



Implementation of a Teaching at The Right Level Approach to Improve Chemistry Learning Outcomes at X.3 SMAN 5 Palembang

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Abstract: This research aims to improve the chemistry learning outcomes of X.3 students at SMAN 5 Palembang using the Problem Based Learning model through the TaRL approach. This research uses a quantitative and qualitative approach (mixed method). Qualitative through direct observation, observation instruments and documentation. Meanwhile, quantitative is obtained through calculating the percentage of pre-cycle, cycle I and II using the criteria for achieving learning objectives (KKTP). Student learning outcomes are in 4 categories: Proficient, Competent, Developing and Needs Guidance. After the research was conducted, there was an increase in student learning outcomes in the category requiring guidance or coaching when learning from the pre-cycle decreased, from initially 12(34%) students to 4(11%) students in cycle I, and 0(0%) students in cycle II. In the pre-cycle Developing category there were 12(26%) students, reducing to 6(17%) students in cycle I, and 3(9%) students in cycle II. For the competent category, there was an increase starting from pre-cycle 8(23%), students increased to 10(29%) students in cycle I, and increased again to 17(34%) students in cycle II. The same thing happened in the proficient category where the increase starting from the pre-cycle was 6(17%), students to 15(43%) students in cycle I, and 20(57%) students in cycle II.

Keywords: Chemistry, Learning outcomes, Tarl.

Abstrak: Penelitian ini bertujuan untuk meningkatkan hasil belajar kimia peserta didik X.3 di SMA Negeri 5 Palembang menggunakan model Problem Based Learning melalui dengan pendekatan TaRL. Penelitian ini menggunakan pendekatan kuantitatif dan kualitatif (mix methode). Kualitatif melalui observasi langsung, instrumen observasi dan dokumentasi. Sedangkan kuantitatif diperoleh melalui perhitungan persentase pra siklus, siklus I, dan II menggunakan kriteria ketercapaian tujuan belajar (KKTP). Hasil belajar peserta didik 4 kategori: Mahir, Cakap, Berkembang dan Perlu Bimbingan. Setelah dilakukan penelitian terjadi peningkatan hasil belajar peserta didik pada kategori memerlukan bimbingan atau coaching saat pembelajaran dari pra siklus berkurang yang pada awalnya ada 12(34%) orang peserta didik menjadi 4(11%) orang peserta didik pada siklus I, dan 0(0%) peserta didik pada siklus II. Pada kategori Berkembang pra siklus terdapat 12(26%) orang peserta didik berkurang menjadi 6(17%) orang peserta didik pada siklus I, dan 3(9%) orang peserta didik pada siklus II. Untuk kategori cakap terjadi peningkatan yang dimulai dari pra siklus 8(23%), orang peserta didik meningkat menjadi 10(29%) orang peserta didik pada siklus I, dan meningkat lagi menjadi 17(34%) peserta didik pada siklus II. Hal yang sama terjadi pada kategori Mahir dimana peningkatan yang dimulai dari pra siklus terdapat 6(17%), orang peserta didik menjadi 15(43%) orang peserta didik pada siklus I, dan 20(57%) peserta didik pada siklus II.

Kata Kunci: Hasil belajar, Kimia, Tarl.

• INTRODUCTION

Education is root of a nation's progress. Through education, we can create the future of the nation and also a superior generation that is able to compete with the times. Education can be said to be a process to develop the potential of each individual so that they can live life as a whole, both cognitively, affectively and psychomotorically (Mawati et al., 2023). According to the Republic of Indonesia Law Number 20 of 2003 Chapter 2 Article 3 states that "National education functions to form the abilities and character and civilization of a nation that has dignity so that it can make the life of the nation intelligent, aims to develop the potential of students so that they can become people of faith and piety. to God Almighty, have noble character, be healthy, knowledgeable, capable, creative, independent, and be a democratic and responsible citizen (Setiyaningsih & Subrata, 2013). Therefore, activities in the world of education certainly cannot be ignored, in the midst of increasingly close and intense global competition in the current era. It is hoped that the existence of education that is planned and structured in a structured manner can produce quality education that is very effective and efficient.

