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PREFACE

Mathematics, Science, and Computer Science Education International Seminar (MSCEIS) has been started since 2013 as an International Seminar of Mathematics, Science and Computer Science Education. This seminar is motivated by improving the quality of mathematics, science and computer science education. The aims of the seminar are: (1) To bring together the scientists, education experts and practitioners, students, and civil society organization representatives in the scientific forum. (2) To share and to discuss theoretical and practical knowledge about innovation in mathematics, science and education.

MSCEIS 2016 was the 3rd seminar to provide forum for researchers in Mathematics, Science, and Computer Science Education to share new ideas or research result in their field. The theme for this seminar is “Harnessing Local Wisdom to Build Competencies of Excellence in Research and Collaboration in The New Era of The ASEAN Economic Community”. This seminar is organized by FPMIPA UPI and SEAMEO QITEP in Science and sponsored by Universitas Pendidikan Indonesia (UPI).

The conference took place in Bandung, Indonesia, on 15 October 2016. More than 880 participants are involved from various topics in mathematics, science, and computer science education. There are 120 selected papers that go through a strict peer-reviewed process, and these papers will be published in the present conference proceedings.

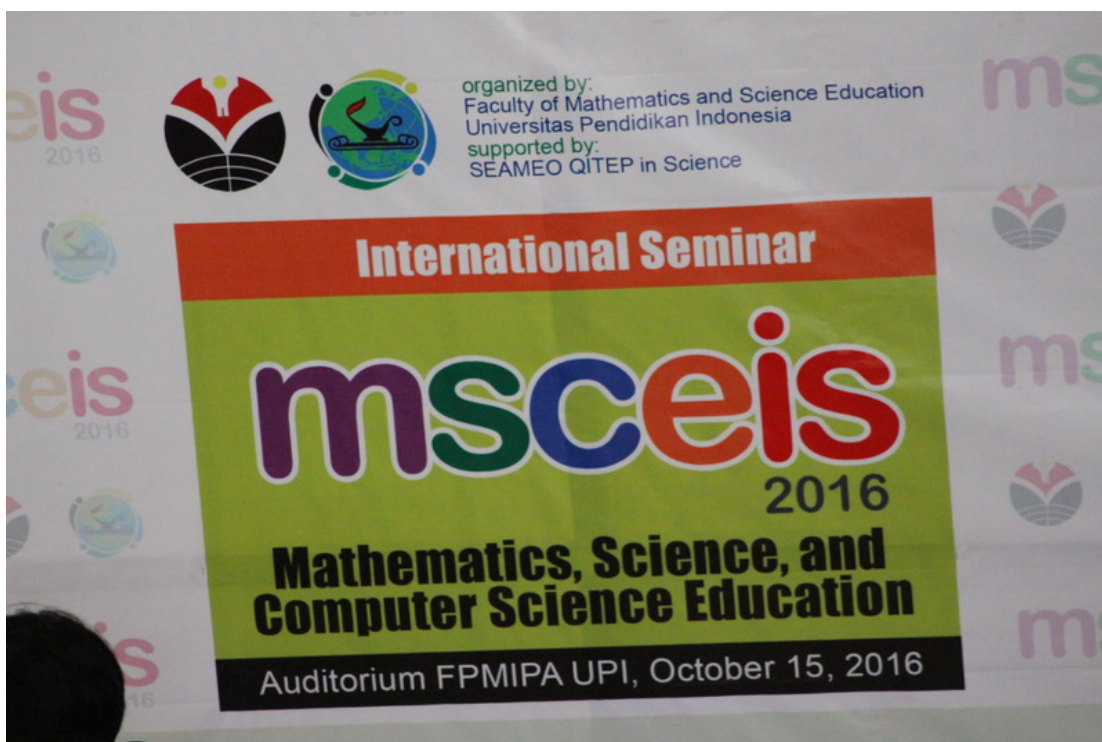
We would like to thank the organizing committee and the members of reviewers for their kind assistance in reviewing the papers. We would also extend our best gratitude to keynote speakers for their invaluable contribution and worthwhile ideas shared in the conference.

