



Empowerment and Training on Making Minimum Competency Assessment (AKM) Questions Based on Reading Literacy and Numeracy for Chemistry Teachers throughout Tulungagung Regency

Sri Rahayu¹, Ratna Kumala Dewi^{1,2}, Hayuni Retno Widarti¹, Muntholib Muntholib¹

¹Chemistry Department, Faculty of Mathematics & Science, Universitas Negeri Malang, Malang 65145, Indonesia

²Department of Chemistry, Faculty of Education and Teacher Training, UIN Sayyid Ali Rahmatullah Tulungagung

E-mail: sri.rahayu.fmipa@um.ac.id

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Abstract: *Chemistry MGMP teachers in Tulungagung Regency need more knowledge to improve their competence in preparing literacy and numeracy-based chemistry AKM questions. This chemistry AKM participates in the National Assessment, so teachers need training and assistance in creating chemistry AKM questions and instruments. This community service activity aims to strengthen teacher competence in evaluating chemistry learning and providing strategies for preparing AKM chemistry questions. Community-based research (CBR) methods were conducted through training and practice involving 37 chemistry teacher participants. The service results showed an increase in N-Gain of 0.7, which was in the high category, so the teachers could write AKM chemistry questions based on reading literacy and numeracy. The questionnaire results also show that this community service activity is beneficial and provides valuable experience for teachers, with 90% of teachers answering strongly agree and considering that this training activity has been carried out.*

Introduction

The Ministry of Education and Culture has decided that the National Examination (UN) will end in 2020 and be replaced by a Minimum Competency Assessment (AKM) and character survey ¹. AKM development is based on a combination of the Program for International Student Assessment (PISA) with Trends in International Mathematics and Science Study (TIMSS)². The Ministry of Education and Culture also designed a prototype

¹ Kemendikbud, *Desain Pengembangan Soal Asesmen Kompetensi Minimum* (Badan Penelitian dan Pengembangan Perbukuan Kementerian Pendidikan Dan Kebudayaan, 2020).

² Pusmenjar, "AKM Dan Implikasinya Pada Pembelajaran," *Badan Penelitian dan Pengembangan Perbukuan Kementerian Pendidikan Dan Kebudayaan* (2020): 1–37.

assessment method called AKSI (Indonesian Student Competency Assessment)³. This action evaluates students' abilities from elementary to high school and equivalent, including: Minimum Competency Assessment (AKM), character survey, and learning environment survey⁴. This assessment is used as a mapping to identify existing deficiencies so that improvements can then be carried out in pairs that will make a real contribution to the formation and development of essential life skills and abilities that can be used as life provisions to develop the student's personality⁵.

AKM is carried out to equip Indonesian students to solve problems as individuals, citizens of Indonesia, and the world. The character survey is intended to shape students into superior human beings who are able to compete in the 21st-century era, such as critical thinking skills, creativity, communication, and collaboration⁶. This AKM assessment is not intended for school ranking, and students are not burdened or afraid like they are about to face the National Examination⁷. Students will be randomly selected to participate in the AKM and character survey. Teachers and school principals are also involved in carrying out learning environment surveys.

AKM, character survey, and learning environment consist of questions that measure the ability to reason using language (literacy), reason using mathematics (numeracy), and strengthening character education⁸. The teacher begins with the AKM question form to illustrate how to manage the learning process in front of him and how to carry out assessments using the AKM question form⁹. The AKM concept is an assessment to measure the minimum abilities required by students. The material

³ Aifah Fauziah, Enur Fitiriani Dewi Sobari, and Babang Robandi, "Analisis Pemahaman Guru Sekolah Menengah Pertama (SMP) Mengenai Asesmen Kompetensi Minimum (AKM)," *Edukatif: Jurnal Ilmu Pendidikan* 3, no. 4 (2021): 1550–1558, <https://edukatif.org/index.php/edukatif/article/view/608>.

⁴ Via Putika Sari and Ika Candra Sayekti, "Evaluasi Pelaksanaan Asesmen Kompetensi Minimum (AKM) Pada Kompetensi Dasar Literasi Membaca Peserta Didik Sekolah Dasar," *Jurnal Basicedu* 6, no. 3 (2022): 5237–5243.

⁵ Nanda Novita, Mellyzar Mellyzar, and Herizal Herizal, "Asesmen Nasional (AN): Pengetahuan Dan Persepsi Calon Guru," *JISIP (Jurnal Ilmu Sosial dan Pendidikan)* 5, no. 1 (2021).

⁶ Pusmenjar, "AKM Dan Implikasinya Pada Pembelajaran"; Deni Ainur Rokhim et al., "Assessment of High School Students' Ability to Solve Structured Problems with Ideal Model on Acid-Base," *Orbital* 14, no. 4 (2022): 276–284; Ratna Farwati et al., "STEM Education Implementation in Indonesia: A Scoping Review," *International Journal of STEM Education for Sustainability* 1, no. 1 (2021): 11–32.

