



Science Teachers' Understanding of Culturally Responsive Teaching on Independent Learning Curriculum

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Received: July 28, 2023

Revised: October 12, 2023

Accepted: January 25, 2024

Published: January 31, 2024

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DOI: [10.29303/jppipa.v10i1.4821](https://doi.org/10.29303/jppipa.v10i1.4821)

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Abstract: This research aims to describe teachers' understanding of Culturally Responsive Teaching (CRT), difficulties to implement it, and its relation to higher order thinking skills through descriptive qualitative method using interview instrument. The research subjects were twenty science teachers from three senior high schools that have implemented Independent Learning Curriculum in Medan City and Deli Serdang Regency in North Sumatera. The results revealed that 70% of teachers have limited understanding and only 30% of the teachers who understand the concept of this learning correctly. The research results also showed that only 20% had ever implemented CRT in their classrooms and 80% had never implemented. This is all due to difficulties. Based on previous research, it shows that CRT make many positive contributions to learning processes and outcomes, improving the learning process and outcomes, improving higher order thinking skills and building student's character. Therefore, teachers need to understand, be able to design and implement learning model based on CRT to serve diverse students.

Keywords: Culturally Responsive Teaching; Higher Order Thinking Skills; Science Education; Teachers' Understanding

Introduction

Independent Learning Curriculum is a holistic-oriented, competency-based, contextualized and personalized curriculum that is in accordance with the cultural context, school mission and local environment and student needs (Festiyed et al., 2022). The implementation of the learning process is expected to be organized in an interactive, inspiring, fun, challenging, motivating learning atmosphere for students and provides sufficient space for initiative, creativity, independence according to students' talents, interests and physical and psychological development (Sakdiah & Syahrani, 2022).

In an effort to implement a learning process that is in accordance with curriculum development and student characteristics, teachers must have competence and skills in designing and managing learning (Ortiz-Rodríguez et al., 2022; Surahmi et al., 2022). Teachers

become intellectual actors who have a foundation of knowledge and skills developed during teaching activities (Bortz et al., 2020). Teachers should be able to manage learning for their students well and design materials related to students' daily lives so as to create more meaningful learning (Demeter et al., 2022; Kavanagh et al., 2020).

Subject matter related to everyday topics can promote students' background and culture. Students can understand difficult material concepts as well as solve various problems in everyday life because the subject matter is related to students' real life (Agustin et al., 2018; Rikizaputra et al., 2021; Wallace et al., 2022).

Many efforts have been made by teachers but only limited to the realm of students' cognitive abilities. Based on the 2018 PISA (Program of International Student Assessment) results, Indonesia is still below the OECD average and places Indonesia at the bottom of the science category (Hamdani et al., 2022; Yusop et al.,

How to Cite:

Sani, R. A. ., Tanjung, Y. I. ., Sani, R. A. ., Nasution, B. ., Yohandri, & Festiyed. (2024). Science Teachers' Understanding of Culturally Responsive Teaching on Independent Learning Curriculum. *Jurnal Penelitian Pendidikan IPA*, 10(1), 156-164. <https://doi.org/10.29303/jppipa.v10i1.4821>

2022). These results show that Indonesian students still do not fully understand science concepts so they cannot compete internationally (Pratiwi, 2019).

Student learning problems are related to the learning process carried out. The implementation of science learning that is related to local culture is still rarely done (Nurhasanah & Puspitasari, 2022; Rikizaputra et al., 2021) even though local culture can be a source of contextual science learning (Barron et al., 2021; Rahmawati et al., 2020; Sumarni et al., 2022). Learning has not been able to direct students to link the science knowledge they learn with phenomena that occur in everyday life (Y. I. Tanjung, 2015). In addition, learning has not been able to achieve students' higher order thinking skills (Akhiralimi et al., 2022; Anggraena, 2019; Y. I. Tanjung & Dwiana, 2019). Not to mention the problem of diverse backgrounds, cultures and characteristics of students in the classroom (Bergantz, 2021; Cruz et al., 2020; Rogelberg et al., 2020).

Learning problems depend on teachers' competence and skills in managing the classroom. Teachers' skills in designing and managing learning will have an impact on the quality of learning and student learning outcomes (Büscher & Prediger, 2022). When a skill is linked to life experiences, it is more meaningful and appealing and can be learned more easily. Background and culture make learning easier as the brain processes information related to prior knowledge.

Student learning achievement is not only at the cognitive level but must reach higher-level thinking skills and build good relationships with the environment and society (Beddu, 2019). This can be done by teachers by continuing to improve their knowledge and teaching skills with new paradigm learning concepts and in accordance with the current curriculum (Arisanti, 2022). The learning concept in question such as Culturally Responsive Teaching.

Culturally Responsive Teaching (CRT) is one of the teaching concepts based on the principles of Independent Learning Curriculum. The principle in question is learning that supports the development of student competencies and characters holistically according to the context, environment and culture of students and involves parents and other communities in learning (Suryaman, 2020).

