

Portrait of a Chemistry Teacher's Efforts in Creating an Inclusive Classroom

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Abstract: High school chemistry teachers in the Special Region of Yogyakarta can use this research as a source of information and a reference for developing curriculum implementation, learning strategies, and inclusive classroom assessments. and as input for the development and improvement of inclusive education programs for Yogyakarta equivalent high schools, especially in other districts that want to realize inclusive classes in general. This research study uses a qualitative descriptive method to describe the experience of teaching the object under study. that the percentage of learning strategies for teaching students with disabilities in the application of inclusive chemistry classes that were agreed upon with an average of 79% had the highest percentage, disagreed with 13%, and doubted 8%. For the percentage of learning strategies for teaching students with disabilities in the application of inclusive chemistry classes, agreement with an average of 85% has the highest percentage, disagreement is 7%, and doubt is 7%. And the percentage of learning development monitoring and assessment techniques for persons with disabilities in the application of the inclusion chemistry class agreed, with an average of 86% having the highest percentage, 11% disagreeing, and 4% unsure.

Keywords: inclusion class, curriculum flexibility, learning strategies, and learning evaluation.

Introduction

Education is the right of all countries, and every citizen has the right to education. This is a bridge for every citizen to receive a proper education, including students with disabilities (Sistem Pendidikan Nasional, 2020). Students with disabilities, who are called students with disabilities, are children who are different from the average child in terms of physical, mental, social, and intellectual limitations, and sometimes even experience extraordinary experiences that are different from the average child (Köb and Janz, 2021). In the field of education, students with disabilities have the same rights as other students. Although educational services for students with disabilities are different from those for ordinary children because they have their own uniqueness and characteristics, This situation requires the provision of educational services that meet their needs (Damianidou, 2021).

In Indonesia, there are many schools that provide special services for students with disabilities, including segregation, integration, and inclusion education (Latifah, 2020). The segregation education system is an education system that separates students with disabilities from the general education system (Calderón-Almendros, Moreno-Parra and Vila-Merino, 2022). The implementation of the segregation education system is carried out separately from the special implementation of general children's education, such as SLB/A (for blind children), SLB/B (for deaf children), SLB/C (for mentally retarded children), SLB/D (for children with physical impairments), SLB/E (for disabled children), and others (Nisa, 2020). Integration Education is an education service system that provides opportunities for students of special schools (SLB) to study in regular schools at certain times, depending on the class of the special schools, such as only in arts or physical education classes. So SLB students are in the same class as regular students (Aqielhaiqal, 2021).

There are various types of integrated education. First, regular schools have special classes for students who receive the same special education, for example only for blind students. Second type Second, regular schools have special rooms for regular students (students with disabilities) who experience learning difficulties due to their physical condition (Insani, Dewi and Furnamasari, 2021). Meanwhile, inclusive education is an education system that provides opportunities for all students with disabilities and intellectual and/or special talents to participate in education or learn in an educational environment with average students (Simón, Palomo and Echeita, 2021). The goal of inclusive education is to ensure that all children have access to education that is affordable, effective, relevant, and appropriate in the areas where they live (Brydges and Mkandawire, 2020).

Meanwhile, inclusive chemistry education is an approach to teaching chemistry that accommodates the needs and abilities of each student, including students with disabilities (Suprihatiningrum, 2016). Inclusive education emphasizes that all students can learn together in the same class, regardless of their background or abilities. This includes providing accessible and meaningful learning experiences for all students, including those with disabilities or special needs (Higgins, Phillips and Cowan, 2013). This also means ensuring that course material is presented in a way that all students can understand it and providing additional support to students who need it to ensure that they are able to participate effectively in class (Gasong, 2018).

Research conducted by (Oktavia, 2022), states that, in an effort to improve inclusive education services, it is expected that teachers can use interesting learning media and optimize student work more, and chemistry teachers should have the knowledge and ability to understand students with disabilities. Research discussing the same topic (inclusive) by (Angreni and Sari, 2022), stated that schools and teachers had not provided services (implementation of learning, media, learning strategies, class curriculum, and service models) that were in accordance with the needs of students with disabilities. And teachers are advised to collaborate with teachers in other schools to

develop learning tools, classes, and service models with the help of special accompanying teachers. Research conducted by (Sari, Fernandes and Febriani, 2022), stated that the teacher had not been able to optimize the inclusive learning strategy with the ability to manage the class, as the teacher's assessment of children with special needs was also different from other children.

