

Creating an Accepting Learning Environment for All Students from a Science Perspective

Risa Safira Ramadhani^{1*}, Ediyanto Ediyanto¹, Asep Sunandar¹, Iva Nandya Atika², Irvan Budhi Handaka³

¹Department of Special Education, Faculty of Education, Universitas Negeri Malang, Indonesia

²Universitas Islam Negeri Sunan Kalijaga Yogyakarta, Indonesia

³Universitas Ahmad Dahlan, Yogyakarta, Indonesia

* Corresponding author. Email: risasafiraramadhani@gmail.com

Abstract: The current study aims to analyze the theory of a learning environment that can make it acceptable for all students from a science perspective in an inclusive education setting. All students in this topic are typical students and students with special needs. This study goes through three stages: 1) determining the scope that will focus on the research, 2) determining the urgency and novelty of the study, and 3) determining the research formulation and objectives. Twenty-one journal articles from 2006–2020 are selected in this study and were collected through the Google Scholar and Eric databases. Based on the review results, inclusive education settings expect a learning environment acceptable to all students. Learning environments in inclusive settings pay attention to universal learning design, flexible curricula, competence and positive attitudes of teachers, and accessible supporting facilities. From the science perspective, a learning environment that all students can accept can be conditioned to be more pleasant by using an appropriate learning model. Teachers can use the 7E (Elicit, Engage, Explore, Explain, Elaborate, Evaluate, Extend) or inquiry learning model, which can be combined with media or practicum tools to optimal learning students. In addition, support from all parties, including peers, teachers, parents, family, community, and government, is needed to create an acceptable environment for all students.

Keywords: learning environment, inclusive education, science learning, student with special needs

1. INTRODUCTION

Inclusive education is an educational service that provides opportunities for children with special needs to attend regular schools with their peers (Darma and Rusyidi, 2015). In general, inclusion is education for all or education for all (Al Kahar, 2019), so there are no more limits for children with special needs in getting quality education (Husna, Yunus & Gunawan, 2019). In implementing inclusive education, the learning environment is also a factor that needs to be considered. The learning environment is an essential factor in the learning process and can affect the sustainability of teaching and learning activities in schools (Farid, 2017; Simbolon, 2014). In addition, the learning environment can also affect student achievement (Widyaningtyas, 2012). The learning environment that students need is a conducive, safe, and acceptable learning environment (Harjali, 2017; Rohmah, 2017; Zabir, 2018; Neldawati, 2020).

An acceptable learning environment is a learning environment that can meet the needs of all students in the class so that students can study well. In the inclusion setting, the learning environment is also a factor that needs to be considered, one of which is the natural sciences learning environment. Science

learning is learning that is often considered difficult by students, especially for students with special needs. There are many facilities or learning tools that need to be prepared by schools and teachers to fulfill science learning. Science learning equipment is also not arbitrary because studying it requires a lot of equipment, such as balances, microscopes. In studying it, schools need a laboratory in the teaching and learning process, so much equipment must be available to support science learning in the laboratory.

Moreover, the characteristics of science learning are based on experimental ability. Realistic learning experiences (such as practicums involving experimental and demonstration activities) are needed in science learning. In fact, limitations on children with special needs, such as physical limitations on the blind and deaf, can make it challenging to carry out science learning

Learning for children with special needs must be adapted to the needs of students so that they can also participate in learning well. The learning requires modifications in the curriculum, learning methods, learning strategies, and learning media to achieve comfort in the student learning environment. Based on this explanation, this study aims to analyze

the theory related to developing an acceptable learning environment for all students in terms of the scientific perspective.

2. METHOD

The method used in writing this article is a narrative review, which is a research conducted by summarizing several research results and comparing them to produce a holistic interpretation. This study critically reviews the knowledge, ideas, or findings contained in the body of academic-oriented literature (Cant & Cooper 2010).