⁷ Wirna Eliza and Eka Yusmaita, "Pengembangan Butir Soal Literasi Kimia Pada Materi Sistem Koloid Kelas XI IPA SMA/MA," *Jurnal Eksakta Pendidikan (Jep)* 5, no. 2 (2021): 197–204.

⁸ Pusmenjar, *Asesmen Nasional Lembar Tanya Jawab* (Badan Penelitian dan Pengembangan Perbukuan Kementerian Pendidikan Dan Kebudayaan, 2020).

⁹ Pusmenjar, "AKM Dan Implikasinya Pada Pembelajaran."

assessed includes literacy, numeracy, and strengthening character education .

Literacy is the ability to reason using language. Literacy is not just the ability to read but can be defined as the ability to analyze reading and understand the concepts behind writing, including discourse in chemistry learning ¹⁰. Meanwhile, numeracy is the ability to analyze using numbers. Numeracy is the knowledge and skills to use various kinds of numbers and symbols related to basic mathematics to solve practical problems in various contexts of daily life such as in the form (graphs, tables, charts, and so on) then use the interpretation of analysis results to predict and make a decision ¹¹. Students need literacy and numeracy skills in chemistry learning because chemistry material contains many mathematical calculation concepts which require abilities in reasoning and arithmetic operations such as the concepts of reaction rate, equilibrium, acid base, titration, etc ¹².

At the start of this AKM training activity, it was tested on a limited basis with chemistry teachers in Tulungagung Regency. Immediately after facing AKM-based chemistry questions, many teachers experienced difficulties because the form of the AKM questions was different from the questions in general because the questions given required a high level of reasoning in solving the questions. The form of AKM questions that are introduced to teachers during training is not only limited to subject teachers who are taking the National Examination, but also for all subjects including chemistry. This means that the form of AKM questions is cross-competency, cross-field and/or cross-subject questions and no longer differentiates subjects significantly but sees a competency as a complete picture of various subjects. Chemistry subjects will be a tool

¹⁰ Arie Wibowo Khurniawan and Gustriza Erda, "Evaluasi Pisa 2018: Indonesia Perlu Segera Berbenah," in *Vocational Education Policy, White Paper*, vol. 1, 2019; Unifah Rosyidi, "Merdeka Belajar ; Aplikasinya Dalam Manajemen Pendidikan & Pembelajaran Di Sekolah," *Seminar Nasional Pasca Sarjana UNJ* (2020).

¹¹ I Komang Muliantara and Ni Ketut Suarni, "Strategi Memperkuat Literasi Dan Numerasi Untuk Mendukung Merdeka Belajar Di Sekolah Dasar," *Edukatif: Jurnal Ilmu Pendidikan* 4, no. 3 (2022): 4847–4855; Tju Meriana and Erni Murniarti, "Analisis Pelatihan Asesmen Kompetensi Minimum," *Jurnal Dinamika Pendidikan* 14, no. 2 (2021): 110–116, <http://ejournal.uki.ac.id/index.php/jdpDOI:https://doi.org/10.51212/jdp.v14i2.7>.

¹² Sri Rahayu, Klaudia E.N. Bambut, and Fauziatul Fajaroh, "Do Different Discussion Activities in Developing Scientific Argumentation Affect Students' Motivation in Chemistry?," *Cakrawala Pendidikan* 39, no. 3 (2020): 679–693; Muntholib et al., "Chemical Literacy: Performance of First Year Chemistry Students on Chemical Kinetics," *Indonesian Journal of Chemistry* 20, no. 2 (2020): 468–482; Muntholib Muntholib et al., "Impact of Explicit Scientific Inquiry Instruction on Students' Scientific Argumentation Skills in Salt Hydrolysis," *AIP Conference Proceedings* 2330, no. March (2021).

or medium for forming these competencies.

AKM overall possesses certain qualities that position it as a promising force in advancing education within Indonesian society. One indicator is an increase in student rankings so they can compete in facing questions requiring high-level thinking skills (HOTS), which is a characteristic of PISA ¹³. Chemistry teachers, as one of the pillars of the education system, play a significant role and responsibility for the effectiveness of AKM implementation. To achieve this goal, chemistry teachers must have adequate knowledge and competence regarding the concept and implementation of AKM.