The curriculum is the heart of education which determines the direction of the realm of education to produce high-quality human resources. The curriculum does not only contain the core of education but also formulates learning activities that can equip students with aspects of knowledge and attitudes (Subandi, 2014). This is also the government's basic reason for improving the quality and quality of education in Indonesia. Currently, there have been 10 changes to the education curriculum, starting in 1947 (Priantini et al., 2022). The curriculum currently used is the independent learning curriculum. The Minister of Education and Culture Nadiem Makarim's decision on the "Freedom to Learn" movement aims to liberate learning. The learning process in the independent curriculum is more flexible for students, because the learning process is carried out based on the nature and era of students in accordance with Ki Hadjar Dewantara's thoughts. Natural nature with a positive culture of the school environment can shape students' good morals. Meanwhile, the nature of the Age is based on developments over time (Muna & Fathurrahman, 2023). Through independent learning, students can get to know and understand various materials using a scientific approach that can be done anywhere, anytime, where learning activities no longer depend on the teacher.

A professional teacher in implementing the learning process should be able to consider several things that can lead to student development and ways of thinking (Fitria et al., 2018). The critical thinking learning process for students can be trained and developed to increase the meaningfulness of learning. Success in the teaching and learning process is certainly inseparable from the role of a teacher who has the ability to develop learning models that are oriented towards effective student involvement in the learning process. Learning models are certain learning steps that can be implemented with the hope of achieving learning goals and competencies more quickly, effectively and efficiently (Kaban et al., 2020). One model that can be used in an independent curriculum that can create creativity and critical reasoning in students is the problem-based learning model.

According to Nata (2014) the problem-based learning model is a learning model that can train students' thinking skills where students will be actively involved in study groups. Apart from that, with this problem-based learning model, students can construct knowledge and discover their own learning concepts and solve problems. Problem-based

learning can also be an appropriate alternative for improving the quality and learning outcomes of students (Limbong & Silaban, 2023). This problem based learning model can teach students to have a spirit of great responsibility in learning (Safira & Andromeda, 2023). However, sometimes in the learning process there are still students who have not been able to achieve the learning objectives, this can be because the development stages and levels of achievement of students have different starting lines. The new learning paradigm in the independent curriculum provides flexibility for teachers to accommodate by paying attention to the diversity of characteristics and abilities of students by using aspects of the differentiated process as well as the TaRL (Teaching at the Right Level) approach. According to (Ambarita & Solida, 2023), aspects of the differentiation process can refer to: 1.) students can understand information, ideas and also skills. 2.) can reflect learning styles and preferences, 3.) vary the learning process depending on how students acquire knowledge. This can also be done by grouping students based on pretest results before learning or cognitive diagnostic assessments.

The Minister of Education and Culture of the Republic of Indonesia, Nadiem Makarim, said that the presence of this independent curriculum is an innovation in creating a pleasant learning atmosphere without burdening students. Nadiem also hopes that student learning outcomes will no longer be based on KKM (Minimum Completeness Criteria) which sometimes makes it difficult for teachers (Inayati, 2022). However, currently it has changed to KKTP (Criteria for Achievement of Learning Objectives). The teacher will determine criteria or indicators for achieving goals using instruments in the form of rubrics, exemplars, checklists, anecdotal notes and also graphs. In this independent curriculum, the success of students' learning process can also be seen from students who have succeeded in achieving learning objectives. Where the preparation of learning objectives itself must consist of components, namely competence and content (Sufyadi et al., 2022)

Teaching at the right level is an approach to the learning process based on student development in which learning activities become more flexible because they adapt to the level of students' understanding (Suharyani et al., 2023). Learning activities at Teaching at the Right Level can be carried out by carrying out initial formative assessment activities before studying. This is useful for knowing students' understanding or abilities as well as student characteristics. Then the results are grouped based on level of understanding. This is also related to aspects of the differentiated learning process in the independent curriculum, placing students based on their characteristics.

