Vol 8 No 3, September 2024
ABDI DOSEN
Jurnal Pengabdian Pada Masyarakat
pISSN: 2614-6509
eISSN: 2620-5156

TRAINING AND ASSISTANCE IN PREPARING HOTS QUESTIONS BASED ON DIGITAL LITERACY PEDAGODIC-CHEM FOR CHEMISTRY TEACHERS IN DONGGALA REGENCY

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Abstract

Higher order thinking skills or abbreviated as HOTS is an ability that is applied in the revised 2013 Curriculum. Teachers are required to be able to create Higher Order Thinking Skills (HOTS) oriented questions, namely questions whose questions are able to train students to think at a high level of analysis, evaluation, and creation. The provision of HOTS questions aims to create challenging learning for students to reflect and apply their reasoning. However, the reality in the field based on interviews and the distribution of needs analysis questionnaires among chemistry teachers obtained data of 50% in the classification of good enough for indicators of knowledge of HOTS questions, indicating that the level of preparation of HOTS questions for chemistry teachers is not optimal. Most of the questions given are still at the LOTS level, because it is difficult to find the accuracy of the level of questions that are reached by students' abilities. Partners have not used pedagogic-chem strategies to develop HOTS questions, such as the use of contexts that are relevant to students' lives. Teachers who are members of the Chemistry Subject Teacher Conference (MGMP) as partners of this service still experience problems in analyzing the forms of questions that can improve higher order thinking skills (HOTS). To overcome this problem, training and mentoring with a participatory model were conducted, which included: a) introducing the concept, function, and purpose of HOTS questions to face 21st century skills, b) introducing the utilization of HOTS questions in learning evaluation along with applicable and principle steps, c) guiding teachers to create a bank of HOTS questions according to the division of domains and aspects of measuring HOTS achievement, d) guiding teachers in direct practice in mapping HOTS questions to the achievement of learning objectives in the process of achieving pedagogic-Chem, e) mentoring online and offline in the process of developing HOTS question banks obtained digitally and conventionally systematically, f) mentoring in utilizing digital information through relevant sources in making HOTS questions, g) mentoring in the process of searching for various information that can be managed and developed into HOTS questions based on digital literacy, and h) mentoring in the pedagogic-Chem evaluation process of HOTS question testing in the classroom productively. These activities have been carried out well thanks to good cooperation with various parties. This is illustrated by the outputs in the form of HOTS questions that the

Submitted: August-2024 Received: August-2024 Available online: September-2024

participants have made from the training and mentoring results of this service. The final result of this service is in accordance with the expected target, namely the book of HOTS questions produced which is used in chemistry learning.
Keywords: Digital Literacy, Kimia, Pedagogic-Chem, Soal HOTS

INTRODUCTION

Based on data from the Donggala District Chemistry Teacher Council (MGMP), the group has 26 members. Members come from 17 public and private schools namely SMAN 1 Banawa, SMAN 1 Sindue, SMAN 1 Sirenja, SMAN 1 Balaesang, SMAN 2 Balaesang, SMAN 3 Balaesang, SMAN 1 Dampelas, SMAN 2 Dampelas, SMAN 1 Sojol, SMAN 2 Sojol, SMAN 1 Rio Pakava, SMAS Nasional Wani, SMAN 1 Banawa Tengah, SMAN 1 Sindue Tombusabora, SMAN 1 Sindue Tobata, SMAN 1 Balaesang Tanjung, SMAS YPTB Ketong. The group of chemistry teachers spread across these schools is less active in participating in MGMP. The percentage of attendance that participated in MGMP was only about 35%. The material discussed in MGMP is still limited to a) improving understanding of the material, b) writing scientific papers as a requirement for promotion, c. utilization of learning media (Figure 1). Therefore, there are still many essential problems needed in schools that have not been revealed in MGMP, which is no less important is the evaluation tool, which refers to HOTS (Higher Order Thinking Skills) questions. HOTS questions are designed to test students' higher order thinking skills, analyzing (C4), evaluating (C5), and creating (C6). Therefore, it is important to include HOTS questions in MGMP discussions to ensure that students get a comprehensive and in-depth education. HOTS questions will hone logic, critical thinking, and creativity.