Previous research outlines that CRT accommodates the different learning needs of students so as to make learning more meaningful, build higher order thinking skills and build care and empathy for others with all their backgrounds and cultures (Hamilton, 2018; Majewska et al., 2022; Mburu, 2022; Meléndez-Luces & Couto-Cantero, 2021; Rahmawati et al., 2020; Rogelberg et al., 2020; Tanase, 2022). It builds positive behaviors, strengthens students' character and cultural identity

(Edwards & Edick, 2013; Larson et al., 2018; Rahmawati et al., 2019). CRT fosters and enhances students' soft skills including social awareness and patriotism (Hasanah et al., 2021). It also provides opportunities for parents to participate in student learning as part of their learning community (Rahmawati & Ridwan, 2017).

Some limitations found from previous research are that teachers have not been able to minimize tensions between students in learning because differences in character and culture make students have their own way of thinking and learning style (Tanase, 2022). Teachers have not been able to go beyond equality and inclusiveness for each student (Hamilton, 2018). This means that teachers have difficulty designing diverse lessons to accommodate students' differences. Although teachers have tried to implement CRT and consider themselves culturally responsive teachers, their knowledge of CRT practices is minimal (Mburu, 2022).

In order for teachers to implement CRT and understand students' diversity, teachers must also understand their own culture and develop the ability to integrate culture and local wisdom in classroom learning (Jacobs & Haberlin, 2022; Tanase, 2022). When teachers continue to learn about the diversity of their students, professional, efficient and effective learning will be realized (Marlina, 2020; Y. I. Tanjung et al., 2023). Therefore, teachers' ability to implement CRT depends on their understanding and attitude.

Based on these problems, the objectives of this study are 1) Describe teachers' understanding of CRT and its relation to higher order thinking skills, 2) Describe the importance of CRT, 3) Analyze teachers' difficulties in implementing CRT. The results of the study are expected to be useful as an initial study of research related to CRT and its relation to higher order thinking skills.

Method

The research method uses qualitative descriptive research. Descriptive research is research that describes something as it is, is natural and in accordance with existing reality.

The research sample was taken using purposive sampling technique based on indicators determined by the researcher, namely teachers who teach science and come from senior high schools that have implemented the Independent Learning Curriculum. This technique was chosen so that the sample could represent the research data needs. The sampling results obtained as many as 20 science teachers from 3 high schools in Medan City and Deli Serdang Regency in North Sumatera as research respondents.

The research instrument used an interview sheet validated by expert validators to provide valid results. This instrument was used to explore teachers' understanding and difficulties in implementing CRT. Description of the interview instrument in the form of questions totaling 11 items. Questions related to understanding the concept and urgency of learning, implementation techniques, problems encountered during implementing learning and teachers' opinions on whether this learning concept can build students' higher order thinking skills.

The research was conducted in stages: 1) Selecting research subjects according to the criteria, namely science teachers from schools that have implemented Independent Learning Curriculum in Medan city and Deli Serdang Regency, North Sumatra, 2) Conducting interviews with science teachers related to differentiated learning, 3) Reducing teacher answer data and verifying it to produce valid research data.

The data analysis technique used descriptive narrative (Figure 1) adapted from the Miles and Huberman model. Activities in qualitative data analysis are carried out interactively and take place continuously until completion, so that the data is saturated.

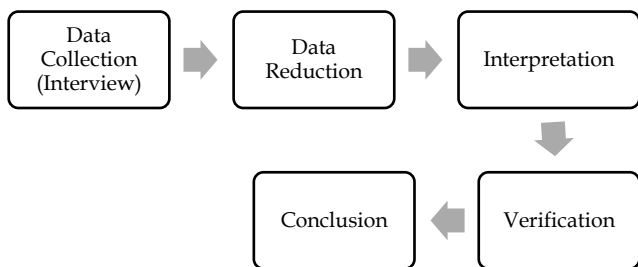


Figure 1. Qualitative Descriptive Research Stages (Adapted from Miles & Huberman)

Result and Discussion

Result

This study used interview techniques conducted directly to teacher respondents and obtained data in the form of diverse answers according to the experiences and realities experienced by respondents. The data was reduced to facilitate analysis in order to obtain a summary of the teacher's understanding of the material in question. Based on the reduction results, a description of the research results was obtained.

Teachers' Understanding of the Concept of CRT

Understanding is a person's ability to understand or comprehend something and be able to interpret it in various perspectives. More deeply, understanding is not

only knowing and being able to explain but being able to apply what is known appropriately.

In questions related to teachers' understanding of the concept of CRT, 70% of teachers have an understanding that is limited to the scope of culture only, while 30% explain CRT in accordance with existing theory. These results are presented in Figure 2.