The stages of narrative review research (Gasparyan et al., 2011) consist of three stages. The first stage is to determine the scope that will focus on the research to be formulated into a research title, determine the urgency and novelty of the research, and determine the formulation and research objectives. The main intervention examined in this scientific inquiry is a learning environment. The learning environment is acceptable to all students from the perspective of science learning and inclusive education. The outcome generated in this scientific research is a learning environment theory that all students can accept from the perspective of science learning and inclusive education.

Second, conduct a literature search with keywords that are relevant to the research topic. The search for publication articles was carried out on Google Scholar and Eric with the keywords: "inclusive learning environment" and "science learning environment for children with special needs." The articles used are literature published in 2006-2020. The criteria for the journals reviewed are research journal articles in Indonesian and English with environmental material that is acceptable to all from a science perspective. Based on these criteria, there were 12 eligible articles with keyword criteria related to an inclusive learning environment and nine articles related to science learning for further analysis.

3. RESULT AND DISCUSSION

Learning Environment for All Students

An acceptable learning environment for all students considers all the needs of students, including students with special needs (Setiawan & Ansari, 2019). In the learning process, the effective thing to consider is the classroom environment and make the necessary adaptations to ensure that the learning environment has facilitated students' academic and social needs. One thing to consider is establishing a classroom with a universal design to have physical access to all materials and activities without the child experiencing difficulties (Suleymanov, 2015; Bucholz & Sheffler, 2009; Bayles 2018; Hymel & Katz, 2019; Moffat Laureta, 2009; Rana, 2016). In addition to implementing a universal design, teachers also need to expand safety procedures for all students, including children with special needs, so that the teacher's safety is well monitored by the teacher (Bucholz & Sheffler, 2019). Building a classroom environment also needs to adapt to all students' needs,

especially students with special needs who have different needs. With the universal classroom design, equality and social justice for students with special needs can be protected. The learning environment can support the diversity that exists in students and form an acceptable learning environment for all students (Setiawan & Ansari, 2019).

Creating an acceptable environment for all students cannot be separated from the availability of facilities or infrastructure to support the teaching and learning process. In addition, creating an acceptable environment for all students needs to pay attention to the supporting facilities needed to ensure that the environment has facilitated the needs of all students (Suleymanov, 2015; Setiawan & Ansari, 2019). The learning environment should also consider accessibility for all students (Bucholz & Sheffler, 2009; Bayles & Morrell, 2018; Al Khakim, Prakosha, & Himawanto, 2017; Harjali, 2017; Utami & Putra, 2020). Facilities and facilities that support the learning environment for students need to consider comfort and beauty, one of which is furniture arrangement in the classroom (Harjali, 2017). Seating placement for students is also something that teachers also need to arrange because the right seat makes students comfortable when studying. It is attempted to make it easier for teachers to teach with students at learning centers (Harjali, 2017; Bayles & Morrell, 2018). The form of accessibility for children with needs in inclusive schools, such as making running texts displayed on school or classroom walls, makes it easier for deaf students to know the information. For autistic students, schools can avoid sharp or dangerous angles on every building in the school and increase sloping areas and non-slippery floors in the school environment, making it easier for disabled students who use wheelchairs to carry out mobility.

Moreover, when the learning process, the teacher can repeat the instructions in reading with oral instructions (Al Khakim, Prakosha, & Himawanto, 2017). Inclusive schools must have special rooms, which are part of the handling of children with special needs. These special rooms include: Individual Study Rooms which are used for children to study with teachers individually or in groups with a limited number of students, namely a maximum of 5 students, A contemplation room is needed for children who have tantrums or severe tantrums, and a consultation room is used for parents to consult with teachers, psychologists and pedagogues at school (Utami & Putra, 2020).

Teacher competence is the most important thing that needs to be considered in creating an acceptable learning environment for all students. Teachers' knowledge, beliefs, and positive values can create an effective learning environment for all students (Suleymanov, 2015; Loreman, 2007). The realization of competence in teachers can not be separated from the existence of training for classroom teachers and the fulfillment of human resource needs for special assistant teachers (Loreman, 2007). With training for teachers, teachers can teach using teaching styles, learning strategies, and learning

media to reach all students (Harjali, 2017; Obiakor, Harris, Mutua, Rotatori & Algozzine, 2012). In addition, if the teacher knows all students in his class, it is easier for teachers to convey the material, and the learning process will be more acceptable to all (Suleymanov, 2015; Loreman, 2007). It is also necessary for teachers to collaborate with other professions or experts in providing educational services for students with special needs, such as doctors, psychologists, special school teachers, and other experts (Ansari, 2019).