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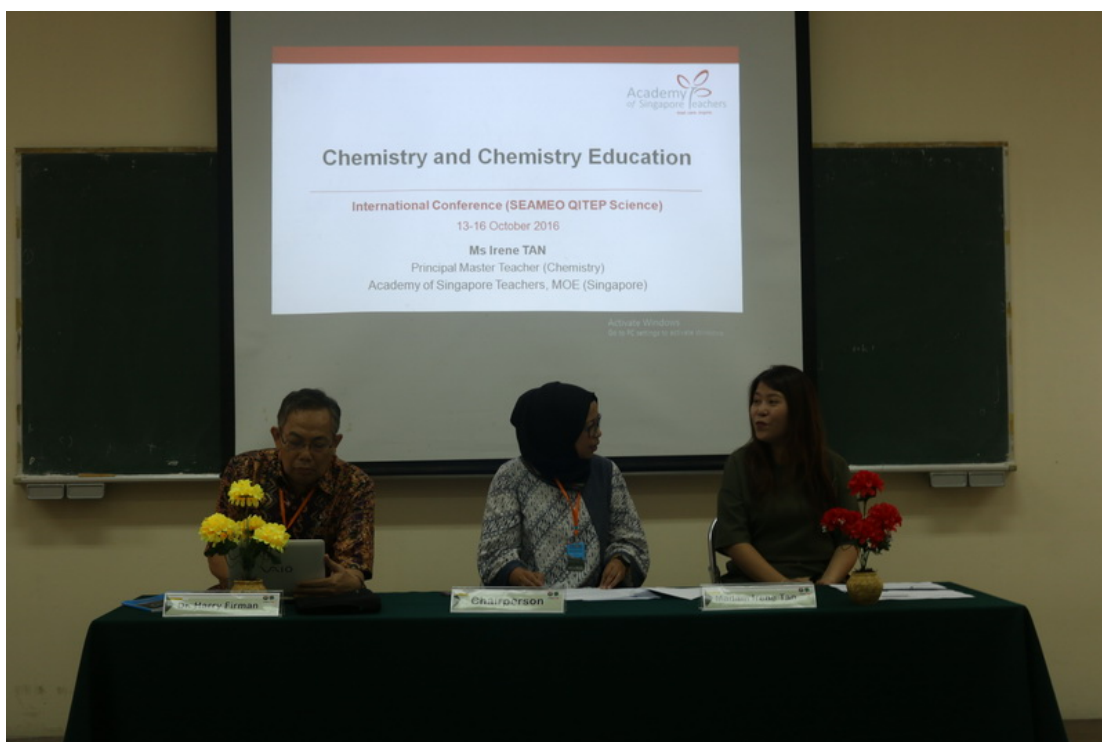
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Professionalism of Junior High School (SMP) Science Teacher in Preparing Instructional Design of Earth and Space Sciences (IPBA)

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Professionalism of Junior High School (SMP) Science Teacher in Preparing Instructional Design of Earth and Space Sciences (IPBA)

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Abstract. The teacher is one important factor in the provision of education in schools. Therefore, improving the quality of education means we need to enhance the quality and the professionalism of teachers. We offer a solution through education and training of junior high school science teachers in developing the instructional design of Earth and Space Sciences (IPBA). IPBA is part of the science subjects which is given to students from elementary school to college. This research is a preliminary study of junior high school science teacher professionalism in creating instructional design IPBA. *Mixed method design* is used to design the research. Preliminary studies conducted on junior high school science teacher in one MGMPs in South Sumatera, and the respondent are 18 teachers from 13 schools. The educational background of science teachers who teach IPBA not only from physical education but also biology and agriculture. The result of preliminary study showed that the ratio of teachers who teach IPBA are 56% from physic education, 39% from biology, and 5% from agriculture. The subjects of IPBA that considered difficult by teachers are the distribution of sun, moon, and satellite motion; specific processes in lithosphere and atmosphere; and the correlation between lithosphere and atmosphere with the environment. The teachers also face difficulty in preparing media, choosing the right methods in teaching IPBA.