Chemistry learning can be carried out inclusively. However, there are obstacles and challenges for schools, especially for teachers who want to create an inclusive class. As for the obstacles found in the research mentioned above, there are educators who lack knowledge of curriculum implementation, learning and assessment strategies, accessibility barriers, and limited learning resources. From there, it becomes a challenge for chemistry teachers to create an inclusive class.

These three components (curriculum, learning strategies, and assessment) are the principles for becoming professional educators, as explained in the national curriculum system, namely that the learning design takes into account the stages of development and the current level of achievement of students and reflects the characteristics and development of students that vary according to learning needs, making learning meaningful and interesting. Lessons are designed and implemented to develop the ability to become lifelong learners (Purba *et al.*, 2021). The learning process supports the development of all abilities and characters in students. Relevant learning, defined as learning tailored to students' backgrounds, environments, and cultures, with parents and the community as partners, and long-term learning (Triwiyanto, 2015).

Based on the indications of the problems above in the application of inclusive education and learning practices as the basis for implementing inclusive classes for chemistry subjects, researchers want to examine the portrait of chemistry teachers' efforts in realizing inclusive classes in senior high schools of the same level in the Special Region of Yogyakarta. This research was raised based on problems in the application of inclusive chemistry in the Special Region of Yogyakarta, namely research conducted by (Hanum, 2019) that there

are obstacles in implementing inclusive chemistry classes, namely the application of learning for deaf students when the class is noisy and deaf students who are less active. Whereas for blind students, the teacher has difficulty managing time. In another study conducted by (Ristiyanti, 2020), It was mentioned that chemistry teachers frequently use this word when explaining material to blind students, whereas the teacher explains material to deaf students with unclear and too fast lip movements. Because of that, the constraints of both ensure that students have difficulty understanding the material presented. There hasn't been a lot of research done on the efforts of chemistry teachers to create inclusive classes.

The findings obtained from this study can be used by high school chemistry teachers in the Special Region of Yogyakarta as a source of information and a reference for developing curriculum implementation, learning strategies, and inclusive classroom assessment. and as a contribution to the development and improvement of inclusive education programs at equivalent high schools in the Special Region of Yogyakarta in particular, as well as in other regions that wish to implement inclusive classes.

Materials and Methods

Study area

This research study was conducted using a qualitative descriptive method that guides researchers to explore or photograph social events that will be studied thoroughly, extensively, and deeply (Ramdhan, 2021). According to Bogdan and Taylor, a qualitative approach is a research procedure that produces descriptive data in the form of written or spoken words from people and observed behavior. Qualitative research focuses on social phenomena, giving voice to the feelings and perceptions of the participants under study (Solihin, 2021).

Procedures

Respondents to this study consisted of 4 chemistry teachers from senior high schools in Yogyakarta, including 2 public schools and 2 private schools. The research object refers to the teacher's

experience in realizing an inclusive class. Respondents were selected and recruited purposefully using an official letter containing a brief description of the research, accompanied by a letter of interest and a consent form to become a respondent.

Data analysis

The research data collection technique was carried out by written interviews, which were carried out by giving a set of written questions to respondents in the form of a questionnaire to answer, which contained 50 statement items. The questionnaire was developed using a Likert scale of 3 (S: agree, RR: undecided, and TS: disagree). The questionnaire used in this study was a closed questionnaire, i.e., one with answers already provided, so that respondents only had to choose and answer directly (Sugiyono, 2008). The results of the questionnaire were analyzed using descriptive statistical techniques. Descriptive statistics are statistics that are used to analyze data by describing it or describing it as it has been collected without intending to make generally accepted conclusions or generalizations (Sugiyono, 2014).

Results and Discussion

Description of Respondents

Respondents in this study consisted of four chemistry teachers (all male) from four senior high schools in the Province of D.I. Yogyakarta. The first respondent (a) has 28 years of teaching experience. While teaching, he has handled students with disabilities of the blind and quadriplegic types. The second respondent (b) has 25 years of teaching experience and, while teaching, has worked with students with disabilities, including blind, mentally retarded, quadriplegic, and deaf. The third respondent (c) has 16 years of teaching experience. While teaching, he has handled students with disabilities of the deaf, low vision, blind, and autistic types. The fourth respondent (d) has 22 years of teaching experience; while teaching, he has worked with students with deafness and mild physical disabilities.

