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Research Article

Lesson Preparation Practices of Pre-service High School Science Teachers: Implications to Science Education

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ABSTRACT

Teacher preparation is a vital factor in the development of effective future teachers. As such, this study tried to determine the pre-service teachers' lesson preparation practices in one of the Teacher Education Institutions in the Philippines and provided descriptions of their practice teaching experiences particularly on lesson planning/preparation. Quantitative and qualitative methods of research were used wherein data were gathered through questionnaires, documentary analysis and semi-structured interviews. Results revealed that the pre-service science teachers followed the systematic method of lesson preparation with the use of detailed lesson plans. Their lesson preparation practices are good and they are already prepared to face and hurdle the task of a real classroom teacher. Despite these, there are still aspects in lesson preparation that needs to be further developed like the formulation of affective domain objectives as well as the selection of appropriate motivational and assessment techniques. To further develop the pre-service program for science education, the study recommends that Teacher Education Institutions continue to design programs and activities regarding pre-service teachers' development not only in science but also in other subject areas to enhance their lesson planning skills.

Keywords: *lesson plan, lesson preparation practices, pre-service teachers, science*

Introduction

Lesson planning and preparation is an important aspect that must be done by a teacher prior to actual teaching. The teaching and learning process becomes more systematic and organized when the lesson is carefully planned

and the teacher is prepared to execute the lesson.

A lesson plan needs to be developed by a teacher as a direction guide towards all the activities to be done in the classroom for the attainment of the desired learning competencies.

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Teaching preparation basically deals with teachers' awareness and understanding of pedagogical knowledge. Without having these, teachers could not decide what to do in order to create meaningful learning.

The dynamics of teaching is a continuous interaction of the teacher and the learner, the learners with other learners- inside and outside the classroom as well as in co-curricular and other school activities. Dynamism and professionalism in teaching includes the acceptance of roles, responsibilities and accountability of the teacher in the teaching-learning process. A professional teacher is one who has competent skills, observes high standards of the job, abides by the code of ethics and must be well prepared to face the class.

Lesson planning competencies are very useful for teachers especially pre-service teachers in developing their potentials (Coñado & Abocejo 2019). Well-executed lesson plans bring about competent teachers who become effective and efficient educators. Pre-service teachers' exposure towards improving instructional planning helps them to recognize opportunities towards developing strategies which enables them to overcome challenging situations in the teaching practice. Moreover, becoming aware of the challenges toward lesson planning allows students to be prepared of their tasks in the actual setting.

Teachers will be able to communicate what learning is all about and what they believe matters in learning through the lessons that teachers teach each day. As they experience teaching the lesson, students may decide whether they will or will not invest their time and energy to learn the material. Teachers also experience and learn how to monitor multiple classroom events simultaneously while at the same time collecting and analyzing data on student performance. They also make important instructional decisions almost continually in the course of teaching lessons. They need to consider the logical progression of the lesson as they unfold to lead students to improve knowledge and performance. Teachers particularly the pre-service teachers who acquire sophisticated planning skills are able to offer a richer instructional environment for their students (Skowron, 2001).

The decision-making process of lesson planning requires teachers to pull together an array of knowledge and understanding about learning in general and science learning in particular. The characteristics of students and the different ways students achieve the lesson goals are also considered. Lesson planning is also an opportunity to think about the kinds of teaching that result in student learning. The lesson plan is designed to save time. It enables one to organize the class activities and to have a more systematic presentation of the lesson. Without the plan, there is a tendency that the class will be sidetracked by irrelevant activities and there will be no direction to be followed in the discussion or lesson presentation. Planning underpins purposeful learning and effective teaching and enables the teacher to focus on quality delivery and engagement with the learners (Jones, 1998). As a teacher then, most especially as a pre-service teacher, one should know the vital role of having a lesson plan in teaching,

Effective teachers in all disciplines plan lessons. Much of their planning requires attention regarding the features of lessons that have been shown to make a difference in student learning. Other aspects of lesson planning are discipline-specific. There are a number of factors that teachers have to consider as they develop lesson plans. Some factors that are common to most disciplines are organizing principles while some are critical features of effective lessons, teacher behaviors, and instructional decisions that reflect student characteristics. All these are important for planning and implementing lessons that lead to effective student learning. In order for learning to flourish, teaching has to be appropriate to the subject matter in hand and the type and nature of the pupils (Fautley & Savage, 2013). The teacher then has to think about the kind of teaching that will happen in order to facilitate learning when preparing or planning the lesson.