The low level of understanding regarding strategies and techniques for developing AKM-based questions among chemistry teachers in Tulungagung Regency makes this one of the reasons for the author to carry out AKM training. This research and training was carried out to determine teachers' knowledge and perceptions of AKM in chemistry learning. The observations and interviews show that chemistry teachers' knowledge regarding AKM still needs to be improved. Teachers need to understand the assessment concept for both AKM and AN. Apart from that, chemistry teachers in Tulungagung Regency do not have adequate skills in developing AKM-based chemistry HOTS questions, including AKM literacy and numeracy. So far, many chemistry teachers in Tulungagung Regency have never participated in AKM training and have not implemented AKM in chemistry subjects. Each school has no team tasked with designing or compiling AKM-based chemistry HOTS questions. It is hoped that this AKM training activity can provide several benefits, especially for chemistry teachers in Tulungagung Regency by helping teachers improve: (1) The ability to understand AKM literacy and numeracy and their implementation in chemistry learning, (2) Assist teachers in improving their abilities in preparing HOTS chemistry questions, and (3) Create a chemistry AKM assessment instrument.

This training activity has been chosen to increase teacher competency in AKM because the training has been proven effective in increasing teacher professionalism. Several training activities that have been carried out previously show that the training activities that have been carried out can positively and significantly increase teacher

¹³ Nita Delima et al., *PISA DAN AKM Literasi Matematika Dan Kompetensi Numerasi*, 2022; Samsul Hadi et al., "The Difficulties of High School Students in Solving Higher-Order Thinking Skills Problems," *Problems of Education in the 21st Century* 76, no. 4 (2018).

competence and professionalism so AKM training is important to carry out.

Method

This community service activity was carried out at SMA 1 Boyolangu Tulungagung, East Java. The parties involved are the chairman of the Tulungagung Regency Chemistry MGMP, along with state high school, private high school, and islamic high school's chemistry teachers who are part of the MGMP community. The method used in this community service activity applies the Community-Based Research (CBR) method through a direct approach accompanied by conceptual learning and procedural fluency so that a knowledge transfer process occurs between the service team (researchers) and the community (partners)¹⁴. This process is very important to maintain momentum in achieving the expected changes because there is a process of cooperation between parties¹⁵. This method integrates the Tridharma of Higher Education, namely education, research, and service.

The CBR method is a community-based research study that seeks to provide support, power, and active involvement of the community in the empowerment process to produce something of value that is beneficial to the community¹⁶. This method focuses on identifying the problems faced, identifying support priorities, identifying program development, and responding to community needs¹⁷. The method stages consist of several aspects, namely laying the foundation, research planning, data collection and

¹⁴ Sarah Flicker et al., "A Snapshot of Community-Based Research in Canada: Who? What? Why? How?," *Health Education Research* 23, no. 1 (2008): 106–114; Karen Hacker et al., "Community Capacity Building and Sustainability: Outcomes of Community-Based Participatory Research," *Progress in Community Health Partnerships: Research, Education, and Action* 6, no. 3 (2012): 349–360; Abdul Muhid et al., "Perubahan Perilaku Open Defecation Free (ODF) Melalui Program Sanitasi Total Berbasis Masyarakat (STBM) Di Desa Babad Kecamatan Kedungadem Kabupaten Bojonegoro," *Engagement: Jurnal Pengabdian Kepada Masyarakat* 2, no. 1 (2018): 99–119.

¹⁵ Flicker et al., "A Snapshot of Community-Based Research in Canada: Who? What? Why? How?"

¹⁶ Abdul Muhid et al., "Perubahan Perilaku Open Defecation Free (ODF) Melalui Program Sanitasi Total Berbasis Masyarakat (STBM) Di Desa Babad Kecamatan Kedungadem Kabupaten Bojonegoro"; Chusnul Chotimah, "Pengembangan Sekolah Berbasis Go Green Dan Waste Management Untuk Mewujudkan Green School Di SDI Miftahul Huda Plosokandang Kabupaten Tulungagung," *Engagement: Jurnal Pengabdian Kepada Masyarakat* 3, no. 2 (2019): 143–160; Nur Khasanah et al., "Pemberdayaan Kader Gerbangmas Melalui Pelatihan Pembuatan Mpasi Pak Olan Di Desa Kaliboto Kidul Kecamatan Jatiroto Kabupaten Lumajang Dengan Pendekatan Community-Based Research (CBR)," *Jurnal Abdimas Bina Bangsa* 3, no. 2 (2022): 390–397.

¹⁷ Amang Fathurrohman et al., "Implementasi Manajemen Bank Sampah IT Pada Komunitas Bank Sampah Berbasis Masyarakat, Pemuda, Dan Sekolah Di Kabupaten Pasuruan," *Engagement: Jurnal Pengabdian Kepada Masyarakat* 2, no. 2 (1970): 154–167.

analysis (information gathering and analysis), and acting on findings, as shown in Figure 1.