Chemistry Curriculum for Students with Disabilities

The curriculum used by the four respondents who were students with disabilities used the K13 curriculum. Where is the respondent (a)? The curriculum used is the regular curriculum, which has been modified to meet the needs of the child. This curriculum is dynamic and constructive, so it can be adapted according to differences in age, ability, physical, social, economic, ethnic, and religious conditions of students. Passing standards have also been modified to suit the objectives, content, materials, processes, and assessments that have been determined. Teachers do not follow the curriculum rigidly but can adjust it according to the needs of students. Learning programs that are designed and implemented are believed to be able to meet the needs of students, and learning objectives can be negotiated for students.

For respondent (b), the curriculum used is the regular curriculum, which is not modified according to the needs of the child. This curriculum is not dynamic and not constructive, so it cannot be adapted according to differences in age, abilities, physical, social, and economic conditions, ethnicity, and religion of students. This curriculum is not modified based on predetermined goals, content, materials, processes, or assessments. Teachers follow the curriculum rigidly without making any adjustments according to the needs of students. Learning programs that are designed and implemented are believed to be able to meet student needs, but learning objectives cannot be negotiated.

As for respondent (c), the curriculum used is the regular curriculum, which has been modified to meet the needs of the child. This curriculum is dynamic and constructive, so it can be adapted according to differences in age, ability, physical, social, economic, ethnic, and religious conditions of students. Passing standards have also been modified to suit the objectives, content, materials, processes, and assessments that have been determined. Teachers do not follow the curriculum rigidly but can adjust it according to the needs of students. Learning programs that are designed and implemented are believed to be able to meet the

needs of students, and learning objectives can be negotiated for students.

And respondent (d) says: "The curriculum used is the regular curriculum, which has been modified to meet the needs of the child." This curriculum is dynamic but not constructive, so it cannot be adapted according to differences in age, abilities, physical, social, and economic conditions, ethnicity, and religion of students. The graduation standards are not modified, and the curriculum is not modified based on predetermined objectives, content, materials, processes, and assessments. Teachers do not follow the curriculum rigidly but can adjust it according to the needs of students. Learning programs that are designed and implemented are believed to be able to meet the needs of students, and learning objectives can be negotiated to ensure the quality of life in the community. The statistical data obtained can be seen in the following table:

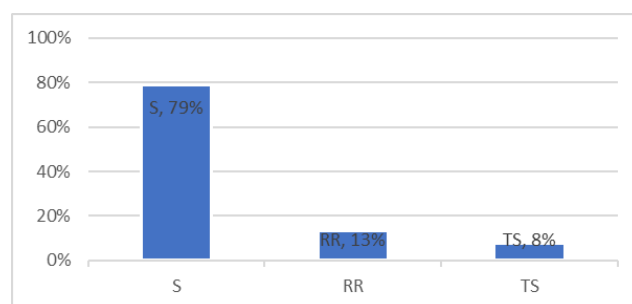


Table 1. (Chemistry Curriculum for Students with Disabilities)

Based on interview data with the four respondents above, the percentage of the curriculum for students with disabilities in the implementation of the inclusive chemistry class agreed, with an average of 79% having the highest percentage, 13% disagreeing, and 8% unsure, as listed in table 1.

Therefore, based on the results above, the Chemistry Curriculum for Students with Disabilities is a modified version of the regular curriculum that has been adapted to meet the special needs of students with disabilities. This curriculum is dynamic and constructive, which means that it can be changed according to differences in students' ages, abilities, physical, social, economic, ethnic, and religious conditions.

Thus, the chemistry curriculum for students with disabilities must pay attention to the special needs of these students, such as the need for

repetition and more detailed explanations, the use of visual or audio materials to help understand material, or the use of assistive technology to assist students in doing assignments or accessing subject matter as expected (Mutia and Cahyani, 2021). This curriculum must also pay attention to students' abilities to understand and apply chemistry concepts and provide challenges according to those abilities (Lailiah *et al.*, 2021).

In addition, the chemistry curriculum for students with disabilities must also pay attention to the need for adaptation to a learning environment that suits the needs of students. This can include adjustments to the equipment or devices used, as well as adjustments to the teaching methods or strategies used (Okech, Yuwono and Abdu, 2021). By taking into account the special needs of students with disabilities, this modified chemistry curriculum can help these students learn more effectively and gain a better understanding of chemistry subject matter (Oktavia, 2022).