Based on the author's observations at SMAN 5 Palembang, there are still many students in chemistry subjects who show that the students' learning outcomes are still less than optimal and have not reached the criteria for achieving learning objectives. The use of the Teaching at The Right Level approach in chemistry learning in the Merdeka curriculum using a differentiated problem-based learning model process has not yet been carried out much research. Through this, the author is interested in conducting classroom action research using a problem based learning model with a teaching at the right level approach with the aim of seeing the process of improving student learning outcomes after implementing the TaRL approach.

• **METHOD**

The research used was Collaborative Classroom Action Research which was carried out in collaboration between Pre-service PPL PPG students and tutor teachers, as well as PPL supervisors. Where the researcher takes action, while the teacher or

colleagues during the process act as observers. Action as an observer is to focus on practical problems and solve problems as quickly as possible (Setyosari, 2013). The object of the research is the implementation of the Problem Based Learning learning model with the Teaching at the Right Level approach with the research subjects being class X.3 students consisting of 35 students including 18 female students and 17 male students. This research was carried out in 2 cycles.

In an effort to improve students' chemistry learning outcomes at SMAN 5 Palembang using a problem based learning model with the Teaching at the Right Level approach, there are 4 stages carried out in 1 cycle. This is referred to based on the Kemmis & Taggart model, namely planning (Plan), carrying out actions (Act), carrying out observations (observe), holding reflection or analysis (Reflection) (Arikunto et al., 2015). Once the cycle 1 actions have been carried out, they have been put into practice. Then reflection will be carried out, then after reflection it will be followed by re-planning which is carried out in the form of cycle 2.

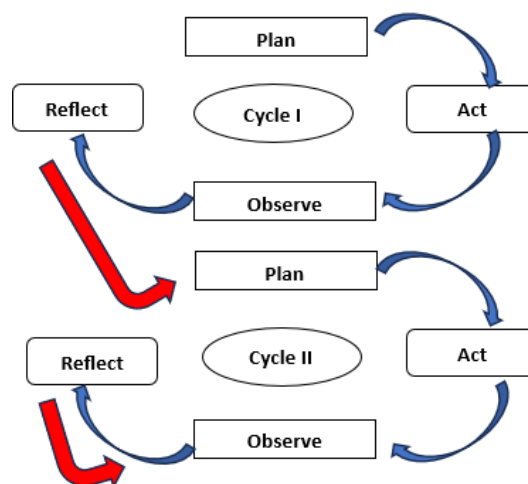


Figure 1. Classroom Action Research

The type of approach used is quantitative and qualitative (mixed method), namely explanatory mixed-method design (Creswell, 2012). To collect quantitative data through data collection techniques from pre-cycle, cycle I and cycle II learning outcomes using criteria for achieving student learning objectives adopted from the Guidebook and Learning Assessment. Meanwhile, qualitative data was obtained through data collection techniques, namely 1.) direct observation in class regarding the problems to be observed, 2.) Using observation instruments for student activities during learning, 3.) documentation in the form of photos and videos as evidence of the implementation of activities. The following are the criteria for achieving student learning objectives that are used:

Table 1. Criteria Achievement of Learning Goals Learners

Category	Value Range	Information
Proficient	90-100	Already reach completeness, necessary enrichment or challenge more.

Category	Value Range	Information
Competent	80-89	Already reach completeness, no needs remediation.
Develop	70-79	Not yet reached completeness, remediation certain.
Need Guidance	<69	Not yet achieved, remedial throughout part.