Figure 1 one of the implementation of MGMP Chemistry activities in Donggala Regency

HOTS is not obtained spontaneously but must be generated through teaching content that is presented in a reflective, critical, logical, metacognitive and critical manner, one of which is by providing thinking stimulation through digital literacy to facilitate students' open and flexible thinking [1]. Learners have difficulty achieving HOTS due to the presentation of pedagogic-chem content that is still not contextualized and does not provide maximum digital literacy stimulation. The growth of students' thinking is influenced by the form of question levels presented by the teacher, the presentation of HOTS questions but not assisted by

pedagogic-chem digital literacy will add to student confusion, chemical content which is generally abstract should be paraded in the process of achieving cognitive levels contextually combined with meaningful digitalization. Reviewing various problems in achieving the results of HOTS questions nationally, the average data is below 50%, it is important that training on the preparation of HOTS questions based on pedagogicchem digital literacy is carried out.

The successful utilization of digital literacy in the preparation of HOTS questions will open up opportunities for the development of upgrading students' abilities in HOTS thinking, of course this is very much needed in managing competencies, teachers who are trained and through mentoring will facilitate the achievement of competencies in creating and compiling HOTS questions using chemical content. The characteristics of students' diverse ability levels will get the same opportunity in the process of gradually cultivating higher order thinking skills [2]. The concept of digital literacy habituation will shift various old habits that are conventional to be more elegant in the process of acquiring knowledge and skills.

Pedagogic-Chem is a competency that teachers must have in the profession, relevance to the teaching process and educating using chemistry content. Through this activity, it is hoped that it can minimize the stagnant state of competence in teachers and loss of learning in students and the inability of students to manage HOTS abilities both in learning and in application in the reality of everyday life. The results of the team's search found the fact that MGMP activities still focus on the process of preparing tools to face the Merdeka learning curriculum, for the process of preparing HOTS questions has not been optimally implemented.

This is supported by an interview with a member of the Donggala district chemistry MGMP Mrs. Sarinah Tonio, there are still many teachers who have not been able to create and compile HOTS questions, especially those who are members of the MGMP. The quality of questions used in tests or exams is almost always the same. This can be caused by teachers who tend to use questions from supporting books that are dominated by questions at the Low Order Thinking Skills (LOTS) level, namely remembering, understanding and applying [3], Teachers do not understand how to make and develop HOTS questions, training related to HOTS question development is still minimal, and teachers do not see the importance of HOTS questions for students.

Based on the description that has been stated, it can be concluded that the ability of teachers, especially those who are members of MGMP Donggala district in preparing HOTS questions still needs to be improved. Therefore, in an effort to help teachers improve their understanding of the concepts and preparation of HOTS questions, it is necessary to hold a training for teachers in the form of training in the preparation of HOTS questions. The service team from the Chemistry Education Study Program, FKIP, Tadulako University was inspired to carry out a community service activity, with the title “Training and Assistance in Preparing HOTS Questions Based on Pedagodic-Chem Digital Literacy in Donggala District”.

METHOD

Method of approach

The approach methods offered to solve partner problems are: Providing training on the concepts and materials of pedagogic-Chem based on digital literacy and the preparation of digital-based HOTS questions, then providing exercises/practice of making HOTS questions, assisting chemistry teachers in implementing pedagogic-Chem in the classroom to achieve digital literacy-based learning goals and assisting teachers in compiling HOTS questions in the 21st century skills Problem Bank.

Based on the above, the following steps will be taken in the implementation of the activities:

1. Socialization related to planning in the form of socialization of PkM activities with partners in the form of coordinating the procurement of PkM activities according to the vision and mission of partners in MGMP Chemistry activities, in planning activities joint discussions are held to decide the schedule for implementing activities, licensing and preparation of activities. Initial Observation, PkM Team by involving students
2. Presentation in the form of stimulation and material provision related to the concept of digital literacy-based Chem pedagogic training and material for preparing HOTS questions based on Digital Literacy. Teachers learn to make their own HOTS questions, didampingi tim pelaksana pengabdian.
3. The application of technology in the form of the practice of preparing HOTS questions based on pedagogicChem digital literacy, a practice that is a novelty for partners.
4. Assistance in preparing HOTS questions based on pedagogic-Chem digital literacy, at this stage will be an input in achieving the objectives of PkM implementation, partners as targets in PKM activities must have the ability and strategy in preparing HOTS questions.
5. The evaluation phase will be conducted before and after the training process.
6. Reflection and Sustainability The program aims to measure the strengths and weaknesses of the training activities, then make recommendations for the sustainability of the activities and produce products in the form of HOTS 21st century skills question banks.