1. Introduction

Teacher, as a professional, have a function, role, and position which is very important in achieving the vision of education in 2025, to create an intelligent and competitive Indonesian people. In UU No. 20 of 2003 about National Education System article 39 (2) states that teachers are professionals. As professionals, teachers should have an academic qualifications and competency as a learning agent (Depdiknas, 2005). Competency as learning agents include four aspects: pedagogical competence, personal competence, professional competence and social competence.

Professional development that prepares teachers to design learning experiences for students has not been widely studied. The current study appears in the program that prepares teachers to play an important role in designing a series of lectures for students using available materials and to use the lessons they developed (Penuel, *et al.*, 2011). Professional teachers are those who have the expertise,



skills, or skills that meet certain quality standards or norms and require professional education. They must have academic qualifications and competence (Depdiknas, 2005).

Several studies have been conducted in a teacher professional development program. Trautman & Makinster (2010), stating that the model of adaptive and flexible professional development can improve the perception of teachers in teaching using geospatial technology to improve students' critical thinking skills. Professional development to assist teachers in teaching instructional design leading to enhanced science learning (Penuel, *et al.*, 2011).

Science including Earth and Space Sciences (IPBA), developed in order to understand natural phenomena (National Research Council, 1996; Brotosiswoyo, 2000). According to the National Science Education Standards (National Research Council [NRC], 1996), IPBA is one of the primary content on science education that should be given in each grade, level or stage. Unfortunately, the teacher's ability to transfer the knowledge to the students is considered low. Poor ability science teacher / IPBA can not be separated from the teacher preparation process itself by the Institute of Education Personnel (LPTK) (Pujani *et al.*, 2011). As stated by McDermot (1990), one of the important factors that affect the poor performance is the lack of science education teachers are well prepared.

The efforts to improve the quality of teachers start from early education, continuing education, and education and training of teachers in the office (*in-service training education*). According to Musset (2010) in Sulaeman (2016), stated that the ongoing training is a means to develop skills needed for teachers so that students can achieve higher learning outcomes. Meanwhile, according to Bayrakci (2009) in Sulaeman (2016), until now, in-service teacher training is accepted as an effective method for improving the knowledge, skills, and confidence of teachers. Training for science teachers has been seen as a set of academic activity that attended by teachers actively, fully creative, and teaching practices how to face students (Brito, *et al.*, 2005; Trova and Trna, 2014 in Sulaeman, 2016).

Interviews with the head of MGMP in Ogan Ilir, South Sumatera, show that the science teacher who teach IPBA has different educational backgrounds, not only physics, but also chemistry, biology, and agriculture. This leads to mismatch both in terms of qualified teachers and in mastery of the material. The results of further observations of the material scope IPBA in middle and high school curriculum, it is found that there is shifting in curriculum about IPBA contents. It is indicated from the decreasing in material scope of IPBA in physics curriculum of the competency-based curriculum (KBK) in 2004 to KTSP 2006, as well as on Curriculum 2013.

Based on the review, it is necessary to develop education and training programs to improve the professionalism of junior high school science teacher in one MGMP South Sumatera province in the preparation of instructional design of Earth and Space Sciences (IPBA).

2. Research Methods

Mixed method design is used to do the research with a sample of 18 junior high school science teachers from 13 schools. The data is collected through questionnaires.

3. Results and Discussion

3.1 Background Science Teacher Education

The initial study, shows that educational degree of science teachers in Ogan Ilir mostly bachelor degree. It can be seen that their educational background is 56% physics education, 30% biology education, and 5% agriculture (shown in Figure 1). The education background has high influence in mastery of some specific subject of Earth and Space Sciences (IPBA). Furthermore, teacher is demanded to be more innovative in delivering the material to the students. Thus, teaching and learning in the classroom well conducted.

