'Correct Explanation' and 'Solid Foundation', are responsible why science education failed to escape from dominant science education (Van Berkel, 2005). In the book published by Van Berkel (2005), he presented the reasons why chemistry teachers tend to experience difficulties in stepping away from dominant science education. It was also articulated that science teaching is concentrated too much on the theoretical content and less on the development of skills of students in science. For example, in the emphasis 'Correct Explanation', it is believed that understanding the exact meaning of the nature is the goal of science learning (Robert, 1982; van Driel et al., 2005). On the other hand, the emphasis 'Solid Foundation' stress that science is a process of cumulative knowledge and finding the most capable scientist is the ultimate goal of science learning (Robert, 1982). These curriculum emphases were reduced into three curriculum emphases (Robert, 1982; van Driel et al., 2005, 2008). The emphases 'Solid Foundation' and 'Correct Explanation' were combined and named as 'Fundamental Science' (FS). The emphases 'Science/ Technology/ Decision' and 'Everyday Explanation' were combined and named as 'Science, Technology and Society' (STS), while the emphases 'Structure of Science', 'Scientific Skills Development' and 'Self as Explainer' were also combined and named as 'Knowledge Development in Science' (KDS). The emphasis FS was regarded as 'dominant emphasis' or 'default curriculum'. Distinctions suggest that STS is context-oriented learning, while KDS is skill-oriented learning (Hansson et al., 2020; Robert, 1982; van Driel, 2005, 2008).

Theoretical Framework

The theoretical framework used in the study was based on the curriculum emphases created by van Driel et al. (2005). These curriculum emphases, which is in the domain of chemistry education, were derived from the seven curriculum emphases contextually articulated by Robert (1982). These emphases were defined as a set of messages to students about science which go beyond the learning of facts, principles, laws, and theories; and provide an answer to the question "Why I am learning science?" The said framework was based on the assumption that science learning always corresponds to a certain purpose or intention. The first curriculum emphasis is 'Fundamental Chemistry' which was renamed as 'Fundamental Science' in this research. Learners in this science teaching emphasis were often presented with theories through books and instructions. Then after reading the theory from the book or hearing the lecture from the teacher, students will complete a certain task using the said theory. Students, in this emphasis, often lead into an intuition that the theory is correct and true and need to be learned for them to proceed with the higher-level study. The second curriculum emphasis is 'Chemistry, Technology, and Society', which has been renamed as 'Science, Technology, and Society' in this paper. The emphasis could involve discussions about the amount of preservative in foods and the safest maximum amount of food preservatives that can be mixed with the foods. During the process, learners investigate the chemical property of the food preservatives and seek for explanations and conclusions with regards to the proper amount of food preservatives in foods. In this situation, science learning is associated to social activities. Learner in this emphasis realize the existence of social and personal questions, which require scientific knowledge to provide answers to the questions. The third curriculum emphasis 'Knowledge Development in Chemistry', which in the study was renamed as 'Knowledge Development in Science'. In most cases, learners in the said emphasis are engaged in designing and doing inquiry processes. Learners perform experiment and calculations to discover the same law of gravitation Galileo himself discovered before.

METHOD

This research aimed to evaluate the curriculum emphases of the pre-service science teacher as well as their views about the goal of the current science education curriculum through the use of 'Concurrent Triangulation Research Design' (Creswell & Clark, 2017). The said deign intended to directly compare the quantitative and qualitative responses of the preservice science teachers. The research design involved two different methods (qualitative and quantitative methods) but concurrent way of collecting and analysing data for the problem.

Participants

There were 213 pre-service science teachers who participated in the research. The participants came from seven Teacher Education Institutions (TEIs). The participants are enrolled in secondary teaching program specializing either in the field of physics, chemistry, and physical science. The participants are at the final stage of their study program and currently enrolled in practice teaching to complete their teaching program. The participants are divided into three different specializations: physics, chemistry, and physical science. It was considered that at the final stage of their program, pre-service teachers have already developed and acquired beliefs about science teaching that could highlights the effectiveness of their teacher training program. Demographic shows that 89% of the participants are enrolled in public higher education institutions, while 11% are from private higher education institutions. 65% (138) of the participants are female, while 35% (75) are male (age ranged: 21-24).