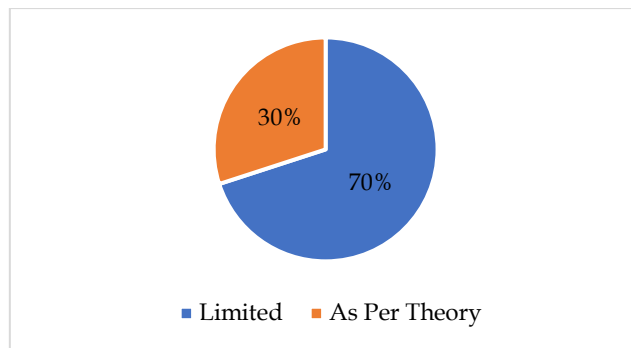


Figure 2. Percentage of Teachers' Understanding of CRT

The Importance of CRT

The results of teachers' answers to the question of why CRT is important in the classroom are presented in percentage form in Table 1.

Table 1. Importance of CRT

Percentage of Respondents	Reason
15%	Students can learn theory from practice in the real world.
20%	Students understand things more easily because teaching is based on student experience
20%	Students can appreciate and preserve the culture they have
30%	Students are more motivated and active to learn because learning is linked to students' cultural background and experiences
5%	Students can interpret the material they learn
10%	Social relationships between students can be well established because CRT seeks to build students' sense of caring for others.

Difficulties in Implementing CRT

Question Based on the results of the study, only 20% claimed to have implemented CRT in their classrooms and 80% did not. The interpretation of the percentage of implementation is presented in Figure 3.

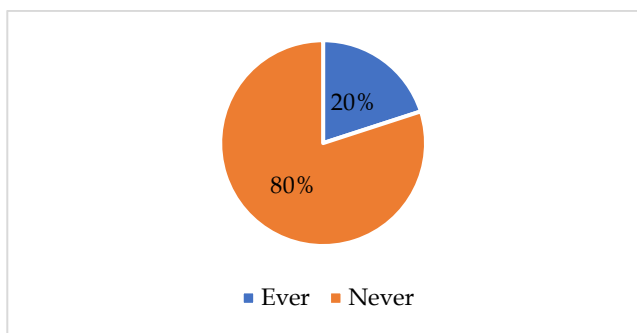


Figure 3. Percentage of CRT Implementation

Some of the difficulties teachers face in implementing CRT are teachers' limitations in understanding the concept of CRT, teachers' difficulties in linking learning with students' character and culture, teachers' difficulties in preparing culturally responsive lesson plans for diverse students, teachers' difficulties in adjusting materials that can be extracted from local culture with learning materials, especially science materials, difficulties in streamlining learning time because local culture-based materials require more understanding from students, difficulties in examining science concepts from culture, artifacts or local knowledge of the community (local wisdom), difficulty determining what cultural materials or local wisdom can be raised in learning because of diverse students, difficulty knowing the background and culture of students so that it is not easy to determine what cultural materials can be raised in learning.

CRT in Science Learning and it's relationship with HOTS

Based on the results of the answers to the question of what and how cultural responsive learning is related to science learning, 87% of teachers agree that this teaching is closely related and important to be applied to science learning. While 13% did not give an answer. The other results show that CRT can build students' Higher Order Thinking Skills (HOTS). These results are presented in Figure 4.

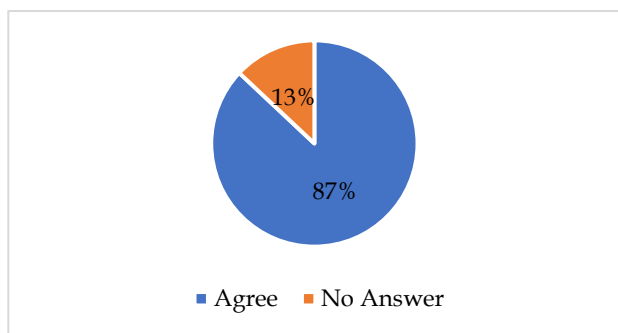


Figure 4. Percentage linkage of CRT with science

Discussion

Based on the first results of research related to understanding the concept of CRT, 70% of teachers answered this teaching concept in a narrow scope, while 30% explain CRT in accordance with existing theory. This result is accordance with Mburu (2022) who stated although teachers have tried to implement culturally responsive teaching and consider themselves culturally responsive teachers, but their knowledge of culturally responsive practices is minimal.

Teachers' understanding of CRT has been researched previously and it was found that many teachers do not fully understand it and teachers' perceptions in this regard affect their views and actions in applying this teaching concept in the classroom (Androsof & Zhang, 2023). Teachers agree that CRT can help students improve their personal and academic abilities but teachers have not been able to implement this teaching practice in the classroom (Al Alaleeli, 2022).

Based on the second results found CRT implementation is important because students are more motivated and active to learn because learning is linked to students' cultural background and experiences. Besides that students can appreciate and preserve their culture. CRT accommodates students' various characteristics, cultural knowledge and experiences in learning to help students better understand material concepts, increase student engagement in class and build new knowledge and student character (Rahmawati et al., 2019).