Source: (Sufyadi et al., 2022)

Table 2. Criteria Rubric Achievement of Learning Goals Learners

Cycle I

Material	Nomenclature of Chemical Compounds
Learning objectives	<ul style="list-style-type: none"> ● Participant educate understand and determine formula chemistry and nomenclature organic compounds ● Participant educate understand and determine formula chemistry and nomenclature compound inorganic ● Participant educate analyze formula chemistry and names related compounds with source and/ or solution problem global issue.
Indicator Achievement of Learning Goals	<ul style="list-style-type: none"> ● Participant educate can write formula organic and inorganic chemistry with Correct ● Participant educate can write formula chemistry If its constituent ions are known ● Participant educate can determine Name compound from formula chemistry ● Participant educate can analyze compound chemistry that can meet in life. ● Participant educate can determine constituent cations and anions compound
Indicator Achievement of Learning Goals	<ul style="list-style-type: none"> ● Participant educate can write formula organic and inorganic chemistry with Correct

	<ul style="list-style-type: none"> ● Participant educate can write formula chemistry If its constituent ions are known ● Participant educate can determine Name compound from formula chemistry ● Participant educate can analyze compound chemistry that can meet in life. ● Participant educate can determine constituent cations and anions compound
Category	<ul style="list-style-type: none"> ● Proficient (if participant educate has achieve 5 KKTP indicators) ● Speak (if participant educate has achieve 4 KKTP indicators). ● Developing (if participant educate has achieve 3 KKTP indicators). ● Need Guidance (if participant achieve <3 KKTP indicators).

Cycle 2

Material	Stoichiometry
Learning objectives	<ul style="list-style-type: none"> ● Participant educate capable explain connection draft base stoichiometry (mole concept) and concentration substance in compound vinegar pempek. ● Participant educate capable counting (mole concept) and levels substance in compound. ● Participant educate can determine reaction barrier ● Participant educate can convert substance use formula base stoichiometry
Indicator Achievement of Learning Goals	<ul style="list-style-type: none"> ● Participant educate capable count mass molecule relatively something substance ● Participant educate capable count rate substance in compound chemistry ● Participant capable apply mole concept for finish calculation chemistry ● Participant educate capable convert mass substance into the mole shape ● Participant educate can determine reaction barrier

Category	<ul style="list-style-type: none"> ● Proficient (if participant educate has achieve 5 KKTP indicators) ● Speak (if participant educate has achieve 4 KKTP indicators). ● Developing (if participant educate has achieve 3 KKTP indicators). ● Need Guidance (if participant achieve <3 KKTP indicators).
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Data analysis techniques used on quantitative data that is descriptive quantitative with calculation percentage For see enhancement results Study participant educate. After That done data processing uses calculation formula as following:

$$Me = \frac{\sum Xi}{N}$$

Information:

Me: average (Mean)

$\sum xi$: Jumlah semua nilai

N: Amount individual

Source: Sugiyono (in Wastari & Sagoro, 2018).

● RESULT AND DISCUSSION

This collaborative classroom action research involves colleagues and tutors as observers in the implementation of classroom teaching. The researcher himself plays the role of actor (action). Collaborative research aims to improve overcome problems regarding learning, personal and social problems experienced by students (Panjaitan et al., 2022). Data collection was carried out consecutively in class X.3 in chemistry learning 2 JP. The following is a recapitulation of student learning outcomes.

Table 3. Recapitulation Results Study Learners

Category	Information	Pre Cycle	Amount	Cycle I	Amount	Cycle II	Amount
		Percentage		Percentage		Percentage	
Proficient	90-100	17%	6	43%	15	57%	20
Competent	80-89	23%	8	29%	10	34%	12
Develop	70-79	26%	9	17%	6	9%	3
Need Guidance	<69	34%	12	11%	4	0%	0

Based on the table presented above, the data obtained are the learning outcomes of pre-cycle, cycle I and cycle II students from 35 students in class X3 of SMA 5 Palembang. Students are grouped into 4 categories, namely students who are Proficient, Competent, Developing, and need Guidance. The results of this grouping were obtained based on the students' Pre-Cycle results. Of the 35 students, 6 students are in the proficient category with a percentage of 17%, 8 students are in the competent category with a percentage of 23%, 9 students are in the developing category with a percentage of 26%, and 12 students are in the need guidance category with a percentage of 34%.