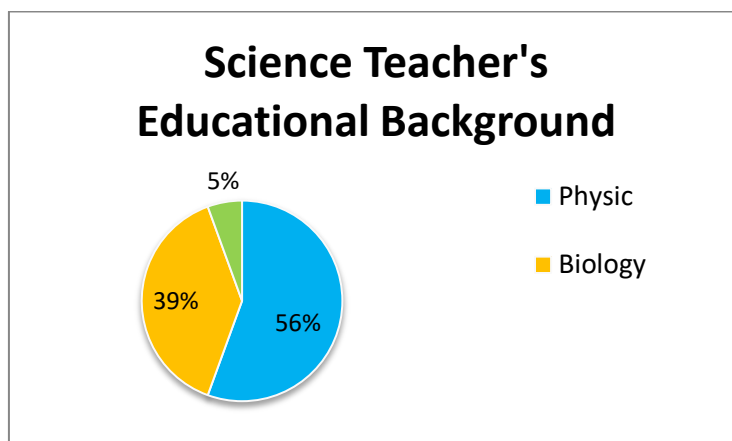


Figure 1. Science Teacher's Educational Background

3.2 Science Teacher Teaching Experience

The teachers' teaching experience in Ogan Ilir can be classified, as follows:

1. 0% has 0-5 years of experience,
2. 67% has 6-10 years of experience,
3. 16% has 11-15 years of experience, and
4. 17% has 16-20 years of experience

Based on the data, their experience is still relatively young. An experience teacher is different from the inexperienced one. Experience for a science teacher is important to determine the success of the learning process.

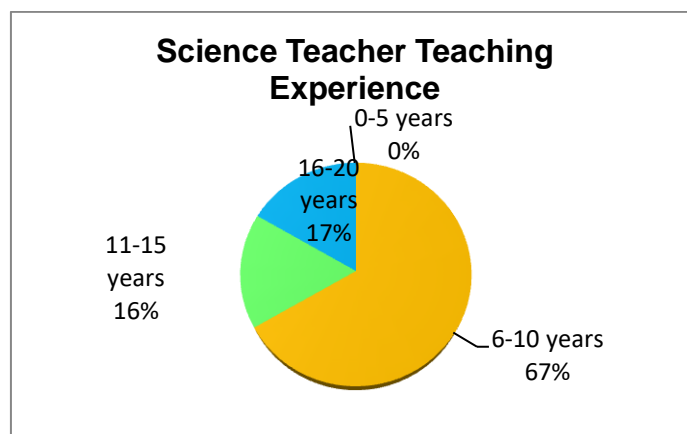


Figure 2. Science Teacher's Experience in Teaching

3.3 Difficulties in understanding the material of Earth and Space Science (IPBA).

In the term of understanding the concept, the data shows that:

1. On concept of the solar system, 21% of teachers said it is easy, 72% is moderate, 7% is difficult, and 0% is very difficult.
2. On the concept of the sun as a star and the earth as a planet, 13% of teachers said easy, 74% is moderate, 13% is difficult, and 0% is very difficult.
3. On the concept of distribution of motion of the sun, moon, and satellite; 0% easy, 71% moderate, 29% is difficult, and 0% is very difficult.
4. On the concept of special processes in the lithosphere and atmosphere, 0% easy, 57% moderate, 43% is difficult, and 0% is very difficult.
5. On the concept of relationship processes in the lithosphere and atmosphere with the environment,

0% easy, 79% moderate, 21% is difficult, and 0% is very difficult.

In general, it can be concluded that there are still some science teachers in Ogan Ilir have difficulty in understanding the concept of IPBA.