For graduation, standards have also been modified to suit the objectives, content, materials, processes, and assessments that have been determined. This allows teachers to not follow the curriculum rigidly but to adapt it according to the needs of students. Learning programs that are designed and implemented are believed to be able to meet the needs of students, and learning objectives can be negotiated for students. This modified passing standard system is an effort to pay attention to the uniqueness of each student and allows teachers to provide appropriate support according to the needs of these students (Toharudin and Yusuf, 2020). Thus, students with disabilities are no longer limited by a rigid curriculum but can participate in learning programs that are tailored to their needs, and learning objectives can be negotiated with teachers. This is an important step to ensure that students with disabilities get fair and equal access to quality education (Wang, 2019).

Meanwhile, the Chemistry Curriculum for Students with Disabilities is a curriculum specifically designed to meet the needs of students with disabilities who study chemistry. This curriculum can be changed according to the needs of students, and graduation standards have also

been modified to suit the goals, content, materials, processes, and assessments that have been determined. Learning programs that are designed and implemented are believed to be able to meet the needs of students, and learning objectives can be negotiated for students.

This specially designed curriculum is an attempt to pay attention to the uniqueness of each student and allows the teacher to provide appropriate support according to the needs of that student (Bachtiar, 2020). Thus, students with disabilities are no longer limited by a rigid curriculum but can participate in learning programs that are tailored to their needs, and learning objectives can be negotiated with teachers. This is an important step to ensure that students with disabilities get fair and equal access to quality education (Suprihatiningrum, 2016).

Learning Strategies for Teaching Students with Disabilities

Learning strategies applied by respondents to students with disabilities, respondent (a) Teachers have the necessary knowledge and skills to select and adapt subject matter and teaching according to the special needs of each student. Various classroom management strategies, such as team teaching, cross-grade grouping, peer tutoring, and teacher assistance teams, are used to create a cooperative learning environment and promote socialization for all students. Learning activities provide opportunities for students to practice, experiment, or find something through observation, research, and others.

All students are given the opportunity to develop their skills and talents. The teacher explains the objectives of learning or study groups to students, and learning activities are designed based on the individual differences, needs, and interests of students. Classroom environments, exhibits, and other resources aid student independence in learning. Learning activities are also designed based on the age difference between students. Teachers use a variety of learning methods to increase student activity and cooperation in learning. Schools also have adaptive teaching aids and media to help students understand the subject matter.

For respondent (b), teachers use various classroom management strategies such as team teaching, cross-grade grouping, peer tutoring, and teacher assistance teams to create a cooperative learning environment. However, teachers do not create learning environments that promote socialization for all students. Learning activities are designed based on individual differences and student needs.

The teacher explains the purpose of learning or study groups to students. However, learning activities are not designed based on differences in the ages of students, and teachers do not use a variety of learning methods. Graduate Competency Standards (SKL), Basic Competency (KD), learning indicators, and learning objectives are not modified in the Learning Implementation Plan (RPP). However, the learning strategy used is able to increase student activity and cooperation in learning. Schools also have adaptive teaching aids and media to help students understand the subject matter. Special companion teachers (GPK) also conduct face-to-face learning for a minimum of 6 hours per week to support the success of student learning.

Respondents (c) and (d) apply the same strategy to students with disabilities, namely, that teachers have the necessary knowledge and skills to select and adapt subject matter and teaching according to the special needs of each student. Various classroom management strategies, such as team teaching, cross-grade grouping, peer tutoring, and teacher assistance teams, are used to create a cooperative learning environment and promote socialization for all students. Learning activities provide opportunities for students to practice, experiment, or find something through observation, research, and others.

All students are given the opportunity to develop their skills and talents. The teacher explains the objectives of learning or study groups to students, and learning activities are designed based on the individual differences, needs, and interests of students. Classroom environments, exhibits, and other resources aid student independence in learning. Learning activities are also designed based on the age difference between students. Teachers use a variety of learning

methods to increase student activity and cooperation in learning. Graduate Competency Standards (SKL), Basic Competency (KD), learning indicators, and learning objectives can be modified as needed in the Learning Implementation Plan (RPP). Schools have adaptive teaching aids and media to help students understand the subject matter. Special companion teachers (GPK) also conduct face-to-face learning for a minimum of 6 hours per week to support the success of student learning. The statistical data obtained can be seen in the following table:

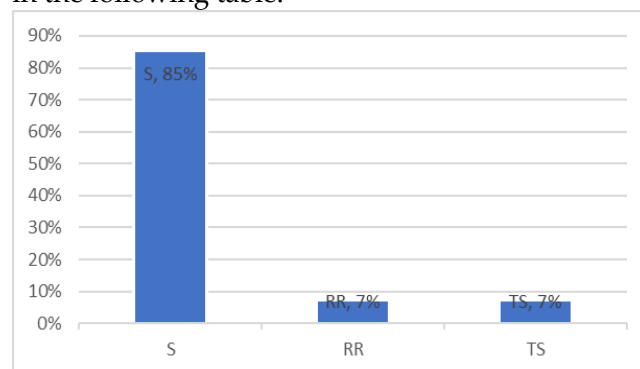


Table 2 Learning Strategies for Teaching Students with Disabilities

Based on interview data with the four respondents above, the percentage of learning strategies for teaching students with disabilities in the application of inclusive chemistry classes agreed, with an average of 85% having the highest percentage, disagreeing 7%, and doubting 7%, as listed in table 2.

Therefore, based on the above results for teaching students with disabilities in chemistry subjects, it is important for teachers to understand the needs and characteristics of these students with disabilities. This helps teachers create an inclusive and enjoyable learning environment for all students, including those with disabilities (Roesminingsih *et al.*, 2022). It also helps teachers develop learning strategies that suit the special needs of students with disabilities, so that these students can learn effectively and reach their full potential (Hudzaifah *et al.*, 2021). As well as understanding the needs and characteristics of students with disabilities, it also helps teachers identify and manage problems that may occur during the teaching and learning process, such as difficulty concentrating or communication

problems (Amka, 2020). By understanding the special needs of students with disabilities, teachers can provide the right support and help these students overcome these problems so that they can continue to study successfully (RAGIL, 2022).

Chemistry teachers select and adapt course material according to the specific needs of each student and use a variety of classroom management strategies to create a cooperative learning environment and promote socialization for all students (Purba *et al.*, 2022).

As a chemistry teacher, it is important to select and adapt course material according to the specific needs of each student. This can be done by understanding the abilities and learning needs of each student, as well as paying attention to their level of understanding of the material that has been taught (Hamdayama, 2022). Chemistry teachers can also use a variety of classroom management strategies to create a cooperative learning environment and promote socialization for all students (Purba *et al.*, 2022). For example, by using learning methods that focus on group discussions or by facilitating fun and interactive learning activities (Kii and Dewa, 2020). Thus, chemistry teachers can help students understand the material better and strengthen their understanding of the necessary chemistry concepts.

Chemistry lessons must be designed based on the individual differences, needs, and interests of students, and teachers must use a variety of learning methods to increase student activity and cooperation. This is important so that students can understand the material better and achieve optimal learning results. Teachers must pay attention to the abilities and learning needs of each student and understand their level of understanding of the material that has been taught. Thus, teachers can adjust the learning methods used according to the needs of students and help them understand chemistry concepts better (Puspitasari, 2019).

The classroom environment, exhibitions, and other resources can help students with disabilities learn independently. Where to ensure classes are friendly to students with disabilities, actions that can be taken are to ensure easy access for students who use wheelchairs or have visual impairments or lack muscle coordination, provide learning

support equipment such as assistive technology, braille devices, or magnifying devices for students who are visually impaired, ensure that classes are equipped with good audio systems for students with hearing impairments, and provide sufficient time and necessary support for students to learn independently (Juwantara, 2020).

Adaptive visual aids and learning media can also help students understand the subject matter. Therefore, teaching aids and adaptive learning media are very important for students with disabilities to understand the subject matter (Ristiyantri, 2020). Visual aids can help students visualize the concepts explained in the subject matter, while adaptive learning media can provide information in a form that suits students' needs, for example, in the form of text that can be read with a magnifying device or in audio form for students who have visual impairments (Abi Hamid *et al.*, 2020). By providing teaching aids and adaptive learning media, students with disabilities will more easily understand the subject matter and can learn better independently.

Meanwhile, special accompanying teachers (GPK) can conduct face-to-face learning for a minimum of 6 hours per week to support student learning success. Special companion teachers (GPK) have an important role in supporting the success of student learning. GPK is usually assigned to help students who have special needs, such as those who have disabilities or who experience learning difficulties. In conducting face-to-face learning, the GPK will meet students directly and provide the assistance students need to understand the subject matter. The GPK is also responsible for developing learning strategies that suit student needs and monitoring student progress in learning. Therefore, GPK must have good communication skills and the ability to arrange and present subject matter in a way that is easily understood by students (Sumarni and others, 2019).