In the first cycle, the learning outcomes of students in the Proficient category were 15 students with a percentage of 43%, 10 students in the competent category with a percentage of (29%), 6 students in the developing category with a percentage of (17%),

and 4 students in the developing category with a percentage of (17%). students need guidance with a percentage (11%). Furthermore, in cycle II, the learning results of students in the proficient category were 20 students with a percentage of (57%), 12 students in the competent category with a percentage of 34%, 3 students in the developing category with a percentage of 9% and 0 students who needed guidance. The following are the results of the recapitulation when presented in bar chart form:

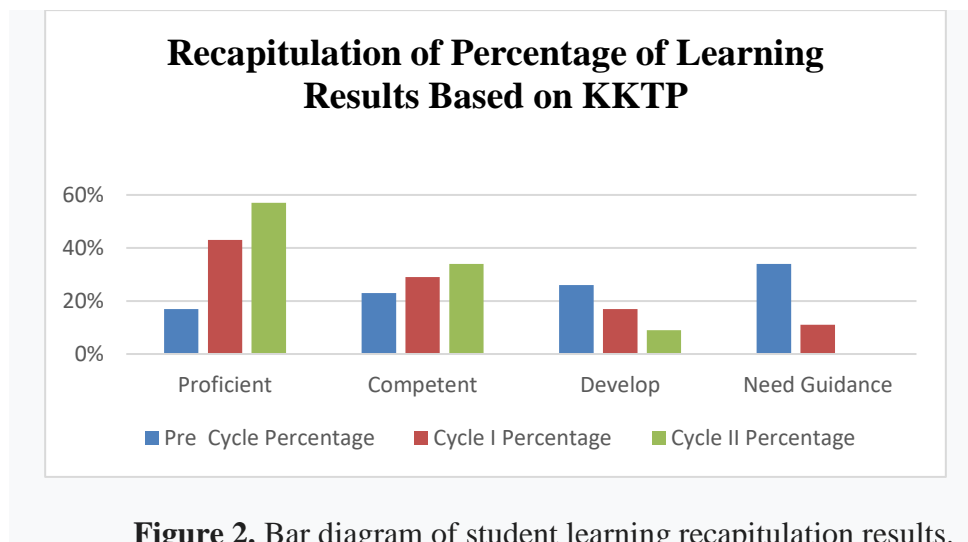


Figure 2. Bar diagram of student learning recapitulation results.

This research was carried out twice in cycles using qualitative and quantitative data collection techniques in class X.3 of SMAN 5 Palembang. Learning activities are carried out using the Teaching at The Right Level approach where students learn based on their phase of ability. The learning process carried out is a new learning paradigm for implementing the independent curriculum using a problem based learning model. According to (Jusuf & Sobari, 2022) in the independent curriculum the focus of learning is more on essential material that can improve students' basic competencies and also teachers have flexibility in implementing learning. The achievement indicators used use learning objective achievement criteria (KKTP) which are arranged in the form of a rubric. There are provisions for using the rubric in grouping student learning outcomes based on intervals. Pre-cycle and cycle I and cycle II activities are categorized as proficient if students have achieved 5 indicators. For the competent category, it reaches 4 indicators, develops 3 indicators, needs guidance <3 indicators. In cycle I activities, students learn the nomenclature of compounds, while in the cycle they learn about stoichiometry.