Students can improve academic achievement, develop cultural competence, and develop higher order thinking skills (problem solving and critical awareness). An important reason for implementing CRT in the classroom is its ability to instill self-awareness of cultural competence in multicultural classrooms, build emotional and social development from cultural awareness and build students' concern and involvement in relationships with others (Berlian & Huda, 2022; Mburu, 2022; Rahmawati et al., 2020; Yuan & Jiang, 2019).

Based on the third results of the study, only 20% claimed to have implemented CRT in their classrooms and 80% did not. Factors that undermine teachers' attitudes towards implementing CRT are pressure from others, lack of time, cultural misunderstandings and misinterpretations, weak local language skills, lack of knowledge, skills and experience in CRT (Min et al., 2022; Nguyen & Huynh, 2023; Subasi Singh & Akar, 2021). This makes it difficult for teachers to understand their students' characters and implement CRT to diverse students.

The successful implementation of CRT depends on teachers' strong commitment and confidence in teaching

students as well as teachers' self-awareness, care and proactivity in meeting the needs of diverse students (Berlian & Huda, 2022; Bonner et al., 2018). Teachers should learn about diversity issues, multicultural literature and CRT models (Iwai, 2019). Some aspects that teachers should build on to strengthen CRT practices are collaboration with fellow teachers and community support, support from administration, teaching effectiveness and relationships with students (Min et al., 2022).

The implementation of this teaching can begin with teacher self-development. The ways to develop oneself into a culturally responsive teacher are: 1) develop a broad conceptualization of culture, 2) develop indicators of the relationship between culture and the learning environment in the classroom, 3) develop empathy and understanding, 4) develop CRT practices in all aspects (Jacobs & Haberlin, 2022).

Based on the fourth results of the answers to the question of what and how cultural responsive learning is related to science learning, 87% of teachers agree that this teaching is closely related and important to be applied to science learning. Several previous studies have linked CRT with science learning including (Rahmawati et al., 2019) concluded that CRT improves understanding of chemical concepts and critical thinking skills. Students taught with CRT obtained higher average scores on General Chemistry materials (Ortiz-Rodríguez et al., 2022). Especially for another scope of science, namely Physics, it has been researched by (Hasanah et al., 2021) that the application of Ethnophysics in Batak culture responsive teaching can improve students' science generic skills. This teaching is also successfully combined with storytelling methods in science classes so as to build a sense of love between teachers and students (Wallace et al., 2022). Other research by (Edelen & Bush, 2021; O'Leary et al., 2020; Ortiz-Rodríguez et al., 2022) examined CRT combined with STEM. The results of the study concluded that CRT in an inclusive educational environment improves student science learning outcomes and equity among student communities in STEM classes, and this CRT can overcome the barriers and deficiencies that occur in STEM implementation.

CRT has the opportunity to build higher order thinking skills such as problem solving, critical thinking, creative thinking and decision making. Especially at the intermediate level, it is not enough to achieve low-level thinking skills, but also to achieve high-level thinking skills (Razak et al., 2021; Y. I. Tanjung & Nasution, 2023). Higher-order thinking skills will develop if students are faced with unknown problems, challenging questions or facing uncertainties/dilemmas so as to build their thinking power (Y. Tanjung et al., 2019; Y. I. Tanjung &

Dwiana, 2019). Many students still have difficulties in solving problems, building their critical thinking and creative thinking skills (Y. I. Tanjung & Nasution, 2023; Yurniwati & Soleh, 2020).

In addition, this teaching encourages more meaningful learning because by studying local culture and linking it to the subject matter, students are required to analyze, evaluate, and create various phenomena that occur with the concepts they learn so that they have the opportunity to improve students' higher order thinking skills. The integration of culture and local wisdom in learning can trigger science process skills and higher order thinking skills such as critical thinking (Awal et al., 2022).

Through CRT, students automatically have a critical mindset, because when we visualize a variety of cultures to students in the minds of students, questions will arise, when hearing music, a sense of compassion arises, when doing dance movements the left and right brains are connected. From this activity students can reason critically, dig deeper into their knowledge and construct new knowledge associated with the material. In addition, CRT can train students to solve problems and build creative solutions to complex problems that occur around students.

Previous research has linked CRT with higher order thinking skills. Students can improve academic achievement, develop cultural competence, and develop higher order thinking skills (problem solving and critical awareness) through CRT (Rahmawati et al., 2019, 2023) CRT can improve students' science generic skills (Hasanah et al., 2021). While (Chou et al., 2018) found CRT creates an interesting and challenging learning experience, facilitates higher order thinking skills such as critical and creative thinking and helps students learn effectively.