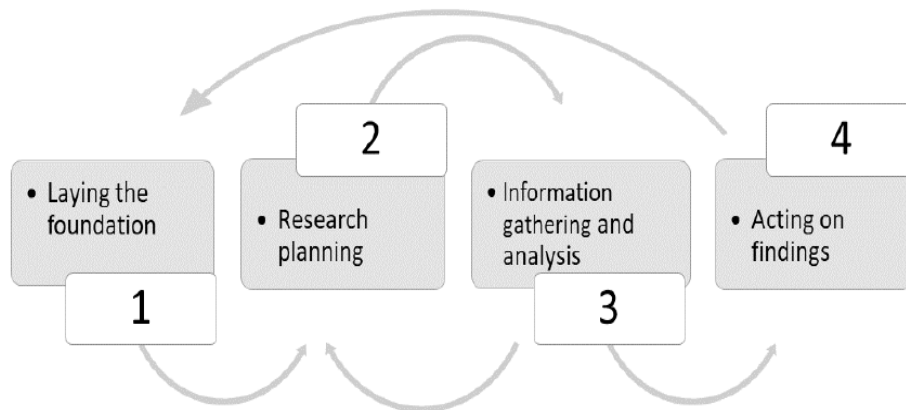


Figure 1. Method stages in CBR

The method in this community service activity consists of several activity stages as follows:

Laying Foundation

At this stage the service team conducted a preliminary study through various sources of information to find out the condition of the target community partners, namely state high school, private high school, and islamic high school's chemistry teachers who are part of the MGMP community in Tulungagung district (Table 1). Apart from that, correspondence, interviews and Focus Group Discussion (FGD) activities were also carried out with chemistry teachers who were part of the chemistry MGMP of Tulungagung district to obtain teacher profiles, MGMP profiles and a complete picture of the problems faced by partners (problem identification), condition mapping. partners, objectives and urgency of activities, partner needs and determining the final target of mentoring, namely creating AKM Chemistry questions.

Through this activity the service team obtains data and knowledge which is used as coordinating material at service team meetings to review the information obtained so as to obtain solutions to the problems faced and determine appropriate service activity program priorities to answer partner needs. Apart from that, it also formulates the competencies of each service team and builds the same perception in carrying out community service in order to get optimal results. At this stage, it is carried out using a

participatory approach, namely actively involving teachers and students. Partners gave a positive response to this stage of the activity and were very enthusiastic to be actively involved in the activity. The list of participants in the AKM Chemistry training community service activities is shown in Table 1.

Tabel 1. List of Participants in Community Service Activities

No.	School Name	Number of Teachers
1	SMAN 1 Kedungwaru	3
2	SMAN 1 Boyolangu	2
3	SMAN 1 Kauman	2
4	SMA N 1 Ngunut	1
5	SMAN 1 Kalidawir	2
6	SMAN 1 Gondang	2
7	SMAN 1 Karangrejo	4
8	SMAN 1 Tulungagung	3
9	SMA Negeri 1 Rejotangan	2
10	SMAN 1 Campurdarat	1
11	SMA Islam Sunan Gunung Jati	1
12	SMA PGRI 1 Tulungagung	1
13	SMA Katolik Santo Thomas Aquino	1
14	SMA Diponegoro Tulungagung	1
15	MAN 1 Tulungagung	2
16	MAN 3 Tulungagung	3
17	MAN 2 Tulungagung	2
18	MAN Tulungagung	5
Total		37

Research Planning

After the community service team has studied the information obtained, the service team determines the service activities required by partners. The team held meetings to prepare service activities and coordinate with partners to obtain agreement on the design of the activities to be carried out to be a solution to the problems faced, determine speakers for each activity and prepare the equipment/instruments needed during the service activities and coordinate the activity participants (Table 1). In this planning, partners are actively involved in planning activities, carrying out internal coordination, and mobilizing members of the MGMP community in SMA/MA to get involved in activities. Apart from that, partners also planned several materials used during the activity, namely examples of AKM chemistry questions. By paying attention to various aspects, it was agreed that the mentoring activities would be in the form of

workshops that implemented an active-based learning approach, namely actively involving participants in service activities so that it was hoped that it would produce something useful for chemistry teachers. This workshop activity consists of socialization (conceptual learning), simulation, and training (procedural fluency).

Chemistry and science concepts are socialized by holding lectures and discussions. Socialization through lectures consisted of three sessions and two meetings with the aim of strengthening understanding regarding AKM. The first meeting discussed (1) increasing teacher competency through AKM, (2) strategies and techniques for preparing AKM questions, and (3) simulations and practice of developing AKM Chemistry questions. The second meeting was related to reviewing AKM teacher questions made by teachers and coaching and strengthening AKM material in chemistry. Each session provides time for discussion so that this socialization allows participants to be actively involved.