The initial stage of learning activities begins with students carrying out an initial formative assessment in the pre-cycle to determine the learning group, but before carrying out this assessment the teacher also has observation data on student characteristics. After obtaining the pre-cycle assessment results, students are grouped based on ability levels consisting of 4 categories: Proficient, Competent, Developing, and requires Guidance. The grouping of students in this case is included in the differentiated learning process aspect because students are given different actions according to their stages. In process differentiation, teachers really understand the needs of students (Sutrisno, 2023). From the results of the assessment, it was found that 6 students were in the proficient category with a percentage of 17%. In the learning process, no treatment was required during the first cycle process, similarly for 8 students in the competent category with a percentage

of 23%. Then, for 9 students in the developing category with a percentage of 26%, and 12 students in the need-guidance category with a percentage of 34%, they will receive different treatment from the developing group and need guidance, and they will need quite intense assistance to improve and build their learning understanding.

Cycle I begins with learning activities using problem based learning syntax where the teacher provides trigger questions in the form of pictures and videos to spark students' reasoning and insight. Then students sit in groups and are given LKPD (student worksheet) to conduct group discussions. This group discussion activity involves cooperative activities, mutual cooperation, thinking skills and mutual cooperation among students. Using this problem based learning model is the right solution to improve students' thinking and problem solving abilities (Satwika et al., 2018). It is also hoped that after participating in this learning, students will not only have freedom in the content of the material but can make each individual student have the character of a Pancasila student profile, as well as become an agent of change for every environmental problem because learning is more contextual. In developing groups that need guidance, coaching or guidance activities are carried out during the ongoing learning process with the aim of producing improved learning outcomes and catching up with students in understanding several indicators. The results obtained by carrying out this first cycle activity showed an increase in the posttest results of students, namely in processes requiring guidance from 12 (34%) students to 4 (11%) students, then in the growing category from 9 (26%) people to 6(17%) people. Then the results obtained were an increase in competent learning outcomes from 8(23%) students to 10(29%) students and proficient students from 6(17%) students to 15(43%). This increase in cycle 1 shows the success of the teaching at the right level approach. Where the process treatment and also the grouping of students is appropriate according to their level of ability, where students who are still developing in the problem-solving learning process are given assistance or guidance in the form of videos that can spark students' thinking. For proficient groups who have completed their group work, they are given the opportunity to tutor their peers who are in the developing category and need guidance. Following served picture diagram stem enhancement results Study pre cycle to cycle I participants studied at X.3 SMA Negeri 5 Palembang.

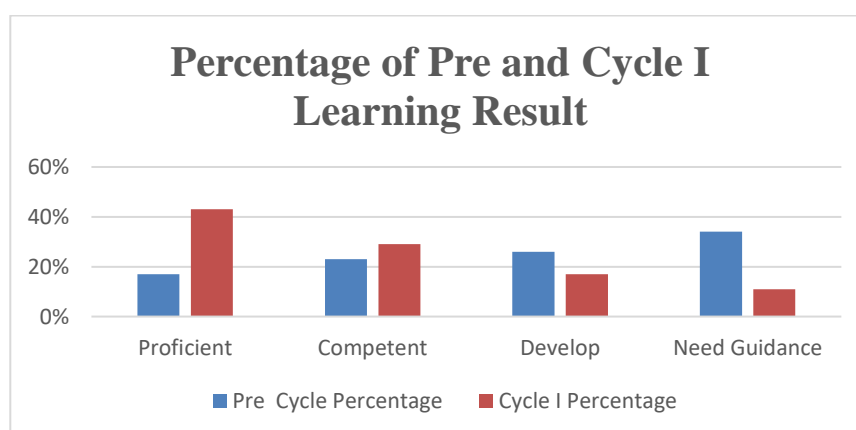


Figure 3. Bar diagram of recapitulation of pre-cycle and cycle I student learning

In Cycle II, students were grouped based on the results of the posttest in cycle I, so that the teacher continued to carry out guidance activities for 4 students in need and 6 students in the developing category. During the activity process, student group discussions present articles related to the culture around where the students live. There is a group of proficient and competent participants who have completed the results of the discussion before the end of time so that the teacher provides challenge questions that can challenge the students. After the implementation of cycle II, there was an increase in student learning outcomes, where in the category needing guidance from 4(11%) students to 0(0%), growing from 6(17%) students to 3(9%), competent. 10(29%) students became 17(34%), proficient 15(43%) students became 20(57%). Below is a bar diagram of the increase in learning outcomes from cycle I to cycle II of students at X.3 SMAN 5 Palembang.