The development of a flexible curriculum and an adaptation curriculum for students with special needs also need to be made by the school to prepare an acceptable learning environment for all students (Suleymanov, 2015 and Loreman, 2007). In addition, learning can also use a spiral curriculum, namely a curriculum that is made starting from basic or simple to complex, and the teaching is done repeatedly until the student understands and applies the knowledge previously acquired (Suleymanov, 2015). Spiral teaching is suitable with teaching methods for students with special needs to understand the material better. Other research adds that providing a curriculum based on learning relevant to students' lives can also make it easier for students to understand the lesson. One of them is collaborative learning, learning knowledge, and learning applications directly through socio-cultural experiences (Bayles & Morrel, 2018; Loreman, 2007). (Loreman, 2007) also explains that in making or modifying the curriculum, it is necessary to consider the needs of students, including learning, physical, social and cultural needs. In the teaching and learning process, the need for learning media is tailored to each student's needs, situations, and conditions. In this case, the teacher can provide an individual learning program for students with different abilities.

An acceptable learning environment for all students also considers a good social environment. Teaching related to the social environment to students can use social learning theory to get used to learning that focuses on socialization. So that in practice, all students play an active role in learning activities, including activities carried out together with students with special needs (Suleymanov, 2015). An acceptable learning environment should also be supported by teaching, giving praise or appreciation to classmates, and accepting each other's differences, so that no student feels marginalized (Buchloz, 2009; Bayles & Morrell 2018). The role of the surrounding environment is also essential in creating a positive environment for all students. The environment around students includes teachers, friends, parents, government, and society (Loreman, 2007; Hang, 2020; Setiawan & Ansari, 2019). In creating an acceptable learning environment for all students, positively accepting diversity and difference is an obligation. In addition to that, a determining indicator of a high-quality learning environment is positive learning engagement and good relationships with peers and teachers (Moffat,

2003). Laureta & Rana, 2016; Hang, 2020; Loreman, 2007). Family, community, and government support can maximize the implementation of an acceptable education for all students (Setiawan & Ansari, 2019; Loreman, 2007).

Science Learning for All Students

An acceptable learning environment for all students covers all aspects of learning in schools, including science learning. In creating an acceptable environment for all students in science learning, teachers have an important role. Science conceptual understanding and achievement of ABK students can be improved if appropriate support for students and resources are available. Science teachers must realize that teachers work as guardians and mediators for ABK students and their environment to realize inclusive education. In addition, teachers must have a positive attitude in teaching science and prepare appropriate teaching strategies through communication with special needs students and their parents. Competence in teachers can be done through partnering with special schools. Science teachers also have the opportunity to teach with various students, with that teachers will have an attitude in providing more opportunities for students to learn (Kang & Martin, 2018). Based on research conducted by (Neldawati, 2020), competent teachers will be better able to create an effective learning environment and be better able to manage their classes so that teaching to students is optimal. In addition, the teacher's role in building space for students to engage in practical learning and reflection in small groups provides a sense of fairness for all students towards science learning (Villanueva, Taylor, Therrien, & Hand, 2012). Experience-based learning, coupled with reflection, is a powerful tool to change teachers' beliefs and practices towards science learning for children with special needs (Kang & Martin, 2018)

As the role of the teacher, the curriculum is also something that must be considered in creating an acceptable learning environment in science learning because a clean learning environment and supported by a good curriculum will affect student comfort and student acceptance of good learning from teachers (Neldawati, 2010). 2020). The Early Science curriculum is one promising approach to teaching science to students with developmental disabilities, including teaching relevant knowledge and inquiry skills to enable students to work scientifically (Apanasionok, Neil, Watkins, Grindle, & Hastings, 2020). In line with this, other research also states that providing inquiry learning and providing opportunities for ABK to argue is more suitable teaching for students with special needs in studying science (Villanueva, Taylor, Therrien, & Hand, 2012). In addition, there is a need for teachers to provide learning support for all students, providing classroom instruction, incorporating various approaches and strategies to address diversity in student needs, interests, experiences, and abilities (Mastropieri, Scruggs, Norland, Berkeley, McDuffie, Tornquist, & Connors, 2006).