Table 1
Distribution of the participants

Teacher Education Institutions (TEIs)	Specialization			Total Participants
	Physical Science	Physics	Chemistry	
TEI A	35	0	0	35
TEI B	24	0	0	24
TEI C	10	0	0	10
TEI D	13	0	0	13
TEI E	28	27	24	79
TEI F	0	22	18	40
TEI G	0	6	6	12
Total	110	55	48	213

Instrument

A 24 items Likert scale questionnaire that include 1 open-ended question was utilized to evaluate the emphases and views about science education curriculum of the pre-service science teachers. This questionnaire was derived from the emphases questionnaire made by de Putter-Smit (2012) that aimed to evaluate science teachers' curriculum emphases in science education. So that the emphases questionnaire become more comprehensible and explicit to the local participants, the original 46 items emphases questionnaire from the research work of de Putter-Smit (2012) was rephrased. To build the content validity of the instrument, three experts in a teacher education program, specifically in the field of science education, examined the rephrased emphases questionnaire. Using 'how well the curriculum emphases of the subject were measured by the items' as a basis in the review of the questionnaire as well as the readability and suitability of the items, seven items were removed, and other important minor corrections were made. The construct validity of the instrument was analysed through exploratory factor analysis using SPSS Statistics 28.0.1 program. The computed Kaiser-Meyer-Olkin (KMO) value was .743 and the computed Bartlett's value was 2749.234 (p=.0001). The exceeding value of the KMO to the recommended value (.60) and the statistically significant of the Bartlett test result indicate that the set of data was adequate for exploratory factor analysis. Based on the computed factor loading value for each item using the factor analysis, fifteen items have a factor loading value lower than .30 which were removed from the questionnaire. The conducted factor analysis has reduced the items to 24 and resulted to three factors: Fundamental Science; Science, Technology and Society; Knowledge Development in Science. The instrument was piloted to 41 pre-service science teachers and the internal consistency coefficient was computed. The computed Cronbach's alpha values, ranging from .80 to .82, are interpreted as reliable. The computed overall reliability factor which is equivalent to .81 is interpreted also as good reliability. To confirm the responses of the pre-service teachers on the Likert-scale questions, a qualitative open-ended question "In your own point of view, what must be the goal of science education curriculum?" was included in the questionnaire. Thus, the overall questionnaire contains 24-items Likert scale and one open-ended question.

Data Gathering

Before the gathering of the data, the higher education institutions that render teaching program in secondary science education were identified by the researcher. From the master list provided by the Commission on Higher Education (CHED) to the researcher, 14 Teacher Education Institutions (TEIs) were purposively selected. To facilitate the gathering of the data, a permission for the conduct of the research was sought first from the different TEIs. Among the TEIs requested to participate in the research activity, 7 have confirmed to participate in the research. After obtaining permissions, an appointment has been made to the respective college deans and department heads regarding the most convenient schedule to administer the research questionnaire. A consent letter, indicating the purpose of the study and the benefit it can provide, was given to the participants before they were asked to answer the survey questionnaire. More than that, the participants were also informed, through consent letter, that the research is voluntary and any information that will be obtained from the survey will be treated with utmost confidentiality. Data gathering was conducted last 2018 for the month of January, less than 2 months before the end of the second semester.