Improving pre-service teacher education is a beginning, but not enough. According to Hammerness (2005), the knowledge, skills and attitudes needed for optimal teaching are not something that can be fully developed in pre-service education programs. Instead of this, teacher education candidates need to be

equipped for lifelong learning. The goal is to develop teachers who are "adaptive experts," who are more able and likely to continually expand the breadth and depth of their expertise (Bransford et. al. (2005).

A study conducted in Thailand by Corcoran (2008) particularly at Kenan Institute Asia (KIA) found out that streamlining lesson plans stimulates students' interest. This is done through the use of a "teaching script". This enables teachers to deliver mathematics or science lessons efficiently and effectively as mentioned by Chodok Panyavaranant, the senior educational consultant of KIA. The teaching script involves five steps, all designed to boost teachers' potential for time management, delivery of lessons, and creation of a good classroom climate. If implemented in the right manner, it can hold students' attention and increase their understanding of the lessons.

Moreover, a qualitative study by Schmidt (2005) about pre-service string teachers' lesson planning processes also examined 10 undergraduate pre-service teachers' lesson planning activities for the classes they taught in a university string project. Data analysis revealed that these pre-service teachers held different views of lesson planning from each other and from their supervisor. Five themes emerged and these are about concerns on knowing how to begin to plan, difficulty identifying what the children needs to learn, the prominence of decisions made, comparisons of thinking about teaching and planning with actual written plans and limited transfer of in-class experiences to teaching in the project. Suggestions for teacher educators include acknowledging the complex nonlinear relationship between planning skills, teaching experience, and professional knowledge, structuring guided experiences with a variety of lesson planning formats (e.g., written, mental, verbal) and maximizing opportunities for pre-service teachers to reflect on connections between their experiences as students and as teachers.

Another study by Kumasalari *et. al.* (2017) found out that lesson plans of Bahasa Indonesia teachers do not correspond to the components regulated in Permendikbud No. 22, 2016 thus affecting their teaching competence. The research of Sahin-Taskin (2017) regarding pre-

service teachers' perceptions of lesson planning in primary education also revealed that primary pre-service teachers are aware of the importance of planning lessons but encountered some difficulties in planning their lessons. Furthermore, Kasim (2015) also mentioned in his study that there are still some teachers who face difficulties in developing effective and systematic lesson plans for teaching.

In the Philippines, there is a dire need of skillful science teachers. Due to this, colleges of education are left searching for the best way to prepare their future teachers. Such demands require that teachers should be able to create lessons grounded in current learning theory. In their preparation, teacher education graduates have undoubtedly been exposed to a magnitude of educational theory supporting this endeavor. However, novice teachers historically struggle in incorporating these ideas into their daily lesson. In most cases they are unable to bridge the gap between their university studies and daily practice.

Pre-service teachers or student teachers undergo different experiences as they hurdle the task and responsibility of becoming a full-pledged teacher. One of the most crucial activity in the life of a student teacher is on the lesson preparation which includes lesson planning, and preparation of instructional materials. Lesson planning entails a lot of preparation starting from the formulation of objectives, selection of teaching strategies to be used, the instructional materials as well as the assessment techniques and instruments to be utilized. All of these, when carefully and properly done prior to the execution will result to better teaching and learning. It has been found out in some studies that pre-service teachers lack confidence and preparedness to face the challenges of teaching in today's classrooms and this could be attributed to their lack of competence in lesson preparation hence this study was conducted to investigate on the lesson preparation practices of pre-service high school science teachers which would serve as basis in designing programs and activities on pre-service teachers' development and to enhance their lesson planning skills.