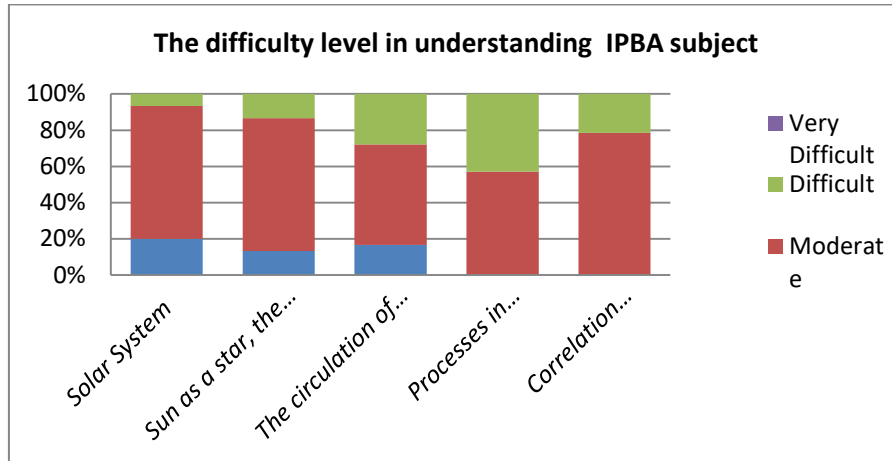


Figure 3. The difficulty level in understanding IPBA subject.

3.4 Difficulties in Creating the Instructional Design of IPBA

The questionnaire shows that science teachers have difficulty in developing instructional design IPBA, for instance in making lesson plans, providing teaching materials, choosing a righth media, methods, and assessment about motion of the sun, the earth, and satellite; specific processes in the lithosphere and atmosphere; and the correlation process in the lithosphere and atmosphere with the environment.

Figure 4 (a) shows that teachers have moderate difficulty in making the lesson plan, while in choosing media, method and making assessment is more difficult. Further, they face difficulty in subject about process in the lithosphere and atmosphere.

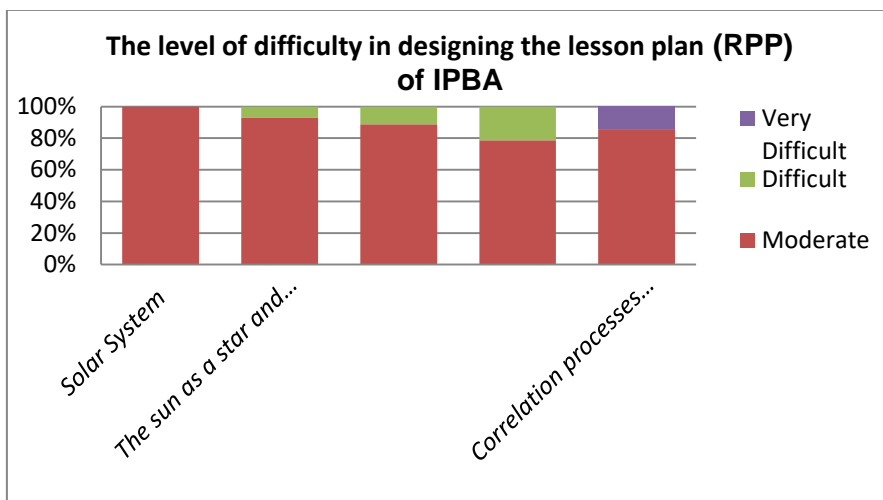


Figure 4a. The level of difficulty in designing the lesson plan (RPP) of IPBA

Figure 4 (b) describe that the level of difficulty is moderate in providing the teaching material, but they face more difficulty about process in the lithosphere and atmosphere.