Students are not only culturally, ethnically and linguistically diverse; they are also gender diverse, neurologically diverse, diverse in identity, character and ability and many more aspects of diversity. Accommodating student diversity and implementing CRT-based learning is one of the challenges of learning today (Cowden et al., 2021). Based on this, teachers need to design learning that can serve student diversity. Although there have been studies that examine the implementation of CRT, there are many weaknesses and limitations of previous studies. Therefore, the recommendation for further research is to examine the limitations of previous research and examine the development of learning models based on CRT so as to build students' higher order thinking skills.

Conclusion

The results of this study revealed that 70% of teachers had a limited understanding of CRT and only 30% understood the concept correctly. The results also showed that only 20% had implemented CRT in their classrooms and 80% had not at all due to difficulties. Previous research has shown that CRT makes many positive contributions to learning processes and outcomes, improving higher order thinking skills and building student character. Therefore, teachers need to understand, be able to design and implement CRT-based learning in order to serve students with diverse characters, backgrounds, experiences, languages, living habits and cultures.

Acknowledgments

The authors would like to thank SMAN 1 Percut Sei Tuan, SMAN 1 Sunggal and SMA CT Foundation for providing permission as a place to conduct research.

Author Contributions

Author A. B & Y. I. T., conceptualised, reviewed the study, led the data extraction. Author B. N. helped extract data, and drafted the manuscript. Author R. A. S. & Y reviewed the study, led the interpretation of results, and contributed to the revision of the manuscript. Author F reviewed the article and assisted with final editing of the article.

Funding

This research was funded by LPPM Universitas Negeri Medan, North Sumatera.

Conflicts of Interest

The authors confirmed that there is no conflict of interest in this article.

References

- Agustin, N., Sudarmin, Sumarti, S. S., & Addiani, A. K. (2018). Desain instrumen tes bermuatan etnosains untuk mengukur kemampuan berpikir kritis siswa SMA. *Jurnal Inovasi Pendidikan Kimia*, 12(2), 2159–2169. <https://doi.org/10.15294/jipk.v12i2.15475>
- Akhiralimi, N., Fitriani, A., Sari, I. P., & Maulidah, R. (2022). Analisis Keterampilan Berpikir Tingkat Tinggi Siswa SMA pada Pembelajaran Fisika. *Jurnal Eksakta Pendidikan (JEP)*, 6(2), 204–213. <https://doi.org/10.24036/jep/vol6-iss2/696>
- Al Alaleeli, S. (2022). Empowering female pre-service teachers through culturally responsive teaching: shared and divergent views of Arab and expatriate teacher educators in the United Arab Emirates. *Education* 3-13, 50(5), 592–611. <https://doi.org/10.1080/03004279.2021.1876133>
- Androsoy, A., & Zhang, B. (2023). Students as Co-Creators: Bringing Culturally Responsive Teaching into a Doctoral Course for International Students in China. *SAGE Open*, 13(1), 215824402211459. <https://doi.org/10.1177/21582440221145914>
- Anggraena, Y. (2019). *Implementasi Kurikulum Matematika dalam Meningkatkan Keterampilan Berpikir Tingkat Tinggi pada Sekolah Menengah Pertama*. Universitas Pendidikan Indonesia.
- Arisanti, D. A. K. (2022). Analisis Kurikulum Merdeka Dan Platform Merdeka Belajar Untuk Mewujudkan Pendidikan Yang Berkualitas. *Jurnal Penjaminan Mutu*, 8(02), 243–250. <https://doi.org/10.25078/jpm.v8i02.1386>
- Awal, R., Azhar, M., & Yohandri, Y. (2022). The Development of Science Learning Media Ethno-Vlog Fermentation Cencaluk in Riau. *Jurnal Penelitian Pendidikan IPA*, 8(1), 302–308. <https://doi.org/10.29303/jppipa.v8i1.860>
- Barron, H. A., Brown, J. C., & Cotner, S. (2021). The culturally responsive science teaching practices of undergraduate biology teaching assistants. *Journal of Research in Science Teaching*, 58(9), 1320–1358. <https://doi.org/10.1002/tea.21711>
- Beddu, S. (2019). Implementasi Pembelajaran Higher Order Thinking Skills (HOTS) Terhadap Hasil Belajar Peserta Didik. *Jurnal Pemikiran Dan Pengembangan Pembelajaran (JP-3)*, 1(3).
- Bergantz, L. (2021). Culturally Responsive Teaching. *The Wabash Center Journal on Teaching*, 2(2). <https://doi.org/10.31046/wabashcenter.v2i2.1924>
- Berlian, Z., & Huda, M. (2022). Reflecting Culturally Responsive and Communicative Teaching (CRCT) through Partnership Commitment. *Education Sciences*, 12(5), 295. <https://doi.org/10.3390/educsci12050295>
- Bonner, P. J., Warren, S. R., & Jiang, Y. H. (2018). Voices From Urban Classrooms: Teachers' Perceptions on Instructing Diverse Students and Using Culturally Responsive Teaching. *Education and Urban Society*, 50(8), 697–726. <https://doi.org/10.1177/0013124517713820>
- Bortz, W. W., Gautam, A., Tatar, D., & Lipscomb, K. (2020). Missing in Measurement: Why Identifying Learning in Integrated Domains Is So Hard. *Journal of Science Education and Technology*, 29(1), 121–136. <https://doi.org/10.1007/s10956-019-09805-8>
- Büscher, C., & Prediger, S. (2022). Teachers' practices of integrating challenging demands of inclusive mathematics education in a professional development program. *Journal of Mathematics Teacher Education*, 1–25. <https://doi.org/10.1007/s10857-022-09560-5>