This study tried to look into the lesson preparation practices of pre-service high school science teachers in one of the Teacher Education Institutions in the Philippines and provided descriptions of their practice teaching experiences particularly on lesson planning/preparation. Specifically, it looked into the practices of pre-service high school science teachers in terms of formulation of objectives, motivation techniques, teaching strategies, instructional materials preparation, assessment techniques and giving of assignments; the problems encountered in the preparation of lessons for their actual teaching and the implications to science teacher education. This would serve as basis for the college to provide additional resources as well as develop and implement programs needed to enhance the practice teaching activities particularly on lesson preparation and to become more supportive on such activities regarding practice teaching.

Methods

This study made use the quantitative and qualitative methods of research wherein the researcher investigated on the lesson preparation practices of pre-service high school science teachers. The quantitative data were gathered through the use of a Likert type questionnaire. Documentary analysis of lesson plans, reflective journals, portfolios and other relevant documents were also done to support the data gathered. To ensure the validity of the findings, triangulation technique was employed using semi-structured interviews.

The respondents of this study were the fourth year BSEd students majoring in physical science who are already undertaking their practice teaching and their cooperating teachers. All pre-service teachers and their cooperating teachers who are presently enrolled in practice teaching during the semester were considered.

Prior to the conduct of the study, written requests were given to the principals of the different cooperating schools where the pre-service science teachers were deployed asking permission to conduct the study and to determine the respondents. After which, the data were gathered by administering a

questionnaire and analysis of documents like lesson plans, reflective journals, portfolios and other relevant documents as well as from the transcript of interviews. Quantitative data were analyzed using frequency count and mean. Qualitative data from interviews were also transcribed and interpreted to come up with the results.

Results and Discussion

Practices of Pre-service Science Teachers.

Based on the data gathered using the different instruments it was found out that pre-service science teachers followed the systematic method of lesson preparation with the use of detailed lesson plans. They followed a format consisting of five parts: Objectives, Subject Matter, Teaching Procedure/Strategy, Assessment and Assignment.

Formulation of Learning Objectives.

Learning objectives are the most important part of a lesson plan (Fautley & Savage, 2013). Teachers can determine the kind of teaching and learning activities they will use in class by specifying concrete objectives for student learning. It is very important that pre-service teachers understand what is meant by a learning objective, how to formulate relevant and attainable learning objectives and how they are used as basis in structuring all the other elements of the lesson plan. In this study, the results show that the pre-service teachers are good in the formulation of cognitive domain objectives as reflected by a mean rating of 2.96. Based on the analysis of lesson plans prepared by the pre-service teachers, majority (83.33%) of them were able to formulate cognitive domain objectives that are relevant to their subject matter but encountered difficulties in the formulation of affective domain objectives as evidenced by the absence of affective domain objectives in their lesson plans. When asked why they did not include affective domain objectives, they said that they are hard up in formulating objectives along that aspect or domain and for some who tried to include affective objectives these were not clear. As mentioned by some of the respondents:

"I am not well versed in formulating affective domain objectives" (S1)

"I usually can't find affective learning objectives in their lesson plans....."

They only place cognitive domain objectives." (T1)

Such result conforms with the findings of Jones *et. al.* (2011) about Six Common Lesson Planning Pitfalls-Recommendations for Novice Educators that one of the common lesson planning blunders or mistakes encountered by pre-service teachers and even in-service teachers with one or two years of teaching experience is on the statement of objectives that are not clear. The study of Putri (2019) also showed that the teachers did not state learning objectives in their lesson plans. Moreover, Oktafianti (2019) also found out in her study on the analysis of lesson plans made by the English teachers at MTS Al Qur'an Harsallakum Bengkulu that the lesson plans had some weaknesses on the competencies and objectives that were formulated.