Data Analysis

To explore the curriculum emphases of the participants and to understand their views about the goals of the current science education curriculum, two general types of data were explored in this research: the participants' quantitative responses to Likert-scale items and the participants' qualitative responses to the open-ended question. The profile of the participants and their distribution in terms of their specializations (Table 1) were also evaluated. The responses of the participants in the CEQ were rated using the usual scoring strategy in Likert-scale data. Completely disagree was scored 1, disagree was scored 2, don't agree but don't disagree were scored 3, agree was scored 4, and completely agree was scored 5. The average score of each student in every factor and the average score of all students in each factor were computed. The overall score obtained by the participants in every factor represents their agreement to statements and served as their overall score in every factor. To confirm the students' responses to the Likert-scale questions, their views on the goals of the current science education curriculum were also evaluated using the open-ended question. To code the responses of the participants to the open-ended question, 30% (64) of the responses were randomly picked from the 213 responses of the participants to the open-ended question. The number is regarded valid to establish 'inter-rater reliability' since the procedure in the selection of responses established equal chance for all responses to be selected. Responses that give emphasis on the relevant of scientific theories were coded FS, responses that give emphasis on the scientific applications were coded STS, while responses that indicate emphasis on scientific skills development were coded KDS. Other responses that neither fall within the three classifications (FS, STS, and KDS) were coded 'other classification'. To ensure the inter-rater reliability of the results, two researchers in the field of science education coded the responses of the participants. The results revealed 90% inter-rater agreement between the two coders.

FINDINGS

The curriculum emphases of the pre-service science teachers were evaluated as well as their views about the current goals of the science education curriculum. Table 2 shows the overall computed mean value in every factor. Among the three mean values, the component 'Knowledge Development in Science' (KDS) has the highest mean value, while the component 'Fundamental Science' (FS) has the lowest mean value. The results also show that, in terms of the mean value, the component KDS exceed the component STS, while the component STS exceed the component FS.

Table 2
Curriculum emphases of the pre-service science teachers

Curriculum Emphasis	*M*	*SD*
FS	3.02	.82
STS	3.17	.75
KDS	3.21	.55

Note. FS = Fundamental Science; STS = Science, Technology, and Society; KDS = Knowledge Development in Science; *M* = mean; *SD* = standard deviation

Furthermore, the views of the pre-service teachers on the current goals of the science education curriculum were also evaluated. 30% of the total responses were randomly selected to establish inter-rater reliability. Table 3 presents the distribution of the inter-rater responses of the pre-service science teachers. Among the inter-rater responses, 5 (8%) responses have given emphasis on the importance of FS, STS, and KDS in science teaching, 8 (13%) responses have given emphasis on both FS and KDS, 7 (11%) responses have given emphasis on both FS and STS, 13 (20%) responses have given emphasis on both STS and KDS, 4 (6%) responses have given emphasis on FS, 9 (14%) responses have given emphasis on STS, 16 (25%) have given emphasis on KDS, while 2 (3%) were classified as other classification. Based on the classification to all the inter-rater responses of the pre-service teachers, the highest number of responses were classified as KDS, while the lowest were classified as FS.

Table 3
Distribution of the inter-rater responses of the pre-service

Curriculum Emphasis	Number of Responses	Percentage of Responses
FS, STS, and KDS	5	8%
FS and KDS	8	13%
FS and STS	7	11%
STS and KDS	13	20%
FS	4	6%
STS	9	14%
KDS	16	25%
Other classification	2	3%
Overall inter-rater responses	64	100%

Note. FS = Fundamental Science; STS = Science, Technology, and Society; KDS = Knowledge Development in Science

Among the 64 inter-rater responses, 5 (8%) responses have emphasized the importance of FS, STS, and KDS in science education. These are responses that have emphasized the importance of the three curriculum emphases, which include emphasis on the theoretical content, emphasis on the importance of science and technology to society, and emphasis on acquisition of knowledge and skills. In the responses of the pre-service science teachers to the question "In your own point-of-view, what must be the goal of science education curriculum?", it was stated that science education curriculum must promote understanding, critical thinking skill and problem-solving skill:

> *"For me, science education curriculum must improve the knowledge and skills of the students in the field of science and technology."*

> *"I think… should deepen the students understanding in science for them to develop scientific processes skills needed in decision making."*

> *"I think… must develop learning activities that will improve students' critical thinking skill, problem-solving skills and applications."*

> *"In my own point of view… need to intensify learners' involvement in decision making that has something to do with science, technology and society."*

Furthermore, 8 (13%) of the inter-rater responses have emphasized both the importance of FS and KDS in science teaching. These are the responses that gave emphasis on the importance of the theoretical content and social importance of science and technology to science learning. Based on the responses of the pre-service science teachers to the open-ended question, one of the participants stated that learning the importance of science and technology to the society promotes learning in science:

> *"… improve the understanding of students in science, the science curriculum should also teach the importance of science and technology to the life of the people."*

> *"… need to show to the students the important part of science and technology to their life, this is how students acquire better understanding of science."*

> *"… advance the scientific knowledge of the students so that they will become productive members of the society."*

Moving onward, 7 (11%) of the inter-rater responses have emphasized both FS and STS. These are the responses that have given emphasis on the importance of both FS and STS in science teaching. For example, in the responses of the pre-service teachers to the open-ended question, it was stated that the development of knowledge about the nature of science (scientific skills, scientific values, etc.) should be part of science learning:

> *"… guarantee that students develop the needed scientific knowledge, scientific attitudes and values needed to excel in their study."*

> *"… involve learners to inquiry-based learning, engaging learners into inquiry-based learning activity will allows leaners to gain deeper understanding in science."*

On the other hand, 13 (20%) of the responses have emphasized both STS and KDS in science teaching. These are the responses that have emphasized the importance of application and processes in science learning. In one of the responses of the pre-service teachers to the open-ended question, it was stated that science education curriculum should enhance the knowledge and skills of students:

> *"… enhance the knowledge and skills of students in science, enhancing the knowledge and skills of the students in science will help them become successful in their future."*

> *"… guarantee that students develop the necessary scientific knowledge, scientific attitudes and values they needed in their study."*

> *"… engage students in inquiry learning so that they can be able to gain deeper understanding about science."*

Furthermore, 4 (6%) of the inter-rater responses are classified as FS. These are the responses that have given emphasis on the importance of theoretical content in science teaching rather than on the importance of science and technology to society or on the development of knowledge in science. In the responses, it was stated that the science education curriculum aims to engage students in various science concepts and theories and aims to teach students all important concept and theories in science:

> *"… engage students in various concept and theories they need to study and prepare them in more advance studies in the future"*

> *"… teach to students all the important concept and theories in science they need to learn.*

Moreover, 4 (6%) of the inter-rater responses are classified as STS. These are the responses that have given emphasis on the importance of science and technology to the society as well as on the importance of application in science learning. Among the responses, it was stated that the curriculum aims to make science teaching useful and relevant to students, aims to show the importance of science and technology to society, and aims encourage students to use their knowledge in solving problems:

> *"… make science teaching more relevant and useful to students."*

> *"… show to students the importance of science and technology to their life."*

> *"… encourage students to use their knowledge in science to solve real life problems."*

Finally, 3 (5%) of the inter-rater responses are classified as KDS. These are the responses that have given emphasis on the importance of knowledge development in science. Among the responses, encouraging students to develop logical reason and valid judgment was stated. It was also stated that science education curriculum must motivate students to ask question:

> *"… encourage students to develop decisions based on their logical reasoning and judgement."*

> *"… develop learning activities that can motivate students to conduct scientific investigation."*

DISCUSSION

Evaluating the curricular beliefs of the pre-service teachers can be regarded as an effective way of evaluating the effectiveness of teacher training programs as well as their readiness to render service in actual teaching. In this research, the curriculum emphases of the pre-service science teachers were examined. Their views and insights about the goals of the current science education curriculum were also analysed. Based on the computed mean values, the component “Knowledge Development in Science” (KDS) was given the most emphasis by the pre-service science teachers, while the component “Fundamental Science” (FS) was given the least emphasis. This shows that the development of knowledge in science through learning processes was considered by the pre-service science teachers as the most important in science teaching, while classroom activities that give emphasis on the theories and contents, like memorization and following procedures, were regarded by the pre-service science teachers as the least important in science teaching. The emphasis given by the pre-service science teachers in the development of knowledge in science as compared to the other emphases is interesting since part of the goals of the current science education curriculum is to engage students in learning activities that will improves their knowledge and skills in science. These learning activities, which can be performed through various learning model (inquiry learning, process design, 5E model, etc.) match to the curricular preferences of the pre-service teachers and are essential to the development of the knowledge of students in science (Department of Education, 2016). These results are comparable to earlier studies conducted before, for example in the research conducted by Hansson et al. (2019), among physics teachers, the importance of physics and technology to society was given the highest emphasis, while the development of knowledge in physics was given the least emphasis. On the other hand, in the research conducted by van Driel et al. (2005) among chemistry teachers, theories were given the most emphasis, while the development of knowledge in chemistry was given the least emphasis. These reflect how reforms in science education curriculum improved the curricular beliefs of the pre-service science teachers and expose how teacher training program in the country has evolved from teacher-centered view of science teaching to students-centered view of science teaching. Aligned to the goals of science education curriculum, these findings can be regarded a steppingstone, since developing and improving the knowledge of students in science is one of the goals of science education curriculum in the country.