Teaching science learning to students with special needs is not easy, with various needs and diverse abilities. The learning environment must be able to provide facilities that suit their needs. Teaching science to students with special needs, models, strategies, methods, and learning media need adjustments or modifications. Science for all or science for all can be realized. The 7E Learning Model (Elicit, Engage, Explore, Explain, Elaborate, Evaluate, Extend) can teach physics to students and research (Turgut, Colak & Salar, 2017) 7E learning model is more fun for students. Brookes & Lin (2012) conducted research that designed a physics learning environment with a holistic approach. Learning is carried out with a 3-level class interaction model, namely self-interaction, the interaction between a group member, the interaction between groups. In addition, it can also facilitate the implementation of a teaching strategy called the shared teaching model. Namely, teaching is carried out by a team consisting of one science teacher and one special education teacher. They share instructional responsibilities such as planning and delivering instructions to all students in the class. Some of them have disabilities (Moin, Magiera, & Zigmond, 2009).

Learning media is a tool for teachers to convey learning easily to students and increase students' understanding of abstract learning. Especially in science learning, learning media for students with special needs is necessary to make them understand science learning which tends to be difficult to explain only orally. One example of the development of a manual science practicum tool using the sense of touch and Voice Equipment (MFE) based on changes in voltage (electric potential) into sound used in physics practicum for children with visual impairments and hearing impairments (Rosana, 2014). In principle, all teaching materials that all students will use in inclusive classrooms adjust to the learning needs of students. (Mastropieri, Scruggs, Norland, Berkeley, McDuffie, Tornquist, & Connors, 2006). In laboratory investigations, students should have the opportunity to design investigations, engage in scientific reasoning, manipulate equipment, record data, analyze results, and discuss their findings as a way of understanding the world of science (Moin, Magiera, & Zigmond, 2009). The condition of the building in the school is also one of the essential things to create comfort in the learning process (Neldawati, 2020).

The role of peer tutors in helping students understand science learning is also an effective technique in science learning (Mastropieri, Scruggs, Norland, Berkeley, McDuffie, Tornquist, & Connors, 2006). Villanueva, Taylor, Therrien, & Hand, 2012 also explained in their research that the learning method for ABK students is to provide learning with the help of peers and provide clear (explicit) instructions. One way of learning science for students with special learning disabilities (LD) can be done with group work, group work to foster cognitive and social skills for all students (Moin, Magiera, & Zigmond, 2009). Science education

programs in inclusive settings can positively impact students with special needs and eliminate differences in abilities and attitudes of children with special needs towards science lessons, thus the need for good relationships with fellow students (Kang & Martin, 2018; Neldawati, 2020).

4. CONCLUSION

An acceptable learning environment for all students considers all the needs of students, including students with special needs. One of the learning designs that can create an acceptable learning environment for students is universal learning design. In addition to creating an acceptable environment for all students, it is necessary to pay attention to the supporting facilities needed to ensure that the environment has facilitated the needs of all students. The competence and positive attitude of the teacher is also the most important factor. The development of a flexible curriculum and an adaptable curriculum for students with special needs also need to be made by the school to prepare an acceptable learning environment for all students. An acceptable learning environment for all students also considers a good social environment. A comfortable environment gets support from various parties: schools, parents, families, communities, and the government, and this can maximize the implementation of an acceptable education for all students.