The learning objectives drive the whole lesson, so care should be taken when creating the objectives for each lesson for they determine the activities that the students would engage in (Milkova, 2012). The teacher then has to ensure that lesson plan goals are compatible with the developmental level of the students and their student achievement expectations are reasonable.

Motivation techniques . Motivation is the attention and effort required to complete a learning task (Moshinskie, 2001). It is a key component to instruction and learning. Without proper motivation, the designed learning experiences will not be successful. Students who are well motivated to learn become more successful than those who are not (Hodges, 2004). Teachers then must have to plan and design motivational activities that would catch the attention of learners to engage in their lessons. In this study, it was found out that motivation techniques were utilized by the pre-service teachers but some were not relevant to the topics being taken up. Such techniques ranged from the traditional story- telling to the use of predicting outcomes in a given situation related to the lesson, use of songs, posing questions, demonstration, use of pictures, video clips, etc. Motivational activities serve as spring board in teaching and these must arouse the

attention of the learners. Such activities must also be relevant to the lesson to be taken up during the period. The mean rating for motivational techniques used by the pre-service teachers is 2.71. This is interpreted as good but considering that this falls close to the lower limit (2.50) of the range for such category, this implies that there is still a need for them to be given more activities on how to devise and utilize appropriate motivational techniques and activities in order to catch the attention of their learners.

The findings in this study is parallel with the findings of Jones *et. al.* (2011) that *"pre-service and beginning teachers had trouble crafting a simple or short activity to motivate the students." The failure to hook or arouse the students' attention at the beginning of the lesson results to students' confusion and unwillingness to persist. They become disengaged and passive throughout the duration of the lesson.* Furthermore, Kasim (2015) also found out that Indonesian teachers had difficulty in developing lesson plans based on the Kurikulum Tingkat Satuan Pendidikan (KTSP) or the school based curriculum that is related to students' encouragement to become active learners.

Teaching Strategies. Engaging students to learn science is something that teachers have to consider when planning their lessons. In here, they have to utilize teaching strategies and techniques that would make the learners enjoy and have fun while learning. This could be done by designing lessons in such a way that learners are given the opportunity to perform hands-on and minds-on learning activities. In this way, they learn and understand better the important concepts and principles in science. In this study, results revealed that a variety of teaching strategies were also implemented by the pre-service teachers with the use of different instructional materials. These strategies include the lecture- demonstration method which is utilized most frequently by the pre-service teachers, followed by the laboratory method, problem solving strategy, use of games and other strategies like the cooperative learning approach, think pair share and small group discussions. Instructional materials that they used also include real objects like plants and animals; models like the solar system model,

planetariums, DNA models, circuit models and diagrams. Science videos, animations and interactive software were also used. The mean rating for the teaching strategies and instructional materials used by the pre-service teachers are 3.15 and 3.12 respectively. They are rated good for these two areas. Despite all these, it was found out from the interviews conducted that some of the pre-service teachers still encounter difficulties in selecting the most relevant teaching strategy that is suited to their learner's abilities. This was mentioned by one of the cooperating teacher respondents:

"They have a wide array of teaching strategies. However, some of the teaching strategies that they use are not suitable or appropriate to their topics. It is important for them to be guided properly on the selection of appropriate techniques and strategies that they use in their teaching.....well, I understand that they are still beginners but with proper guidance and mentoring from cooperating teachers they can be equipped with the needed skills for them to become better teachers." (T2)

Such result agrees with the findings of Kasim (2015) that lesson plans prepared by the teachers in his study were deficient in the teaching methods and strategies.