Simulation and review activities are a continuation of the previous socialization stage, which aims to strengthen the concepts obtained to provide better understanding to partners. This activity was carried out using a training method consisting of training in creating AKM chemistry questions with various forms of answer choices and discussion of the questions. The AKM questions in chemistry created by teachers are divided into several materials to collect various AKM questions such as reaction rate, hydrolysis, acid-base, equilibrium, colloids, etc.

The service team also created AKM-based chemistry pretest and posttest questions to test teachers' initial and final abilities in the field of AKM. This activity aims to determine the level of basic understanding of teachers in the same field of AKM chemistry and provide competitive learning to teachers so that the results illustrate the extent of the teacher's understanding and fundamental abilities in preparing AKM chemistry questions. After the activity was completed, an evaluative discussion was held between the service members and partners.

Information Gathering and Data analysis

The data collection technique is carried out by involving partners through filling out questionnaires by teachers to get feedback from partners during service activities. Chemistry teacher in MGMP Tulungagung are actively involved in providing activity assessments and suggestions so that partners can also analyze and interpret data

together. Success of this activity can be seen from the presence and activities of partners during the activity and the results of questionnaire analysis using scoring techniques. An activity is declared successful if more than 90% of participants attend and participate in full and participants benefit from increased understanding and insight from this activity. Apart from that, an evaluation of the mastery of AKM chemistry material was also carried out using a value scale based on an analysis of the scores on the teacher's pre-test and post-test answer sheets.

Acting on Findings

At this stage there is action in the form of mobilizing knowledge about existing findings. The service team and partners conducted a short FGD with partners after the activity took place to review existing findings and formulate ideas that could be implemented to improve competency¹⁸. The service team also provides ideas and ideas for activities that can be implemented in the MGMP chemistry work program or implemented in the chemistry learning process at school so that it is hoped that it will spur improvements in the quality of education in the field of chemistry.

Result

The service team began its activities by conducting a study of the conditions and problems faced by chemistry MGMP teachers in Tulungagung district in general and specifically in the field of chemistry in high schools through literature studies, correspondence, participatory interviews and FGDs involving high school teachers in the district chemistry MGMP community. The community service team gains knowledge about the problems faced as part of problem identification. Teacher involvement in FGD also aims to be participatory and contributive to provide suggestions and discussions in solving problems with the hope that the solutions provided can later be implemented in educational policies during the teaching and learning process so as to improve the quality of education¹⁹.

¹⁸ Chotimah, "Pengembangan Sekolah Berbasis Go Green Dan Waste Management Untuk Mewujudkan Green School Di SDI Miftahul Huda Plosokandang Kabupaten Tulungagung."

¹⁹ A. A. Ketut Budiastira, Iwan Wicaksono, and I. Gusti Made Sanjaya, "The New Generation Self-Directed Teaching Materials of Natural Science in Elementary Schools Validity Tests," *International Journal of*

Based on the results of problem identification, information was obtained that the general problems faced were the large number of dissatisfaction from the community with the quality of education, disparities in educational institutions in urban and rural areas in terms of teacher quality, teacher to student ratio, educational facilities, and access to education as well as low community participation in education . Specific problems faced by partners include low student interest in learning and difficulty for students to understand chemistry lessons as well as minimal student participation and achievement in the field of chemistry²⁰. This is caused by the lack of creativity in learning methods and the lack of AKM-based chemistry question training. On the other hand, teachers face obstacles in writing AKM chemistry questions due to limited material and the absence of more intensive training.

After analyzing the data found, recommendations were made to carry out community service activities in the form of mentoring through workshops as an answer to the problems faced and as an effort to improve competency and quality of education. In this workshop activity, the team took the theme "Training on Making Minimum Competency Assessment Questions (AKM) Based on Literacy and Numeracy According to the Independent Curriculum for Chemistry Teachers throughout Tulungagung Regency" which consisted of socialization (lectures and discussions) as well as simulations and training. Socialization (conceptual learning) includes 3 sessions with the aim of strengthening basic understanding regarding learning the AKM chemistry concept, namely material related to increasing teacher competency through AKM, developing AKM Chemistry questions, as well as strategies and techniques for preparing AKM questions. Socialization activities are shown in Figure 1 below.



Instruction 13, no. 4 (2020): 763–780.

²⁰ Irma Rahma Suwarma and Sera Apriyani, "Explore Teachers' Skills in Developing Lesson Plan and Assessment That Oriented on Higher Order Thinking Skills (HOTS)," *Journal of Innovation in Educational and Cultural Research* 3, no. 2 (2022): 106–113.

Figure 2. Enhancing Chemistry Teachers' Competency through AKM Question Development Socialization and Practice

This workshop also provided assistance in the form of a training module for creating Chemistry Minimum Competency Assessment (AKM) questions based on reading literacy and numeracy which is shown in Figure 3.