- Chou, P.-I., Su, M.-H., & Wang, Y.-T. (2018). Transforming teacher preparation for culturally responsive teaching in Taiwan. *Teaching and Teacher Education*, 75, 116–127. <https://doi.org/10.1016/j.tate.2018.06.013>
- Cowden, C., Seaman, P., Copeland, S., & Gao, L. (2021). Teaching with Intent: Applying Culturally Responsive Teaching to Library Instruction. *Portal: Libraries and the Academy*, 21(2), 231–251. <https://doi.org/10.1353/pla.2021.0014>
- Cruz, R. A., Manchanda, S., Firestone, A. R., & Rodl, J. E. (2020). An Examination of Teachers' Culturally Responsive Teaching Self-Efficacy. *Teacher Education and Special Education: The Journal of the Teacher Education Division of the Council for Exceptional Children*, 43(3), 197–214. <https://doi.org/10.1177/0888406419875194>
- Demeter, E., Dorodchi, M., Al-Hossami, E., Benedict, A., Slattery Walker, L., & Smail, J. (2022). Predicting first-time-in-college students' degree completion outcomes. *Higher Education*, 84(3), 589–609. <https://doi.org/10.1007/s10734-021-00790-9>
- Edelen, D., & Bush, S. B. (2021). Moving Toward Inclusiveness in STEM With Culturally Responsive Teaching. *Kappa Delta Pi Record*, 57(3), 115–119. <https://doi.org/10.1080/00228958.2021.1935178>
- Edwards, S., & Edick, N. A. (2013). Culturally Responsive Teaching For Significant Relationships. *Journal of Praxis in Multicultural Education*, 7(1). <https://doi.org/10.9741/2161-2978.1058>
- Festiyed, F., Mikhayla, M. E., Diliarosta, S., & Anggana, P. (2022). Pemahaman Guru Biologi SMA di Sekolah Penggerak DKI Jakarta terhadap Pendekatan Etnosains pada Kurikulum Merdeka. *Jurnal Pendidikan Dan Kebudayaan*, 7(2), 152–163. <https://doi.org/10.24832/jpnk.v7i2.2993>
- Hamdani, S. A., Prima, E. C., Agustin, R. R., Feranie, S., & Sugiana, A. (2022). Development of Android-based Interactive Multimedia to Enhance Critical Thinking Skills in Learning Matters. *Journal of Science Learning*, 5(1), 103–114. <https://doi.org/10.17509/jsl.v5i1.33998>
- Hamilton, M. (2018). Mixed but not mixing: Enabling agency and collaboration among a diverse student teacher cohort to support culturally responsive teaching and learning. *Education Research and Perspectives*, 45, 41–66. Retrieved from https://www.erjournal.net/wp-content/uploads/2020/01/03_ERPV45_Hamilton-and-ODwyer.pdf
- Hasanah, N., Sahyar, & Derlina. (2021). Ethnophysical Integration In Cooperative Learning Based On Batak Culture To Improve Generic Skills Of Science (Gss) And Student Teamwork. *Jurnal Pendidikan Fisika*, 10(1), 67–71. <https://doi.org/10.22611/jpf.v10i1.14056>
- Jacobs, J., & Haberlin, S. (2022). Transformative Learning within an International Teaching Experience: Developing as Emerging Culturally Responsive Teachers. *Action in Teacher Education*, 44(2), 104–122. <https://doi.org/10.1080/01626620.2021.1955774>
- Kavanagh, S. S., Conrad, J., & Dagogo-Jack, S. (2020). From rote to reasoned: Examining the role of pedagogical reasoning in practice-based teacher education. *Teaching and Teacher Education*, 89, 102991. <https://doi.org/10.1016/j.tate.2019.102991>
- Larson, K. E., Pas, E. T., Bradshaw, C. P., Rosenberg, M. S., & Day-Vines, N. L. (2018). Examining How Proactive Management and Culturally Responsive Teaching Relate to Student Behavior: Implications for Measurement and Practice. *School Psychology Review*, 47(2), 153–166. <https://doi.org/10.17105/SPR-2017-0070.V47-2>
- Majewska, A. A., Stuart, J. D., Gray, K. M., Ryder, P. V., & Vereen, E. (2022). Development of a "Men's Health" Course for First-Year Undergraduates Using CRT Strategies. *Health Education*. *Health Education*, 122(5), 535–545. <https://doi.org/10.1108/HE-07-2021-0102>
- Marlina. (2020). *Strategi Pembelajaran Berdiferensiasi di Sekolah Inklusif*. Afifa Utama.
- Mburu, J. (2022). "All Children Matter": A Preservice Teacher's Understanding and Practice of Culturally Responsive Teaching in a Third-Grade Mathematics Classroom. *International Journal of Multicultural Education*, 24(1), 27–46. <https://doi.org/10.18251/ijme.v24i1.2623>
- Meléndez-Luces, J., & Couto-Cantero, P. (2021). Engaging Ethnic-Diverse Students: A Research Based on Culturally Responsive Teaching for Roma-Gypsy Students. *Education Sciences*, 11(11), 739. <https://doi.org/10.3390/educsci11110739>
- Min, M., Lee, H., Hodge, C., & Croxton, N. (2022). What Empowers Teachers to Become Social Justice-Oriented Change Agents? Influential Factors on Teacher Agency toward Culturally Responsive Teaching. *Education and Urban Society*, 54(5), 560–584. <https://doi.org/10.1177/00131245211027511>
- Nguyen, C. D., & Huynh, T.-N. (2023). Teacher agency in culturally responsive teaching: learning to teach ethnic minority students in the Central Highlands of Vietnam. *Educational Review*, 75(4), 719–743. <https://doi.org/10.1080/00131911.2021.1974346>
- Nurhasanah, W. F., & Puspitasari, N. (2022). Studi Etnomatematika Rumah Adat Kampung Pulo Desa Cangkuang Kabupaten Garut. *Plusminus:*