From the science perspective, the teacher's conceptual understanding of science learning and the achievement of ABK students supports the realization of an acceptable learning environment for all students. In addition, a clean learning environment and supported by a good curriculum will affect student comfort and student acceptance of good learning from teachers. Teaching science to students with special needs, models, strategies, methods, and learning media need adjustments or modifications. So, science for all or science for all can be realized. The role of peer tutors in helping students understand science learning is also an effective technique in science learning.

This literature study provides an overview of an acceptable environment for all students from science learning. It is hoped that future researchers will conduct further research related to empirical and contextual comparisons in creating an acceptable environment for all students from a science perspective. In addition, theoretical development research to create an acceptable learning environment for all students is seen from a science perspective.

REFERENCES

- [1] Al Kahar, A. A. D. (2019). Pendidikan Inklusif Sebagai Gebrakan Solutif "Education for All". *Al-Riwayah: Jurnal Kependidikan*, 11(1), 45-66.
- [2] Al Khakim, A., Prakosha, D., & Himawanto, D. A. (2017). Aksesibilitas Bagi Anak Berkebutuhan Khusus Dalam Lingkup Pendidikan Sekolah Inklusi Di Karesidenan Surakarta. *IJDS: INDONESIAN JOURNAL OF*

- DISABILITY STUDIES*, 4(1), 16-18.
- [3] Apanasionok, M. M., Neil, J., Watkins, R. C., Grindle, C. F., & Hastings, R. P. (2020). Teaching science to students with developmental disabilities using the Early Science curriculum. *Support for Learning*, 35(4), 493-505.
- [4] Bayles, T., & Morrell, C. (2018). Creating an Equitable Learning Environment. *Chemical Engineering Education*, 52(2), 143-151.
- [5] Brookes, D. T., & Lin, Y. (2012, February). Designing a physics learning environment: A holistic approach. In *AIP Conference Proceedings* (Vol. 1413, No. 1, pp. 131-134). American Institute of Physics.
- [6] Bucholz, J. L., & Sheffler, J. L. (2009). Creating a warm and inclusive classroom environment: Planning for all children to feel welcome. *Electronic Journal for Inclusive Education*, 2(4), 1-13.
- [7] Cant, R. P., & Cooper, S. J. (2010). Simulation-based learning in nurse education: systematic review. *Journal of advanced nursing*, 66(1), 3-15.
- [8] Darma, I. P., & Rusyidi, B. (2015). Pelaksanaan sekolah inklusi di Indonesia. *Prosiding Penelitian dan Pengabdian kepada Masyarakat*, 2(2), 233-227.
- [9] Farid, M. M. (2017). Pengaruh motivasi belajar, gaya belajar, dan lingkungan belajar pada hasil belajar ekonomi di SMA Negeri 1 Wringinanom Gresik. *Jurnal Ekonomi Pendidikan Dan Kewirausahaan*, 2(2), 142-156.
- [10] Gasparyan, A. Y., Ayvazyan, L., Blackmore, H., & Kitas, G. D. (2011). Writing a narrative biomedical review: considerations for authors, peer reviewers, and editors. *Rheumatology international*, 31(11), 1409.
- [11] Harjali, H. (2017). Strategi guru dalam membangun lingkungan belajar yang kondusif: studi fenomenologi pada kelas-kelas sekolah menengah pertama di Ponorogo. *Jurnal Pendidikan Dan Pembelajaran (JPP)*, 23(1), 10-19.
- [12] Husna, F., Yunus, N. R., & Gunawan, A. (2019). Hak Mendapatkan Pendidikan Bagi Anak Berkebutuhan Khusus Dalam Dimensi Politik Hukum Pendidikan. *SALAM J. Sos. Dan Budaya Syar-i*, 6(2), 207-222.