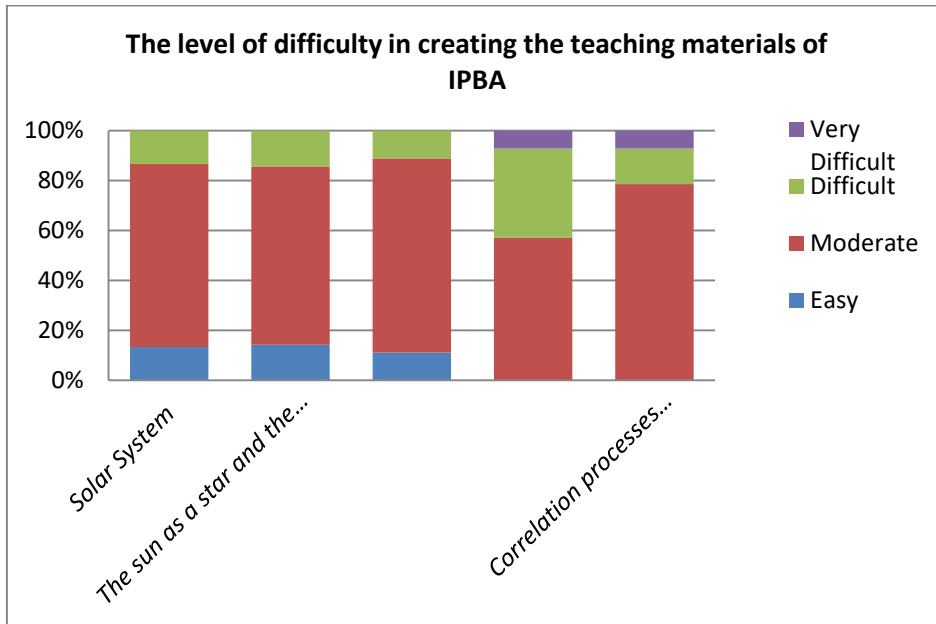


Figure 4b. The level of difficulty in creating the teaching materials of IPBA

Figure 4 (c) describe that the level of difficulty is moderate in choosing the media, but they face more difficulty about process in the lithosphere and atmosphere.

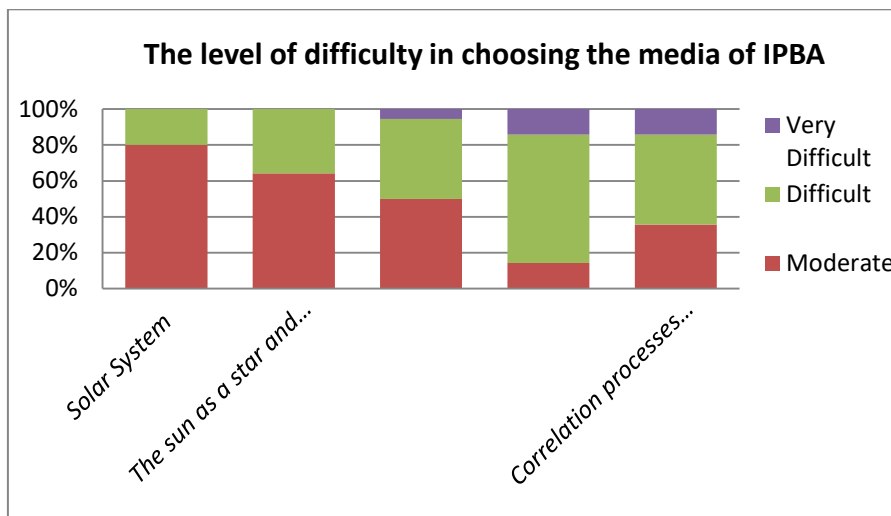


Figure 4c. The level of difficulty in choosing the media of IPBA

Figure 4 (d) shows that the level of difficulty is moderate in choosing the method, but they face more difficulty about process in the lithosphere and atmosphere and its correlation with environment.