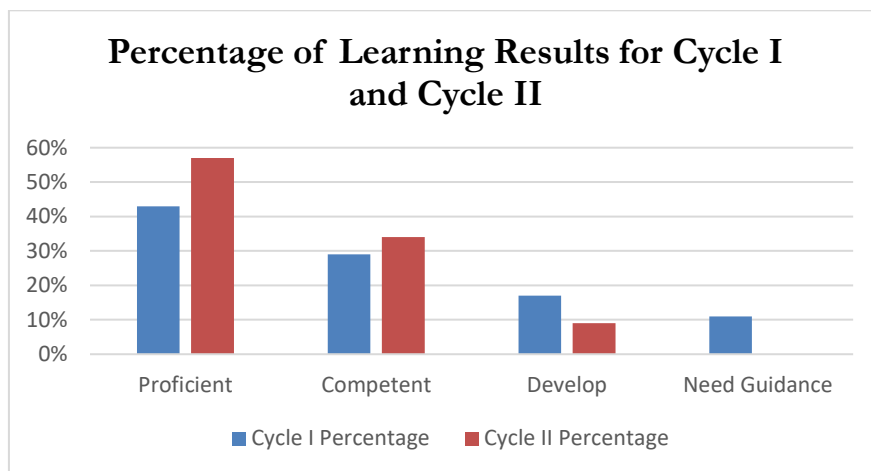


Figure 4. Bar diagram of recapitulation of student learning outcomes for Cycle I and Cycle II

The 2 cycle activities in the research that have been carried out show an increase in the learning outcomes of class X.3 students at SMA Negeri 5 Palembang in the Chemistry subject. The process of a teacher's treatment in implementing learning can have a very significant impact on the way students understand the material in learning. The learning carried out provides 21st century learning skills for students. This is in line with several previous studies such as (Ningrum & Juwono, 2023) which stated that the TaRL (Teaching at The Right Level) approach is very effective to be applied in learning that involves students' numeracy, reading and writing abilities. Research (Syerlinda et al., 2023) with the application of the Teaching at the Right Level (TaRL) approach to excretory system material can be concluded that there has been an increase in learning outcomes for class VIII.1 students with an increase in n-gain from 0.21 with low criteria and an increase of 0.38 in the medium category.

• CONCLUSION

Implementation of the problem based learning model with a teaching at the right level approach at SMA Negeri 5 through classroom action research as an effort to improve student learning outcomes in the independent curriculum through process differentiation. The learning outcomes of students from the 4 categories of Proficient, Competent, Developing and Need Guidance from pre-cycle, cycle I and cycle II showed an increase

in learning achievement. In the category requiring guidance or coaching during learning from the pre-cycle, there were initially 12(34%) students reduced to 4(11%) students in cycle I, and 0(0%) students in cycle II. In the pre-cycle Developing category there were 12(26%) students, reducing to 6(17%) students in cycle I, and 3(9%) students in cycle II. For the competent category, there was an increase starting from pre-cycle 8(23%), students increased to 10(29%) students in cycle I, and increased again to 17(34%) students in cycle II. The same thing happened in the proficient category where the increase starting from the pre-cycle was 6(17%), students to 15(43%) students in cycle I, and 20(57%) students in cycle II.

Based on the results of research that has been carried out, the Teaching at The Right Level approach can help students who are lagging behind in learning or have low learning abilities to be accommodated well through this approach, so Chemistry Teachers are advised to use the Teaching at The Right Level (TaRL) approach. and combining it with other learning models as an alternative can improve student learning outcomes. For future researchers, 2-3 meetings per cycle can also be conducted to obtain maximum data results.

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