- [13] Hymel, S., & Katz, J. (2019). Designing classrooms for diversity: Fostering social inclusion. *Educational Psychologist*, 54(4), 331-339.
- [14] Kang, D. Y., & Martin, S. N. (2018). Improving learning opportunities for special education needs (SEN) students by engaging pre-service science teachers in an informal experiential learning course. *ASIA pacific Journal of education*, 38(3), 319-347.
- [15] Loreman, T. (2007). Seven Pillars of Support for Inclusive Education: Moving from. *International journal of whole schooling*, 3(2), 22-38.
- [16] Mastropieri, M. A., Scruggs, T. E., Norland, J. J., Berkeley, S., McDuffie, K., Tornquist, E. H., & Connors, N. (2006). Differentiated curriculum enhancement in inclusive middle school science: Effects on classroom and high-stakes tests. *The Journal of Special Education*, 40(3), 130-137.
- [17] Moffat, T., Laureta, B., & Rana, L. (2016). Creating inclusive environments and catering for individual needs. *KAIRARANGA*, 17(1), 44-49.
- [18] Moin, L. J., Magiera, K., & Zigmund, N. (2009). Instructional activities and group work in the US inclusive high school co-taught science class. *International Journal of Science and Mathematics Education*, 7(4), 677-697.
- [19] Neldawati, N. (2020). Deskripsi Lingkungan Belajar Siswa Terhadap Mata Pelajaran Fisika di SMA Ferdy Ferry Putra Kota Jambi. *Journal Evaluation in Education (JEE)*, 1(1), 1-7.
- [20] Obiakor, F. E., Harris, M., Mutua, K., Rotatori, A., & Algozzine, B. (2012). Making inclusion work in general education classrooms. *Education and Treatment of Children*, 35(3), 477-490.
- [21] Rohmah, C. O. (2017). Pengaruh Penggunaan Gadget dan Lingkungan Belajar Terhadap Minat Belajar Siswa Kelas XI Kompetensi Keahlian Administrasi Perkantoran SMK Muhammadiyah 2 Yogyakarta. *Skripsi. Yogyakarta: Universitas Negeri Yogyakarta*.
- [22] Rosana, D. (2014). Pengembangan Alat Praktikum Sains (Fisika) Untuk Anak Penyandang Ketunaan Serta Aplikasinya Pada Pendidikan Inklusif. In *Seminar Nasional Fisika dan Pendidikan Fisika Ke-4 2014*. Sebelas Maret University.
- [23] Setiawan, E., & Apsari, N. C. (2019). Pendidikan Inklusif: Upaya Mewujudkan Kesetaraan dan Non Diskriminatif di Bidang Pendidikan bagi Anak Dengan Disabilitas (AdD). *Sosio Informa*, 5(3).
- [24] Simbolon, N. (2014). Faktor-faktor yang mempengaruhi minat belajar peserta didik. *Elementary School Journal Pgsd Fip Unimed*, 1(2), 14-19.
- [25] Suleymanov, F. (2015). Issues of Inclusive Education: Some Aspects to Be Considered. *Electronic Journal for Inclusive Education*, 3(4), 8, 1-23.
- [26] Turgut, U., Colak, A., & Salar, R. (2017). How is the learning environment in physics lesson with using 7e model teaching activities. *European Journal of Education Studies*, 3(6), 1-28.
- [27] Utami, M. N., & Putra, W. B. (2020). Fasilitas Ruang Khusus Pada Sekolah Inklusi Binar Indonesia (Bindo) di Bandung. *Jurnal Arsitektur TERRACOTTA*, 2(1), 34-43.
- [28] Villanueva, M. G., Taylor, J., Therrien, W., & Hand, B. (2012). Science education for students with special needs. *Studies in Science Education*, 48(2), 187-215.
- [29] Widyaningtyas, A. (2012). Peran Lingkungan Belajar dan Kesiapan Belajar Terhadap Prestasi Belajar Fisika Siswa Kelas X Sekolah Menengah Atas Negeri 1 Pati. *Skripsi. Surakarta: Fakultas Keguruan dan Ilmu Pendidikan Universitas Sebelas Maret*.
- [30] Zabir, A. (2018). Pengaruh pemanfaatan teknologi pembelajaran Terhadap motivasi belajar siswa smpn 1 lanrisang Kabupaten pinrang. *Jurnal Azhari*, 1(1), 1-10.