Activity Implementation

The service program for MGMP chemistry partners in Donggala district was carried out at SMAN Sindue Tobata. The service activities carried out are:

1. Socialization with the school and Dinas
2. Explanation to participants about the importance of pedagogic Chem based on digital literacy and the ability to prepare HOTS questions based on Digital Literacy.
3. Work in the form of practicing the preparation of HOTS questions based on pedagogic digital literacy-Chem by teachers who are members of the MGMP chemistry Donggala district accompanied by the service implementation team.

RESULTS OF PKM IMPLEMENTATION

Training implementation

The implementation of the service begins with socialization with related agencies, MGMP Chemistry Donggala Regency. This socialization aims to provide information to related agencies regarding the service and so that participants know the purpose of implementing the program by the implementing team so that there is no misinformation. Furthermore, after the delivery of a comprehensive program plan, it is continued with the provision of training related to the theme of the service, namely Training on the Preparation of Hots questions Based on Pedagodic-Chem digital literacy in Donggala Regency. The training was held at Sindue Tobata High School. In the implementation of the training, the participants involved were members of the Chemistry MGMP of Donggala Regency. The number of participants included in this training was 30 people. The training materials include: Forms, characteristics, examples of higher order thinking skills (HOTS) questions, HOTS-based question preparation techniques, digital literacy development and digital literacy-based Pedagogic-Chem, practice of preparing HOTS questions, practice of developing digital literacy and pedagogic-Chem, and application of hots-based questions into digital literacy. assistance in the preparation of HOTS questions based on digital literacy pedagogic-Chem, for grade 10 to 12 chemistry materials and assistance in solving the Chemistry material questions.

The training materials are described as follows:

1). Definition of Higher Level Thinking Skills (HOTS)

Basically, higher order thinking skills (HOTS) include higher order thinking skills (HOT). Sani [3] argues that higher order thinking skills include critical, logical, reflective, metacognitive, and creative thinking skills. These critical thinking skills are needed in solving problems and making decisions. HOTS will develop if individuals face unfamiliar problems, challenging questions, or face uncertainty/dilemma. The learning paradigm should shift from conventional learning that emphasizes low-level thinking skills towards learning higher-level thinking skills, especially critical thinking is the basis that students must have to be able to develop higher-level thinking [4]. HOTS itself is part of the cognitive domain in Bloom's Taxonomy and aims to hone mental skills around knowledge. Bloom's version of the cognitive domain was revised to six, namely: (1) remembering; (2) understanding; (3) applying; (4) analyzing; (5) evaluating; and creating [5]. Levels 1 to 3 are categorized as low-level thinking skills (LOTS), while levels 4 to 6 are categorized as high-level thinking skills (HOTS). In this service, the question training leads to HOTS.

2). Forms of Higher Order Thinking Skills (HOTS) questions include:

a. Questions to assess critical thinking skills

For example: Section 1 of the Interference test, which contains: Directions, Problem, and Conclusion Statement. Next, fill in the answers in the table provided and include a reason. Part 2: Assumption Acceptance Test, which contains: instructions, questions, and proposed assumptions. Next, fill in the table of accepted assumptions with unaccepted assumptions along with the reasons for each assumption. How to test critical thinking skills, can also be

done by making a list of several statements and asking test takers to choose the type of statement. In addition, it can also use essay questions and questions that use a rating scale (multiple rating). Examples are 1) Questions to see the responses made by test takers 2) Comprehensive questions based on data 3) Explanatory questions based on data 4) Predictive questions based on data

b. Questions to assess creative thinking skills

The most commonly used creative thinking questions in research and learning is a test Torrance. This test can take the form of image creation or sentence description. The term creative means that learning is a process of developing student creativity, because basically every individual has an imagination and curiosity that never stops according to experts, creativity is a person's ability to produce something new or a combination of existing things to seem new [6]. Creative thinking ability is a thought process to reveal new relationships, see things from a new perspective, and form new combinations of two or more concepts that have been previously mastered [7]. Thus, creative thinking skills can bring up new ideas for students.