Figure 3. AKM Chemistry Training Module

After socialization, the activity continues with simulations and training (procedural fluency) to strengthen the concepts that have been obtained so that they can provide better understanding to participants. Simulation and training activities include the application of preparing grids, questions and assessment rubrics for AKM chemistry with different material for each school. Practice and simulation of preparing AKM chemistry question instruments for high school teachers using example questions that have been developed by the HOTS type community service team. The AKM questions were designed by the community service team and the questions have been equated to the AKM chemistry questions. The questions created consist of reading literacy and numeracy literacy. Each component can be several answer choices, for example ordinary multiple choice, complex multiple choice, matching, short essay, and long essay/description. Teachers are also asked to create or look for appropriate infographics according to the context of the problem being discussed. In one infographic, discourse is added as reinforcement and explanation in making AKM questions.

Workshop activities combined with conceptual learning and procedural fluency are the right means, according to partners' needs, to answer the problems they face so

that they can increase teacher competence in preparing AKM chemistry questions and are expected to improve the quality of chemistry education and learning. Partners gain new insights from education experts, then hold interactive discussions and, at the same time, practice making questions based on the instructions given. Through this activity, it is hoped that: (1) it will become a stimulus/idea for teachers to develop innovative chemistry AKM questions according to the needs and conditions of the school as well as the conditions of the students so that students can more easily understand chemistry lessons; (2) increasing the understanding and knowledge possessed by teachers so that they become confident and able to compete competitively in the National Assessment; (3) increasing mastery and completion of HOTS type questions in the field of chemistry; (4) triggering teacher interest and enthusiasm in compiling chemistry AKM instruments; and (5) innovative chemistry learning evaluations can be designed by the core group in the MGMP and try to implement them in the curriculum and MGMP work programs so that a simultaneous movement in learning methods is produced which leads to improving the quality and achievement of education.

Data collection and analysis was carried out by involving partners through assessing mastery of AKM chemistry material using a value scale based on analysis of the values on the question answer sheets as well as filling out questionnaires by the teacher with 5 assessment scales using scoring techniques. As the final stage of providing workshops and mentoring for MGMP Chemistry Teachers in the Context of Improving Competency regarding the Minimum Competency Assessment (AKM) for chemistry based on reading literacy and numeracy, a test was carried out. Trials were carried out to determine the level of success of the training and mentoring program. The test was carried out on 30 chemistry teachers before being given workshops and mentoring. During the pretest and posttest, several teachers did not return, so complete data was collected following the pretest and posttest activities. A comparison table of teacher mastery scores before and after treatment in the form of training and mentoring can be presented in table 2.

Table 2. Statistical Results of Community Service Values

Statistic	Pretest	Posttest
Minimum Value	40	95

Statistic	Pretest	Posttest
Maximum Value	81	80
Average	58,4	87,7
Standard deviation	9,9	3,8
Median	59	87
Mode	63	90
N-Gain	0,7	

Based on Table 2, the average teacher mastery in solving High Order Thinking questions before and after being given treatment in the form of training and mentoring increased by 29.3 % with N-Gain 0,7. This indicates that the data distribution is more concentrated at the central point compared to before treatment was given. From this post-test activity, a collective awareness emerged to try to implement the evaluation of the preparation of AKM questions in discussions of work programs at MGMP and to try to make changes to the processes and methods of chemistry learning in schools. After being given the posttest, service participants were also given a questionnaire sheet to see the extent of the implementation and success of the service activities carried out as shown in Table 3.

Table 3. Teacher Questionnaire Results

No.	Questions	Scoring (%)			
		SS	S	TS	STS
1.	The community service guidelines (PkM) provided in the form of an AKM module contain complete and clear material so that it is easy for me to understand.	83	17		
2.	In my opinion, the assistance provided by the UM Chemistry Lecturer Team in creating AKM chemistry questions has been well organized from pretest, training, assignments, to posttest.	86	14		
3.	I am very interested in following the training until completion because of the availability of direction and assistance for the output of service in the form of a collection of Tulungagung chemistry AKM questions.	90	10		
4.	This workshop, socialization and evaluation of community service (PkM) can help me in writing AKM chemistry questions.	83	17		
5.	This workshop and socialization on making AKM chemistry questions for teachers can help me in preparing students for the National Assessment in the Independent Curriculum.	86	14		
6.	The UM Chemistry Lecturer Team has provided services and responses in accordance with the needs of chemistry teachers and applicable regulations, so I think this training is important to carry out.	93	6		