In addition, it is important to modify the Graduate Competency Standards (SKL), Basic Competency Standards (KD), learning indicators, and learning objectives according to the needs of the Learning Implementation Plan (RPP). This will help students with disabilities understand the

subject matter better and achieve the learning goals that have been set (Prestianta *et al.*, 2021).

Learning Development Monitoring and Assessment Techniques for Persons with Disabilities

Learning Development Monitoring Techniques and Assessment for Persons with Disabilities carried out by respondents (a) The assessment carried out consisted of cognitive, affective, and psychomotor assessments. Students with disabilities have special report cards that are prepared according to their needs. The school uses authentic assessments in evaluating student achievement, and this assessment is carried out continuously throughout the semester.

For respondent (b), the assessment consisted of cognitive and affective assessments but did not include psychomotor or portfolio assessments. Students with disabilities have the same report cards as other students, without a special report card for them. Our school uses authentic assessments in evaluating student achievement, and this assessment is carried out continuously throughout the semester.

And as for Respondents (c) and (d), the assessment carried out consisted of cognitive, affective, psychomotor, and portfolio assessments. Students with disabilities have special report cards that are prepared according to their needs. Our school uses authentic assessments in evaluating student achievement, and this assessment is carried out continuously throughout the semester. The statistical data obtained can be seen in the following table:

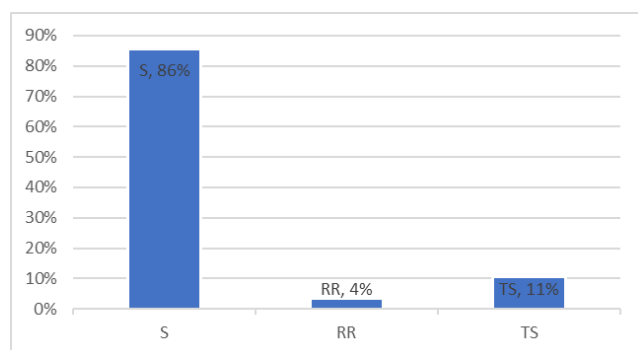


Table 3 Learning Development Monitoring and Assessment Techniques for Persons with Disabilities

Based on data from interviews with the four respondents listed above, the percentage of

learning development monitoring and assessment techniques for persons with disabilities in the application of the inclusive chemistry class agreed with an average of 86%, disagreed with 11%, and doubted 4%, as shown in Table 2.

Therefore, based on the results above, learning development monitoring and assessment techniques for persons with disabilities are a method for measuring the learning progress of students with disabilities in learning chemistry. This assessment consists of four components: cognitive, affective, psychomotor, and portfolio assessment. Cognitive assessment is an assessment that measures students' ability to understand and process the information they have learned (Putri *et al.*, 2022). Affective assessment is an assessment that measures students' attitudes and feelings towards the material being studied (Sani, 2022). Psychomotor assessment is an assessment that measures students' ability to apply the knowledge and skills learned practically (Sani, 2022). A portfolio is a collection of documents that show the overall progress of student learning (Nuraeni and others, 2019).

Teachers in this study prepared special report cards for students with disabilities, which were arranged according to their needs. In addition, teachers also apply authentic assessments in evaluating student achievement, namely assessments that are carried out in a way that is appropriate to the student's learning context and use assignments that are relevant to everyday life (Salamah, Sumarti and Rokhyanto, 2022). This assessment is carried out continuously throughout the semester to obtain a more accurate picture of student learning progress. Continuous assessment during the semester aims to help students identify strengths and weaknesses in learning, understand the material better, help teachers and parents understand student learning progress, help teachers manage learning more effectively, and help schools evaluate the success of learning programs that are applied (Priowuntato, 2020).

Conclusions

Based on the research findings, it can be concluded that the percentage of the curriculum for students

with disabilities in the application of inclusive chemistry classes agrees, with an average of 79% having the highest percentage, 13% disagreeing, and 8% in doubt. For the percentage of learning strategies for teaching students with disabilities in the application of inclusive chemistry classes, agreement with an average of 85% has the highest percentage, disagreement is 7%, and doubt is 7%. And the percentage of learning development monitoring and assessment techniques for persons with disabilities in the application of the inclusion chemistry class agreed, with an average of 86% having the highest percentage, 11% disagreeing, and 4% unsure.

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