Furthermore, results revealed that both KDS and STS exceeded FS in terms of the computed mean values. This indicates that the pre-service teachers have given more emphasis on the development of knowledge and its applications as compared to theory-focus learning such as memorization and following procedures. These results suggest that the pre-service teachers more likely design learning activities that will improve students’ creativity, problem solving skill and critical thinking skill than to design learning activity that will engage students into a routinary activity like memorization and procedural works. To understand the pre-service science teachers’ views about the goal of the current science education, their written responses to open-ended question “In your own point-of-view, what must be the goal of science education curriculum” were analysed and classified. Based on the results of the analysis, the highest number of inter-rater responses is classified as KDS, while the lowest number of inter-rater responses, except for “no classification”, is classified as FS. This indicates that majority of the pre-service science teachers view that the development of scientific knowledge is important in science teaching, and few have considered that subject-matter must be the focus of science teaching. These findings agree to the quantitative responses of the pre-service science teachers in which the highest emphasis was given to KDS and the lowest emphasis was given to FS. These results could also serve as positive indication of improved perspective in science teaching since the development of the knowledge of students is one of the goals of the science education curriculum. Thus, one challenge is to make sure that the established perspective in science teaching is implemented during actual teaching.

Another is how pre-service teachers' perspectives progressive to learning can be enhanced so that science learning will become productive. It has been observed that in terms of the computed mean values, both KDS and STS exceeded FS. An implication that the pre-service teachers gave more emphasis on the relevance of science and technology to society and on the development of knowledge of students in science as compared to the content of the course. These quantitative results agree to the responses of the pre-service teachers, as there were more pre-service teachers who stated, although not directly, that the processes in science learning and applications are included in the science education curriculum objectives.

CONCLUSION

Beliefs about teaching and learning influence how classroom learning activities are design. Thus, improving the curricular beliefs of the pre-service teachers about teaching and learning could serves as one alternative technique to improve classroom learning design. Examining pre-service teachers' curricular beliefs provides a platform that assess if the curricular beliefs of the pre-service teachers are aligned to the implemented curricular objectives at present. In this study, the curriculum emphases of the pre-service science teachers and views about science education curriculum were evaluated though a questionnaire that composed of 24 items Likers scale questions and 1 open-ended question. Among the three curriculum emphases, 'Knowledge Development in Science' (KDS) was given the highest emphasis by the pre-service science teachers, while 'Fundamental Science' (FS) was given the least emphasis. Result also revealed that based on the responses of the pre-service teachers to the open-ended question, KDS was given emphasis by the highest number of pre-service teachers, while FS was given emphasis by the least number of pre-service teachers. These findings suggest that learning objectives that intend to develop students' knowledge in science was given much emphasis by the pre-service. Activities that engage learners to design and inquiry processes was given important by the pre-service teachers.

On the other hand, learning goals that intend to engage learners into procedural works and memorization was given less emphasis by the pre-service teachers. These learning goals often focused on the theoretical content of the course and less on the development of knowledge in science. The high emphasis given by the pre-service teachers on the development of knowledge in science can be regarded as a steppingstone toward progressive science learning since part of the goals of the current science education curriculum is to engage learners to activities that will enhance their problem-solving skill, decision making an creativity. Although the curricular beliefs of the pre-service teachers go with the goals of science education, part of the challenges is how these beliefs transpire into actual teaching practices. As a response, construction of reliable assessment for the teaching performance of the pre-service teachers could be the second step for this research, this is to ensure that the curricular beliefs, productive to learning, transpire into actual teaching practices.

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