Assessment methods/techniques. Assessment of students' learning is another essential aspect in the teaching learning process. When planning lessons, teachers have to look into the appropriate type of assessment that conforms with the learning objectives. The purpose of assessment in the classroom is to help teachers make decisions in the complex social and instructional context in which it takes place (Airasian & Abrams, 2003). Results of assessment determines the level of attainment of the learning objectives as well as the performance of the learners. It also serves as basis for the teacher in planning for the next lesson or activity. The assessment methods/techniques used by the pre-service teachers in this study were found to be of the traditional type. Only few authentic assessment tools were utilized as reflected in the lesson plans. The pre-service teachers got a mean rating of only 2.45 in terms of the assessment methods /techniques they

used in teaching. This corresponds to a fair rating and it is the lowest among the different aspects of lesson planning that was done by the teachers. Further analysis of their lesson plans also showed that there is a need for them to improve their questioning skills. This was also confirmed from interviews with the cooperating teachers who stated:

"Their assessment items are of the lower level questions..... traditional type questions. They don't also give follow-up questions to determine the students understanding about the lesson." (T3)

"They don't ask of questions that are thought provoking. Their questions are mostly of the knowledge level type. In science, there is a need to develop and ask questions that belong to the HOTS level." (T4)

This result conforms with the findings of Jones *et. al.* (2011) and Coñado & Abocejo (2019) that assessment techniques used by the teachers in their study did not match the objectives which resulted to confusion of the pre-service teachers. Kasim (2015) and Oktafianti (2019) also found out that one of the weaknesses of the teachers in their study was on assessment methods and strategies. The study of Putri (2019) also revealed that the teachers do not understand the system of learning assessment and thought that it is too complicated. Assessment is very important since it can be used to identify weaknesses as well as highlight strengths and successes of learners thus helping teachers to plan for improvement (Jones, 1998). Using a range of assessment for learning techniques including self-evaluation and peer-assessment will not only help teachers assess their students' work in a convivial way, but will also give them access to a range of evaluative perspectives that observation and communication alone may not facilitate (Fautley & Savage, 2013).

Giving Assignments. Assignments are intended for learners to gain further mastery and understanding of the lesson or for them to study and prepare in advance for the next lesson. They are used to improve the skills of the learners and enhance their creativity as they learn a lot more when they practice or read something on their own. The main reason for

giving assignments is to provide a practice exposure and knowledge enhancement of a particular subject. Giving assignments requires the teacher to provide information on what the learners will do and how they will do it. It also includes teachers' attention to queries of the learners and ensures that they understood the assigned task.

Giving assignments according to Haynes (2010) is a common problem when it comes to time management. It is sometimes taken for granted and seems just like an add-on to the lesson. This should not be the case since the assignment is still an integral part of the lesson

that is delivered by the teacher to the learners. As such, this must also be given importance just like the other parts of the lesson.

In this study, the assignments given by the pre-service teachers met the standards. The mean rating for the assignments given by the pre-service teachers is 3.07 which is also described as good. This was further validated from the results of interviews with cooperating teachers and through analysis of their lesson plans that the pre-service teachers are doing good when it comes to the giving of assignments to their learners.

Table 1. Mean Ratings of the Pre-service teachers in terms of the different aspects of Lesson Preparation

Lesson Preparation Activities/ Practices	Mean Rating	Descriptive Rating
Formulation of objectives	2.96	Good
Motivation techniques	2.71	Good
Teaching strategies	3.15	Good
Instructional materials	3.12	Good
Assessment techniques	2.45	Fair
Assignments	3.07	Good
Over-all Rating	2.91	Good
<i>Range Descriptive Rating</i> 4.50-5.00 -----Outstanding 3.50-4.49-----VGood 2.50- 3.49----- -Good 1.50- 2.49-----Fair 1.00-1.49-----Poor		

Conclusion and Recommendations

Based on the results of the study, it can be concluded that the lesson preparation practices of pre-service science teachers are already good. This implies that they are already prepared to face and hurdle the task of a real classroom teacher. Despite these, there are still aspects in lesson preparation that needs to be further developed like in the formulation of affective domain objectives, selection of appropriate motivational and assessment techniques.

Pre-service teachers then should be given more training on the development of lesson objectives and motivation techniques to be used in teaching their lessons to make their teaching more effective. Authentic assessment tools must also be utilized in order to have a better

understanding of how the students learn the processes in science or the so called science process skills. Teacher Education institutions may continue to design programs geared towards further development of pre-service teachers not only in science but also in other subject areas to enhance their lesson planning skills.

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