- Jurnal Pendidikan Matematika*, 2(1), 27–38. <https://doi.org/10.31980/plusminus.v2i1.1587>
- O’Leary, E. S., Shapiro, C., Toma, S., Sayson, H. W., Levis-Fitzgerald, M., Johnson, T., & Sork, V. L. (2020). Creating inclusive classrooms by engaging STEM faculty in culturally responsive teaching workshops. *International Journal of STEM Education*, 7(1), 32. <https://doi.org/10.1186/s40594-020-00230-7>
- Ortiz-Rodríguez, J. C., Brinkman, H., Nglankong, L., Enderle, B., & Velázquez, J. M. (2022). Promoting Inclusive and Culturally Responsive Teaching Using Co-classes for General Chemistry. *Journal of Chemical Education*, 99(1), 162–170. <https://doi.org/10.1021/acs.jchemed.1c00339>
- Pratiwi, I. (2019). Efek Program Pisa Terhadap Kurikulum Di Indonesia. *Jurnal Pendidikan Dan Kebudayaan*, 4(1), 51–71. <https://doi.org/10.24832/jpnk.v4i1.1157>
- Rahmawati, Y., Baeti, H. R., Ridwan, A., Suhartono, S., & Rafiuddin, R. (2019). A culturally responsive teaching approach and ethnochemistry integration of Tegal culture for developing chemistry students’ critical thinking skills in acid-based learning. *Journal of Physics: Conference Series*, 1402(5), 055050. <https://doi.org/10.1088/1742-6596/1402/5/055050>
- Rahmawati, Y., Mardiah, A., Taylor, E., Taylor, P. C., & Ridwan, A. (2023). Chemistry Learning through Culturally Responsive Transformative Teaching (CRTT): Educating Indonesian High School Students for Cultural Sustainability. *Sustainability*, 15(8), 6925. <https://doi.org/10.3390/su15086925>
- Rahmawati, Y., & Ridwan, A. (2017). Empowering Students’ Chemistry Learning: The Integration Of Ethnochemistry In Culturally Responsive Teaching. In *Chemistry: Bulgarian Journal of Science Education Природните науки в образованието*, 26.
- Rahmawati, Y., Ridwan, A., Faustine, S., & Mawarni, P. C. (2020). Pengembangan Soft Skills Siswa Melalui Penerapan Culturally Responsive Transformative Teaching (CRTT) dalam Pembelajaran Kimia. *Jurnal Penelitian Pendidikan IPA*, 6(1), 86–96. <https://doi.org/10.29303/jppipa.v6i1.317>
- Razak, A., Apra Santosa, T., Lufri, & Zulyusri. (2021). Meta-Analysis: Pengaruh Soal HOTS (Higher Order Thinking Skill) Terhadap Kemampuan Literasi Sains dan Lesson Study Siswa Pada Materi Ekologi dan Lingkungan Pada Masa Pandemi Covid-19. *Jurnal Pendidikan Biologi*, 6(1), 2021. <https://doi.org/10.37058/bioed.v6i1.2930>
- Rikizaputra, R., Festiyed, F., Diliarosta, S., & Firda, A. (2021). Pengetahuan Etnosains Guru Biologi di SMA Negeri Kota Pekanbaru. *Journal of Natural Science and Integration*, 4(2), 186. <https://doi.org/10.24014/jnsi.v4i2.14257>
- Rogelberg, S. L., Summerville, K., & Ruggs, E. N. (2020). I-O psychology for everyone: Use of culturally responsive teaching to increase diversity and inclusion in undergraduate classrooms. *Industrial and Organizational Psychology*, 13(4), 509–514. <https://doi.org/10.1017/iop.2020.78>
- Sakdiah, H., & Syahrani. (2022). Kompetensi Pedagogik Guru Sekolah Dasar Dalam Mengelola Pembelajaran Terpadu Pada Kurikulum 2013. *Cross-Border*, 5(1), 622–632.
- Subasi Singh, S., & Akar, H. (2021). Culturally responsive teaching: beliefs of pre-service teachers in the Viennese context. *Intercultural Education*, 32(1), 46–61. <https://doi.org/10.1080/14675986.2020.1844533>
- Sumarni, W., Sudarmin, S., Sumarti, S. S., & Kadarwati, S. (2022). Indigenous knowledge of Indonesian traditional medicines in science teaching and learning using a science–technology–engineering–mathematics (STEM) approach. *Cultural Studies of Science Education*, 17(2), 467–510. <https://doi.org/10.1007/s11422-021-10067-3>
- Surahmi, Y. D., Fitriani, E., Pradita, A. A., Ummah, S. A., & Aeni, A. N. (2022). Kompetensi Pedagogik Guru Sekolah Dasar Dalam Mengelola Pembelajaran Terpadu Pada Kurikulum 2013. *Jurnal Cakrawala Pendas (JCP)*, 8(1), 135–146. <https://doi.org/10.31949/jcp.v8i1.1923>
- Suryaman, M. (2020). Orientasi Pengembangan Kurikulum Merdeka Belajar. *Prosiding Seminar Daring Nasional: Pengembangan Kurikulum Merdeka Belajar*, 965. Retrieved from <https://ejournal.unib.ac.id/index.php/semiba/issue/view/956/>
- Tanase, M. F. (2022). Culturally Responsive Teaching in Urban Secondary Schools. *Education and Urban Society*, 54(4), 363–388. <https://doi.org/10.1177/00131245211026689>
- Tanjung, Y. I., & Bakar, A. (2019). Pengembangan Instrumen Tes Fisika Berbasis Dimensi Pengetahuan Konseptual Dari Taksonomi Bloom Revisi. *Jurnal Pendidikan Fisika*, 8(2).
- Tanjung, Y. I. (2015). Pengaruh Konsep Accelerated Teaching Model Master Terhadap Hasil Belajar Fisika Siswa Di MAN 2 Model Medan. *Jurnal Ikatan Alumni Fisika*, 1(1), 35. <https://doi.org/10.24114/jiaf.v1i1.2695>
- Tanjung, Y. I., & Dwiana, Y. A. (2019). Pengembangan instrumen tes berbasis critical thinking skill pada materi gerak lurus. *Jurnal Inovasi Pendidikan Fisika (INPAFI)*, 7(4). <https://doi.org/10.24114/inpafi.v7i4.17081>