7.	The UM Chemistry Lecturer Team provides information in language that is easy to understand so that I can gain knowledge from the training carried out.	83	17	
8.	In my opinion, the UM Chemistry Lecturer Team has consistently provided polite and friendly service when assisting in assignments for writing AKM chemistry questions.	90	10	
9.	In my opinion, the UM Chemistry Lecturer Team has facilitated intensive consultations on the creation of AKM chemistry questions both during service events and outside service events.	80	17	3
10.	In my opinion, the UM Chemistry Lecturer Team has provided facilities and infrastructure that support community service activities (PkM).	90	10	

Information: SS = Strongly Agree, S = Agree, TS: = Disagree, STS = Strongly Disagree

The evaluation results show that the implementation of AKM training has succeeded in increasing participants' knowledge or insight regarding AKM. A total of 30 participants, 86% of teachers, stated that they strongly agreed that the workshop and socialization on making AKM chemistry questions for teachers could help teachers prepare students for the National Assessment in the Independent Curriculum. Another statement, 90% of teachers strongly agree that the service team has provided facilities and infrastructure that support community service activities well. Teachers' knowledge of AKM has increased as evidenced by the N-Gain result of 0.7, which is in the high category. This increase in AKM knowledge and insight can be understood because most participants stated that they had never attended AKM training before. The results of this training provide a significant increase in teacher competence in the aspects of chemical concept knowledge and chemistry learning evaluation.

The questionnaire results showed that this activity was beneficial for the participants. Simulation and training activities are the most popular activities with participants, especially during training on preparing AKM chemistry questions, literacy, reading and numeracy. Participants also experienced increased knowledge and insight regarding AKM questions and gained skills in making assessment instruments using grids and scoring rubrics. During the activity, participants were very enthusiastic about asking questions and discussing the material provided, thereby giving rise to other ideas and ideas for learning innovations that could be developed and implemented in schools to improve the quality of chemistry learning. After the team has processed data from this activity, it is hoped that in the future, community service activities will be directed at

increasing students' grades and abilities in solving AKM chemistry questions through intensive training and mentoring. The output product from this service is a chemistry AKM reference book based on reading literacy and numeracy which is supplemented by the results of preparing questions from the chemistry MGMP teacher which is shown in Figure 4.

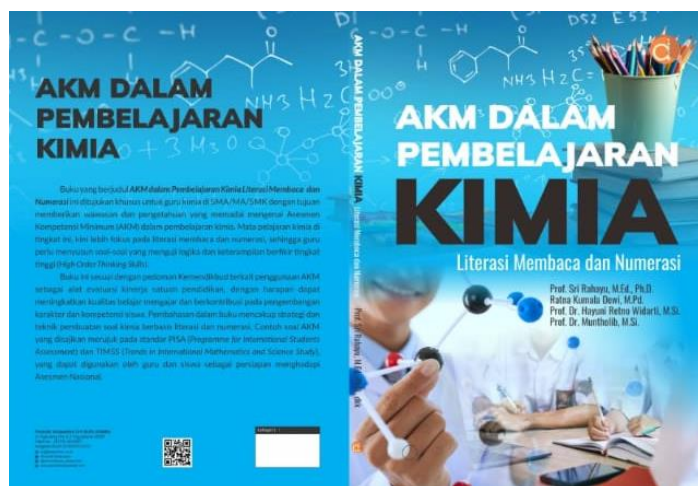


Figure 4. Book of Service Results

Discussion

The results obtained while carrying out the activities show that there has been a change in thinking followed by a commitment to applying the knowledge gained in their respective schools. Teachers are increasingly aware of the importance of increasing competence, especially in developing scientific knowledge and innovation in evaluating chemistry learning. This enhances students' comprehension of the lesson and supports their progress in achieving learning objectives. Increasing the competence of teachers is important because learning is a process of developing knowledge, skills, and behavior that requires the teacher's role as an educator to convey material well to students.

Teachers also need to continue to improve other standard competencies which include mastery of material, understanding of students, learning methods, learning evaluation, personal and professional development²¹. Strengthening individual

²¹ Gisele Ragusa, "Teacher Training and Student Inquiry and Science Literacy: Linking Teacher Intervention to Students' Outcomes in STEM Courses in Middle and High School Classes," in *ASEE Annual Conference and Exposition, Conference Proceedings*, 2012; Jina Chang and Jisun Park, "Developing Teacher Professionalism for Teaching Socio-Scientific Issues: What and How Should Teachers Learn?," *Cultural Studies of Science Education* 15, no. 2 (2020): 423-431, <https://doi.org/10.1007/s11422-019-09955-6>.

competencies can be done through the application of appropriate learning methods and strategies such as developing AKM-based chemistry questions to prepare students to face the National Assessment.