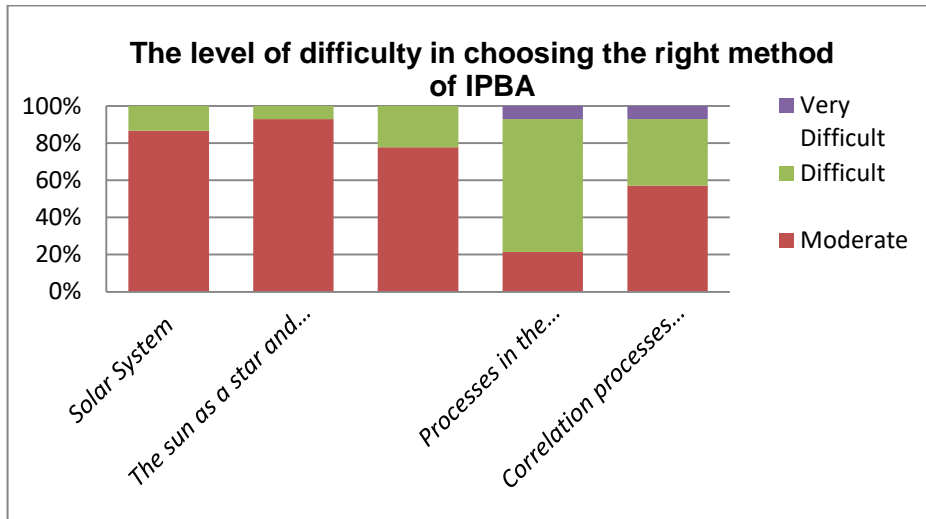


Figure 4d. The level of difficulty in choosing the right method of IPBA

Figure 4 (e) shows that the level of difficulty is moderate in designing the assesment, but they face more difficulty about process in the lithosphere and atmosphere and its correlation with environment.

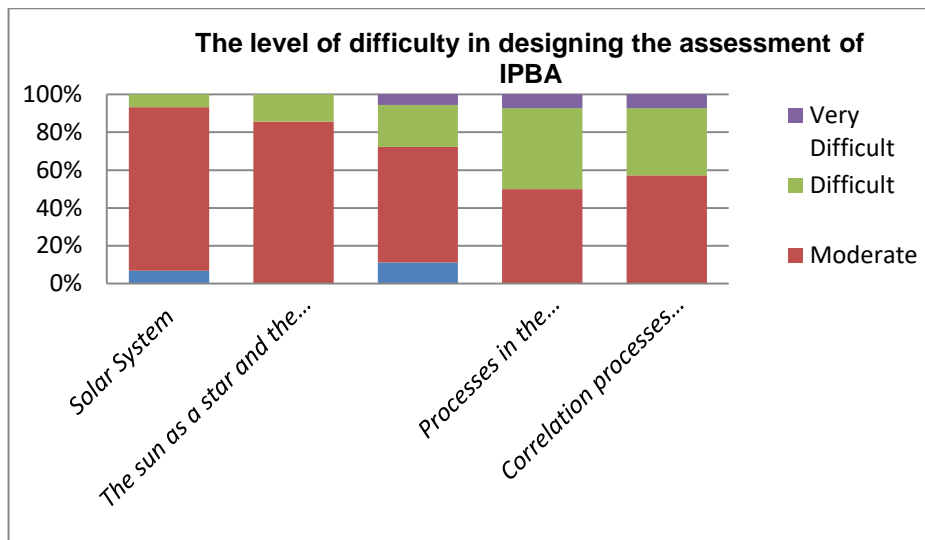


Figure 4e. The level of difficulty in designing Instructional IPBA: (a). Lesson Plan; (b). Teaching materials; (c). Media; (d). Method; and (e). Assesment.

The data can be concluded that they still facing difficulty, primarily in the last 3 subjects: the circulation of the sun, earth, and satellite; processes in litosphere and atmospher; and correlation process between litosphere and atmosphere with environment. The results show their opinion, not the reality in the schools.

4. Conclusion

Teacher is one of important factors in the provision of education in schools. Therefore, improving the quality of education means we need to enhance the quality of teachers. Through education and training about preparation of instructional design IPBA we can improve the quality. Preliminary study through a questionnaire given to 18 science teachers from 13 schools, the educational background of the teachers are varies. While, their experience in teaching is considered poor. Furthermore, they have difficulty in creating the instructional design of IPBA, mainly about motion of the sun, earth, and

satellite; processes in the lithosphere and atmosphere; and the correlation between the lithosphere and atmosphere with the environment.

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