- Tanjung, Y. I., Lufri, L., Mufid, F., Andromeda, A., & Wulandari, T. (2023). Model dan Pengaruh Pembelajaran Berdiferensiasi Pada Pendidikan IPA: Tinjauan Literatur Sistematis. *Elementary School Journal Pgsd Fip Unimed*, 13(1), 68. <https://doi.org/10.24114/esjpgsd.v13i1.42751>
- Tanjung, Y. I., & Nasution, I. R. (2023). The Development of Creative Thinking Test Instruments with Torrance Indicators on Direct Current Electricity Materials. *Jurnal Pendidikan Fisika Indonesia*, 18(2), 134-143. <https://doi.org/10.15294/jpfi.v18i2.32117>
- Wallace, J., Howes, E., Funk, A., Krepski, S., Pincus, M., Sylvester, S., Tsoi, K., Tully, C., Sharif, R., & Swift, S. (2022). Stories That Teachers Tell: Exploring Culturally Responsive Science Teaching. *Education Sciences*, 12(6), 401. <https://doi.org/10.3390/educsci12060401>
- Yuan, T., & Jiang, H. (2019). Culturally Responsive Teaching for Children from Low-Income, Immigrant Families. *Young Exceptional Children*, 22(3), 150-161. <https://doi.org/10.1177/1096250618756897>
- Yurniwati, Y., & Soleh, D. A. (2020). The Effectiveness of Computer-Based Problem Solving to Improve Higher Order Thinking Skills on Prospective Teachers. *International Journal of Instruction*, 13(2), 393-406. <https://doi.org/10.29333/iji.2020.13227a>
- Yusop, N. M., Abdul Razak, K., & Hamzah, M. I. (2022). Differentiated Learning Practices in Teaching Sirah: A Study in Selangor and Negeri Sembilan Trust Schools. *International Journal of Academic Research in Business and Social Sciences*, 12(6). <https://doi.org/10.6007/IJARBSS/v12-i6/14218>