Opening of workshops and training activities

Figure 1 Training on HOTS Problem Making

Practical Work on Preparation of Teaching Materials

At this stage the participants were divided into 3 groups, namely: class X material group, class XI material group and class XII material, with each group accompanied by the service implementation team and field staff. The activities carried out in practical work are a) helping teachers find relevant sources through digital (internet and other sources) to adopt information into HOTS questions that contain the concepts of problem solving, critical thinking, innovation, composing ideas and creativity. b) application in chemistry learning classes

(pedagogic-Chem) by observing and evaluating teacher activities in adjusting to the HOTS level of thinking in the tools used by teachers. c) optimizing the digital literacy process through pre- learning evaluation with the approach of various learning models based on the Merdeka learning d) the results of digital literacy by students are used to conduct story telling and educational games in learning classes, e) the development of procedural knowledge of teachers through sharing and the process of grouping reference sources and information sources (via the internet) obtained through digital literacy on an ongoing basis.

Furthermore, participants are guided / assisted starting from identifying the material for which HOTS questions will be made, so that the learning objectives are met. The desired results can be achieved, up to the preparation of HOTS questions. Developing HOTS Questions

a. Critical Thinking Questions The learning process that can improve students' critical thinking skills is student centered learning and takes place in a social context [8]. One of the basic skills in critical thinking that is also related to problem solving is finding alternative solutions by mapping the problem network using mind maps or other graphic organizers. Mind mapping can be used to analyze the cause (root) of the problem. Problem solutions can be sought by proposing alternative solutions and their impacts, then choosing the most effective and efficient solution [3]. Examples of critical thinking problems: (1) recognize the problem; (2) define the problem; (3) explain the meaning by making careful observations; (3) find alternative solutions with mind mapping; (4) find alternative solutions by analyzing causes and impacts; (5) choose the most effective and efficient solution deductive thinking; (6) inductive thinking; and (7) distinguishing between argument and explanation.

b. Problem Solving Problem-based teaching is a very effective approach to teaching higher-order thinking processes, helping students process information they already have, and build their own knowledge of the social and physical world around them [9]. A person's success in solving problems can be seen by the ability to combine logical thinking and creativity [10]. Teachers who are members of the chemistry MGMP make questions that have characteristics according to the needs of problem solving, both for PBL and for other learning models or strategies.

The questions that have been prepared by MGMP Chemistry partners in Donggala Regency are then reviewed to see whether they are in accordance with the rules for preparing questions. The review can be done by peers in one subject family. Through question review activities, it is expected to produce good questions, from the aspects of material, construction, and language [11]. All of these activities are carried out in such a way as to make it easier for trainees to do this on an ongoing basis.

Figure 2 Practice of making HOTSg questions, accompanied by the Pengabdi Team

Assistance

Mentoring activities are carried out to ensure that the material / technology delivered to partners can be implemented properly so that the results obtained can reach the target.

Picture 3. Photo with teachers who are members of MGMP Chemistry Donggala Regency

The outputs that have been achieved are HOTS questions on Chemistry materials for grades X, XI and XII from MGMP Chemistry partners in Donggala district.

CONCLUSION

The service activities for Chemistry Teacher Consultation (MGMP) partners in Palu city in the preparation of HOTS questions have been carried out well thanks to good cooperation with various parties. This is illustrated by the output in the form of HOTS questions that participants have made from the results of training and mentoring for this service.

Acknowledgments

The author would like to thank the Director of Research, Technology, and Community Service, Ministry of Education, Culture, Research and Technology of the Republic of Indonesia and the Chancellor of Tadulako University for the Funding of the 2024 PKM Program, Contract Number 056/E5/PG.02.00/PM.BATCH.2/2024. In addition, the author would also like to thank the Chemistry Subject Teachers' Conference (MGMP) of Donggala Regency, the Research and Community Service Institute of Tadulako University Palu, SMAN 1 Sindue Tobata, Chemistry Education Study Program Students, FKIP, Tadulako University and all parties who have helped the author in completing this service.

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