Besides conveying chemical concepts to strengthen knowledge competency in this mentoring activity, the service team also seeks to strengthen teacher and student competency by developing innovations and simulations/practices to prepare innovative HOTS (High Order Thinking Skills) chemistry AKM questions. This CBR service method emphasizes participants' active involvement to better understand the material presented²². This method can increase participants' understanding and competence because it allows them to learn knowledge-based evaluation skills and optimally develop thinking abilities and creativity²³. This is important because studying chemistry requires several abilities, namely the ability to understand, solve problems, and critical thinking skills²⁴.

The main activity used in this service is a workshop combining conceptual learning, procedural fluency, and active-based learning. The partners (teachers) can get the benefits of this activity. This activity effectively improves knowledge, abilities, and quality of learning because it allows for two-way interactive discussions and exchange of information and ideas and strengthens the scientific insight of teachers and students. It also increases teacher interest and skills and fosters a competitive spirit to increase knowledge of AKM-based chemistry learning evaluation, reading literacy, and numeracy.

Based on the results obtained while carrying out activities, it shows that there has been a change in thinking followed by a commitment to apply the knowledge gained in their respective schools where teachers are increasingly aware of the importance of increasing competence, especially in terms of developing scientific insight and innovation in evaluating chemistry learning to make it easier for students to understand the lesson and can help students to increase competence in achieving learning goals. Increasing the competence of teachers is important because learning is a process of developing

²² Moh Hafiyusholeh et al., "Pendampingan Guru Madrasah Untuk Mewujudkan Kompetensi Pedagogik Guru Matematika Yang Berdaya Melalui Penguasaan Soal High Order Thinking Skills (HOTS)," *Engagement: Jurnal Pengabdian Kepada Masyarakat* 4, no. 1 (2020): 183-200.

²³ Hafiyusholeh et al., "Pendampingan Guru Madrasah Untuk Mewujudkan Kompetensi Pedagogik Guru Matematika Yang Berdaya Melalui Penguasaan Soal High Order Thinking Skills (HOTS)."

²⁴ Lely Mutakinati, Ilman Anwari, and Kumano Yoshisuke, "Analysis of Students' Critical Thinking Skill of Middle School through Stem Education Project-Based Learning," *Jurnal Pendidikan IPA Indonesia* 7, no. 1 (2018): 54-65.

knowledge, skills, and behavior that requires the teacher's role as an educator to convey material well to students ²⁵.

Several aspects cause teachers to be unable to work on AKM-based chemistry questions due to inaccuracy in working on the questions and a lack of scientific understanding. This type of AKM chemistry question requires a strong understanding and analytical thinking skills. To increase competence in preparing chemical AKM instruments, there are several suggestions from the community service team to participants, namely: (1) participants/teachers must have a strong understanding of chemical material; (2) carry out learning evaluations in a correct, systematic and conceptual manner according to the AKM format; (3) see examples of previous and relevant AKM chemistry questions for further development; (4) the ability to analyze AKM chemistry questions, literacy, reading and numeracy carefully; and (5) improve problem-solving abilities.

This workshops and training activities, including preparing AKM chemistry questions, literacy, reading, and numeracy, will provide participants with a good learning experience. This learning strategy can increase the teachers' understanding because it involves personal experience through direct observation (listening, seeing, reading, and hearing), association, discussion, inferring, and communication. Through this activity, participants (teachers) can apply it to learning at school and gain direct learning experience through this learning process. The experience will help participants gain broader knowledge to support the development of their active and creative thinking in reading literacy and numeracy.

Conclusion

The minimum competency assessment (AKM) is one part of the national assessment which is a form of educational evaluation program by the Ministry of Education and Culture to provide an overview of the level of student competence in each educational unit in reading literacy and numeracy. Chemistry learning using innovative AKM-based learning evaluations in reading literacy and numeracy is needed to improve

²⁵ Carl R. May, Mark Johnson, and Tracy Finch, "Implementation, Context and Complexity," *Implementation Science* 11, no. 1 (2016): 1–12, <http://dx.doi.org/10.1186/s13012-016-0506-3>.

students' understanding and competence in facing national assessments. Assistance activities through workshops, simulations and training are the most popular activities for partners so that they can strengthen partners' understanding and competence, trigger innovation, increase partners' enthusiasm and interest in learning chemistry and provide valuable experience for partners. The results of the increase in AKM posttest scores show that there is an increase in the results of training and community service with an N-Gain value of 0.7 which is in the high category. The average posttest score is 87.7 which shows that the teachers have been able to make AKM chemistry questions based on reading and numeracy literacy well. The questionnaire results also showed that this community service activity was very useful and provided a very valuable experience for teachers with 90% of teachers answering strongly agree and considered that this training activity was important to do. This training is expected to be continued with activities to train AKM chemistry questions based on reading literacy and numeracy to students in Tulungagung Regency.

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